Projects in Implementation Since 1996–December 1999

Andersen Corporation

FINAL PROJECT AGREEMENT SIGNED JUNE 30, 1999

Background

The Project Sponsor: The Andersen Corporation is a leading manufacturer of durable, energy-efficient, high-performance, clad wood windows and patio doors. Andersen's main manufacturing plant is located in Bayport, Minnesota, along the St. Croix River, a federally designated "Wild and Scenic River," which forms a large portion of the border between Minnesota and Wisconsin. Existing manufacturing facilities are located on the 11-acre Fourth Street site, which consists of 78 buildings, most of which are interconnected. Andersen purchased an undeveloped 245-acre tract of land in 1994 that is located approximately one mile west of the Fourth Street manufacturing complex. This plot, which is referred to as the Andersen West Site, is intended to be used as an expansion site for various operations. Manufacturing and related processes at Andersen include wood cutting and milling, wood preservative application, painting, vinyl processing, adhesive operations, byproduct transfer, wood-fired boilers, assembly operations, technology development, production support, and maintenance functions.

The Experiment: The Andersen project will test an innovative experiment to reduce air emissions per unit of production. This reduction will be achieved by using performance-based regulatory approaches based on volatile organic compound (VOC) emissions per standard measure of production, referred to as the "performance ratio." While providing incentives for better performance, the performance ratio will essentially prevent a return to traditional solvent-based coating and wood-preservative processes, while allowing the company the flexibility to search for even greater efficiencies and emissions improvements. The company will be allowed to increase production levels without undergoing case-by-case reviews prompted by VOC emission changes, as long as its VOC emissions per unit of production remain below the performance ratio and its overall emissions remain below a facility-wide VOC cap.

The Flexibility: EPA and the Minnesota Pollution Control Agency (MPCA) agreed to develop both a site-specific rule under the Clean Air Act's (CAA) Prevention of Significant Deterioration (PSD) program and a streamlined Minnesota Project XL multimedia permit (Minnesota XL Permit). The Minnesota XL Permit will, to the extent possible, combine air, hazardous waste, and water discharge conditions at the Bayport Facility into one permit, and it will incorporate the Federal air permit as required by 40 CFR Part 70 for the Bayport Facility. The Minnesota XL Permit will be a consolidation of Andersen's various environmental obligations. It will contain the Clean Air Act Title V, minor New Source Review, and PSD permits, and it will be issued subject to public notice and comment and the opportunity for EPA review and public petition. During the permit's development, overlapping or conflicting conditions from existing permits will be combined or reconciled, as allowed by applicable requirements. The flexibility granted Andersen Corporation includes relief from specific applicable synthetic minor air emission limits with the condition that Andersen comply with the site-specific permit limits for particulate matter (PM) and VOCs. The new permit establishes emission caps for VOCs on a "per standard measure of production" basis and on a facility-wide basis and a facility-wide cap on particulate matter. This regulatory flexibility grants preapproval for emission increases that would otherwise require permit modification approval by the regulatory agency. The Minnesota XL Permit will, to the extent possible, reduce the administrative burden through simplified monitoring, reporting, and record keeping.

The Superior Environmental Performance: The project establishes an innovative, incentive-based per unit emission measure that should drive down Andersen's per unit emission of VOCs. In addition to the per unit measure, emission caps on VOCs and particulate matter ensure that the facility's overall emissions will not exceed those from normal operations. Andersen will be able to manufacture more of its windows from wood fiber and vinyl than in the past, reducing both its use of virgin materials and its air emissions. Andersen will also increase its reliance on low-solvent processes, further reducing air emissions at the facility.

Progress in Meeting Commitments
(As of July 2000)

Current activities are primarily focused on finalizing the permit, which is expected in Fall 2000. However, specific commitments have been targeted and are expected to be incorporated into the Andersen Minnesota XL permit.

Andersen

- Limit VOC emissions to 2,397 tons per year for the entire Bayport Facility, with a subcap of 96 tons per year for the Andersen West Site. (see Figure 1)
- Combine the existing diptank VOC synthetic minor limits into a single rolling average limit of 1,573.9 tons per year. (see Figure 1)
- Limit nonmilling PM emissions for the Bayport Facility to 209.1 tons per year, with a subcap of 96 tons per year (milling and nonmilling PM) for the Andersen West Site. (see Figure 2)
- Control all existing and future milling operations with best available control technology (BACT) (currently believed to be baghouse filters), and meet all PSD requirements for PM and particulate matter less than 10 microns (PM-10). Andersen will be allowed to modify or add VOC units and certain PM and PM-10 units as long as they remain below the caps established in the permit.
- Continue to control the door plant paintline emissions with a catalytic oxidizer until the company receives approval to discontinue the use of the control equipment from the MPCA.
- Ensure that any new or reconstructed paintline equipment does not emit at a rate greater than 4.5 pounds of VOCs per gallon of coating applied. (see Figure 3)
- Ensure that any new or reconstructed preservative application process does not emit VOCs at a rate greater than 2.0 pounds per gallon of preservative used. (see Figure 3)

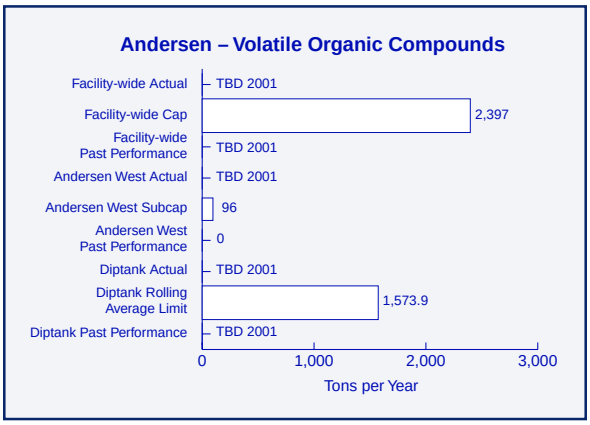


Figure 1

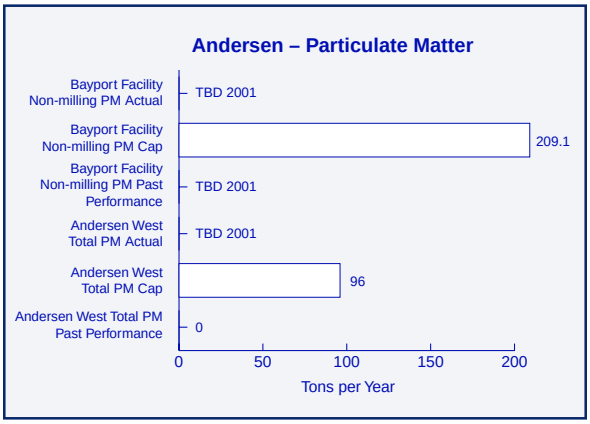


Figure 2

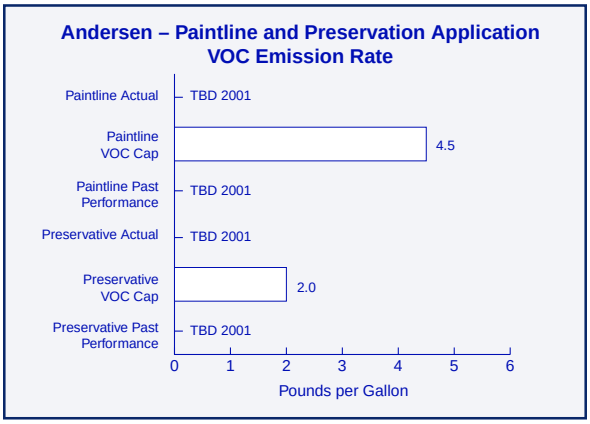


Figure 3

- Conduct a health risk analysis for toxic air emissions.
- Continue to investigate the possibility of recycling windows as feedstock for the Fibrex composite process, and present findings to EPA, the MPCA, Washington County, and the Community Advisory Committee (CAC) within two years of the effective date of the FPA.
- Attempt to cease operation of the west diptank within five years after the start of the project.
- Remove all hazardous waste from the west diptank within 90 days of permanent shutdown; remove all metal parts that have contacted the penta-containing wood preservative and recycle the material using a metal-smelting operation; provide verification acceptable to the MPCA that the parts were properly recycled.
- Finalize calculations to develop the performance ratio and implement the emissions caps.

MPCA

- Finalize and issue the Minnesota Project XL multimedia permit.

EPA

- Promulgate a final rule that will allow regulatory flexibility for this XL project.

Washington County

- Amend its hazardous waste management ordinance.

Benefits for Stakeholders

- Stakeholders can provide input on the project by participating in the CAC, a panel composed of community members established to address and participate in project development and implementation.
- CAC members can learn about Andersen's efforts to stay in compliance while accomplishing project objectives during Andersen's semi-annual compliance status presentations to the CAC.

Andersen continues to keep local residents informed of Project XL initiatives through a local newsletter, Internet postings, news media contacts, open houses, displays, and responses to community inquiries.

Issues Needing Resolution

- Certain stakeholders were concerned that Andersen was not accountable to the CAC, and that the CAC needed greater opportunity to develop overall goals of the stakeholder process.
- Certain stakeholders wished that their concerns not directly related to the XL project would have been more thoroughly addressed during the XL discussions.
- It has been difficult to adequately explain technical aspects of the project to CAC members.
- One stakeholder emphasized that the generally positive reception to the project by the CAC was mainly because the CAC membership was weighted in favor of Andersen supporters.
- MPCA prefers a more extensive role in developing and implementing XL projects.

Lessons Learned

- EPA noted that Andersen's ability to listen and react to community concerns helped make the stakeholder involvement effort a success.
- It is important for stakeholders to understand their roles in the stakeholder process.
- One stakeholder emphasized that the CAC's complete access to information was very important and led to a greater trust in the stakeholder process.
- EPA should have spent more time explaining to stakeholders the reasons its review process continually delayed project development.
- EPA decision makers must be well informed and prepared to participate in key decisions in order for projects to develop in an effective and timely manner.

- Face-to-face meetings appear to have been more effective than electronic and telephone communications.

- Furnishing participants with an outline and the goals of the project, a detailed time line, and description of what to expect from the stakeholder involvement process at the beginning of the project would have been valuable.

Information Resources

(1) *Project XL Stakeholder Involvement Evaluation—Final Draft Report*, May 2000; (2) focus group discussions in July/August 1999 with representatives of Andersen Corporation, Federal and state regulatory agencies, and representatives of the local community; (3) the December 1999 *XL Project Progress Report—Andersen Corporation* (100-R-00-016); and (4) Andersen Corporation: Project XL Final Project Agreement.

Atlantic Steel Redevelopment

PHASE ONE PROJECT AGREEMENT SIGNED APRIL 13, 1999
FINAL PROJECT AGREEMENT SIGNED SEPTEMBER 7, 1999

Background

The Project Sponsor: Started in 1979, Jacoby Development, Inc., is a privately held real estate company located in Atlanta, Georgia. It specializes in property development, financing, brokerage, leasing, and management. Jacoby has proposed redevelopment of a 138-acre former steel mill formerly owned by Atlantic Steel, located near Atlanta's central business district. The proposed redevelopment will be a mix of residential and business uses and will include a multimodal (cars, pedestrians, bicycles, mass transit) bridge that will both provide access to Interstates 75 and 85 and connect the site to a nearby Metropolitan Atlanta Rapid Transit Authority (MARTA) station.

The Experiment: The Atlantic Steel project will test whether "brownfield" redevelopment strategies can be applied to transportation projects, such that air quality and other environmental performance can be improved, as part of an overall community revitalization plan. The Atlanta region is currently not in compliance with the National Ambient Air Quality Standards (NAAQS) for ground-level ozone. Between January 1998 and July 2000, the Atlanta region was out of compliance with transportation conformity requirements under the Federal Clean Air Act (CAA) because it could not demonstrate that its transportation activities would not exacerbate its air quality problem. The CAA generally prohibits construction of new transportation projects that use Federal funds or require Federal approval in areas that are in a transportation conformity lapse. However, projects that are expected to provide an air quality benefit, called Transportation Control Measures (TCMs), can proceed even during a conformity lapse if they are in a Federally approved State Implementation Plan (SIP), which is used to address how the region will conform to the NAAQS. If the Atlantic Steel site is not redeveloped, the development planned for the site will occur at another site or sites in the Atlanta region. Alternate development will most likely occur in a greenfield area, thus promoting the spread of existing urban sprawl. The redevelopment of the Atlantic Steel site will encourage "smart growth" design principles such as pedestrian-friendly and transit-oriented access between centers of residential entertainment, cultural, employment, and recreational uses, thus reducing vehicular traffic and encouraging a neighborhood environment. EPA believes that the planned redevelopment of the Atlantic Steel site (including the bridge) will lead to less air pollution than an equivalent amount of development at other likely sites in the region.

The Flexibility: Under the Atlantic Steel project, EPA is considering the entire redevelopment project to be a TCM. A TCM is a transportation project that demonstrates an air quality benefit. TCM projects that are approved in the SIP are eligible for Federal funding and may gain Federal approval even in noncompliant areas. For the Atlantic Steel site to qualify as a TCM, EPA is offering flexibility in two areas. (1) EPA views the site's location, design transit linkage, and other transportation characterizations (e.g., provisions for bicyclists, participation in a transportation management association) together as the TCM. While the CAA lists several types of projects that can be TCMs, the statute does not limit TCMs to these measures. Specific types of TCMs listed in the CAA include projects that improve public transit, employer-based transportation management plans, projects that limit certain metropolitan areas to non-motorized and pedestrian use, and programs to provide both travel and storage facilities for bicycles. The plan for the Atlantic Steel redevelopment incorporates many elements that could be TCMs by themselves. For example, improved public transit, bicycle and pedestrian paths, and the requirement that employers at the site will join or form a transportation management association. EPA believes that the combination of these elements will have a positive effect on reducing emissions from single occupancy vehicles by encouraging the use of alternative modes of transportation. (2) This project is testing an innovative approach to determining the air quality benefit of the Atlantic Steel site redevelopment. EPA has modeled the site development's potential air quality benefit relative to an equivalent level of development at other sites in the region. This type

of comparison to support a TCM is available only to this particular redevelopment project through the Project XL process. The site's SIP-TCM designation is only possible because a 1998 study conducted by EPA's Urban and Economic Development Division, titled "Transportation and Environmental Impacts of Infill and Greenfield Development" demonstrated that the Atlantic Steel brownfield redevelopment (with its mixed-use and transit components) would generate a relative air quality benefit when compared to a similar development located some distance outside of the central business district, in a greenfield location. To analyze the transportation and air emissions impacts of locating new development at the Atlantic Steel site, EPA used modeling analysis to compare the site to three other possible locations for similar-scale development in the Atlanta region. EPA's evaluation of the site's impacts was driven by two facts: that Atlanta will continue to grow over the next 20 years and that without redeveloping the 138-acre Atlantic Steel site, more of this growth will occur in outlying areas. The analysis of regional transportation and air emissions impacts of the proposed Atlantic Steel development vis-a-vis likely alternative sites shows that absorbing a portion of Atlanta's future growth at the Atlantic Steel site would create less travel and fewer emissions than developing those alternative sites.

The Superior Environmental Performance: This project includes redeveloping the brownfields site; reducing vehicle miles traveled; accelerating cleanup of hazardous waste; using environmentally friendly building practices, building design, and transit linkages; conserving water and energy; and implementing other smart growth principles. Because of its design, use of existing transportation infrastructure, and location, redevelopment of the Atlantic Steel site can improve rather than exacerbate current air quality problems in the region.

Progress in Meeting Commitments

(As of July 2000)

- Prepared a detailed site plan incorporating recommendations by a town planning firm in February 1998.
- Obtained the approval of zoning conditions for the site by the Mayor of Atlanta in April 1998.
- Received approval of the site remediation plan from the Georgia Environmental Protection Division in December 1999.
- Deconstruction has been completed and the following materials has been recycled: metals, oxidized steel products, concrete, used oils, lead acid batteries, power transformers, and railroad cross-ties.
- EPA completed an Environmental Assessment for the project in compliance with the National Environmental Policy Act (NEPA) in August 2000.
- EPA is anticipated to complete its NEPA analysis by January 2001.
- EPA approved the SIP-TCM on August 16, 2000. The SIP-TCM will be effective September 27, 2000.
- Remediation and infrastructure improvement will continue through January 2001.
- Submitted and received approval of a concept report from the Georgia Department of Transportation for the construction of the 17th Street Bridge/Extension in March 2000.
- Jacoby selected URS Greiner Corporation as the 17th Street Bridge/Extension designer on August 24, 2000. The preliminary design phase is scheduled to begin immediately, and construction of the bridge is scheduled for July 2001 and is expected to require 18 months.

Benefits for the Environment

- Jacoby will reduce carbon monoxide and nitrogen oxides emissions by providing access to a mass transit system and local infrastructure, which will reduce the amount of vehicle miles traveled per individual relative to other sites.
- Jacoby has committed to install separate stormwater and sanitary systems to reduce or

eliminate the flow of pollutants from stormwater runoff to receiving waters. Additionally, stormwater controls will be employed to ensure that surface runoff leaving the site will receive some level of treatment prior to reaching the Chattahoochee River.

- Jacoby will implement strategies to prevent and minimize pollution by selecting construction materials and sustainable building technologies that minimize energy use.

- Jacoby will encourage Atlantic Steel to recycle and reuse the solid waste generated during the demolition of the existing structures on the property.

- Jacoby will comply with state laws and building codes that require all newly constructed properties to reduce water use.

Benefits for Stakeholders

- Stakeholders have been involved throughout the evolution of the project and have been encouraged to share their ideas and concerns through written comments and meetings open to the general public.

- Stakeholders are enabled to participate in the planning of a residential village incorporating "smart growth" design principles promoting pedestrian-friendly walkways, transit links, shopping, entertainment, office, recreation, and open park spaces.

- Stakeholder needs and values are an integral part of the 17th Street Bridge/Extension. URS Greiner will design a bridge that serves to accommodate various modes of transportation, the demands of the site, as well as an architecturally pleasing structure to all the users. The bridge is anticipated to include (1) two 11-foot-wide lanes in each direction for general use traffic; (2) two 16-foot-wide dedicated bicycle and transit lanes; and (3) a 24-foot-wide pedestrian park and thoroughfare, complete with elevated walkways, landscaping, and acrylic panels rather than metal fencing.

Benefits for the Project Sponsor

- Jacoby will be granted regulatory flexibility under Project XL by receiving approval of the redevelopment and its associated transportation projects as a TCM, a step taken to reduce vehicular emissions and improve air quality. In return, Jacoby is working to bring a contaminated site back to productive use, and in turn, examine whether the basis for considering the entire redevelopment project a TCM can leverage environmental benefits in air quality.

Issues Needing Resolution

- Major project milestones are slightly behind schedule. Due to minor setbacks, the construction of the 17th Street Bridge/Extension has been delayed for a year. Jacoby expects to remain on-track in meeting its scheduled commitments, however, and bridge construction is expected to begin in July 2001.

Lessons Learned

- Since the Atlantic Steel redevelopment project is still in its early stages, the principal lesson to be learned is whether smart growth strategies can be applied to brownfields and transportation projects, such that air quality and other environmental performance can be improved, as part of an overall community revitalization plan.

- A number of stakeholders were not satisfied with the stakeholder involvement process. They felt as though the process was unclear from the beginning, did not provide a sufficient forum for input, and was managed as a formality. To avoid this problem in the future, Jacoby will sponsor additional public meetings and encourage more direct stakeholder involvement.

Information Resources

The information in this summary was obtained from the following sources: (1) The February 15, 2000 Atlantic Steel XL Summary Report; (2) the September 7, 1999 Atlantic Steel FPA; (3) The De-

cember 1999 *XL Project Progress Report—Atlantic Steel Redevelopment* (EPA 100-R-00-014); (4) *Project XL Stakeholder Involvement Evaluation, Draft Final Report* (April 2000); (5) News articles from the Atlanta Journal Constitution: "Steely Determination: Green Light is Given for Design Work on 17th Street Bridge" (August 25, 2000), "Designer Sees 17th Street Bridge as Unique Gateway into Atlanta" (August 25, 2000), "Development Plan Falls into Place" (August 25, 2000); and (6) News article from Bizjournals.com/atlanta: "Designer Picked for 17th Street Bridge" (August 24, 2000).

Crompton Corporation Sistersville Facility (formerly Witco)

FINAL PROJECT AGREEMENT SIGNED OCTOBER 17, 1997

Background

The Project Sponsor: Crompton Corporation Sistersville Facility (formerly Witco) is a specialty chemical manufacturer. This project focuses on Crompton's chemical manufacturing plant located 6 miles south of Sistersville, West Virginia, where Crompton produces a broad range of silicone and silane products, including surfactants, emulsions, antifoams, and oils. The facility is located along the east side of the Ohio River in a rural setting near the border of Tyler and Pleasants Counties.

The Experiment: The Crompton project strives to reduce pollution through a combination of flexible air pollution control, waste minimization, and pollution prevention activities.

The Flexibility: EPA and the State of West Virginia have agreed to a deferral of Resource Conservation and Recovery Act (RCRA) organic air emission standards through a site-specific rule applicable to two Crompton surface impoundments. EPA is in the process of promulgating National Emission Standards for Hazardous Air Pollutants (NESHAPs) under the Clean Air Act (CAA). EPA plans to propose NESHAPs applicable to miscellaneous organic processes in the first quarter of 2001; this standard is called "the MON." Production activities at the Sistersville facility will be regulated under the MON. The MON is anticipated to require process vent controls similar to the vent incinerator installed by Crompton under the XL project. Therefore, the project will provide superior environmental performance only until the MON is in effect. The project provides for a reevaluation following the proposal of the MON. Crompton will prepare a project reevaluation report within 90 days following the close of the comment period for the new standards. If EPA, West Virginia, and other stakeholders agree to continue the project, the FPA will be amended to achieve superior environmental performance in a different way and to go beyond the MON requirements.

Other Innovations: (1) *Waste Minimization and Pollution Prevention:* Crompton committed to conducting a waste minimization/pollution prevention (WM/PP) study to identify opportunities for additional reductions in waste generated by the facility. (2) *Case-by-Case Deferrals:* EPA and West Virginia consider the WM/PP initiatives to be an important contribution to the superior environmental performance offered by the Crompton project. The applicability of the WM/PP initiatives could be limited if they are subject to the requirements proposed in CAA Subpart YYY. Subpart YYY, as proposed, applies to a process unit that generates wastewater and produces one or more of the listed chemicals listed as a product, co-product, byproduct, or intermediate product. CAA Subpart YYY would apply if Crompton begins recovering substances listed in the proposed CAA Subpart YYY. If Crompton starts recovering these substances, EPA and West Virginia will then consider issuing a limited scope "allowable exclusion/allowable increase" deferral of the regulations on a case-by-case basis. This deferral would be issued with the provision that EPA and West Virginia find that it will not cause an increase in actual emissions of volatile organic compounds or cause a net adverse environmental impact. Further, Crompton must remain in compliance with the provisions of the XL project. If such a deferral is granted, EPA and West Virginia will consider proposing regulations implementing the deferral.

The Superior Environmental Performance: Crompton will install a process vent incinerator that will destroy 98 percent by weight of "capper unit" air emissions, and Crompton will also recover an estimated 500,000 pounds of methanol per year from the facility's wastewater treatment unit.

Progress in Meeting Commitments

(As of July 2000)

- Crompton has met its commitment to purchase, install, test, and monitor a process vent incinerator on its methyl capper unit.
- Crompton has met its commitment to begin collection of methanol from the condenser unit.
- Crompton has met its commitment to conduct a WM/PP study, deliver a final report on the study, and implement the technically and economically feasible WM/PP opportunities identified in the study.
- Crompton has met the following environmental commitments:
  - Crompton has committed to reducing air emissions that are a byproduct of its operations at the Sistersville, West Virginia, facility. These byproducts (methyl chloride, dimethyl ether, and methanol emissions) are being collected and routed to a new vent incinerator installed on the capper unit. The vent incinerator was put into operation on April 1, 1998. In 1998, Crompton found that the oxidizer was reducing the total organics in the vent stream by 99.99 percent. This exceeded the 98 percent reduction required by the project. In 1998, air emissions from the methyl capper unit were reduced by 128,627 pounds per year, and air emissions from the wastewater treatment system were reduced by 51,368 pounds per year, for a total air emissions reduction of 179,995 pounds per year. In 1999, air emissions from the methyl capper unit were reduced by 199,104 pounds per year, and air emissions from the wastewater treatment system were reduced by 34,654 pounds per year, for a total air emissions reduction of 233,758 pounds per year. (see Figure 4)
  - Excess methanol produced in the methyl capper unit during the production of methyl-capped polyether was previously condensed, collected, and either disposed of in the facility's wastewater treatment unit

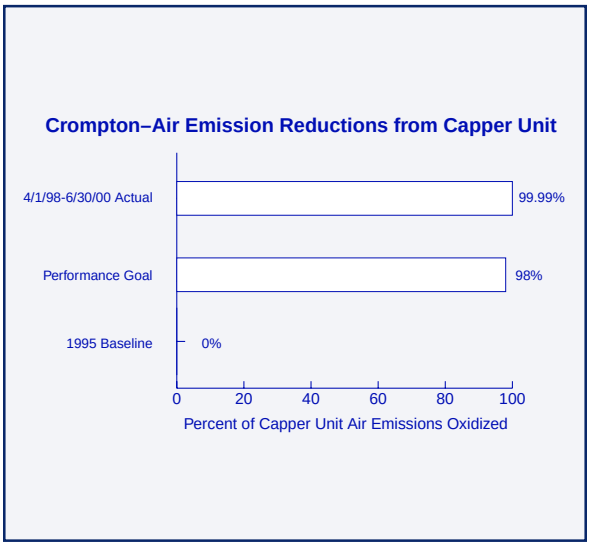


Figure 4

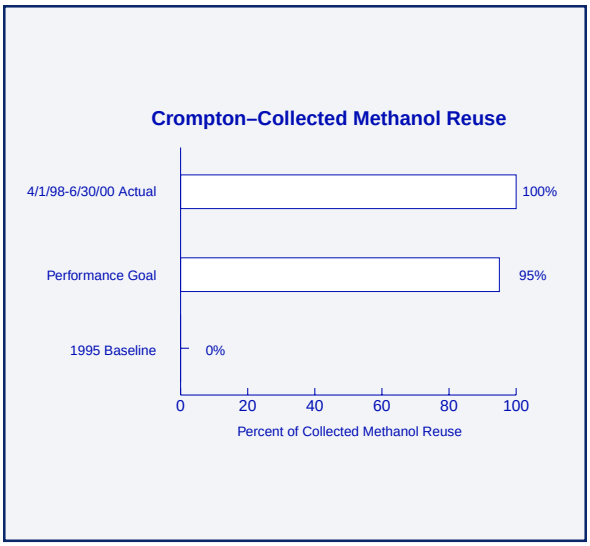


Figure 5

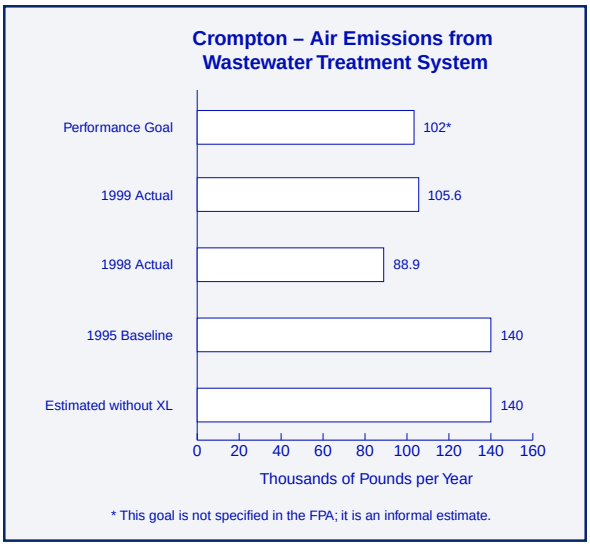


Figure 6

or incinerated. Under this project, Crompton agreed to reuse, recycle, or thermally treat a minimum of 95 percent of this collected methanol. This minimizes the biotreatment of methanol in the facility's wastewater treatment units. Crompton estimated that 500,000 pounds of methanol that otherwise would be treated in the wastewater system will be transferred to tank trucks or rail cars for reuse or recycling each year. In 1998 and 1999, Crompton reused 100 percent of the 852,774 pounds of methanol recovered by the capper unit (424,254 pounds in 1998 and 428,520 pounds in 1999), thus exceeding the 95 percent recycling goal. (see Figure 5)

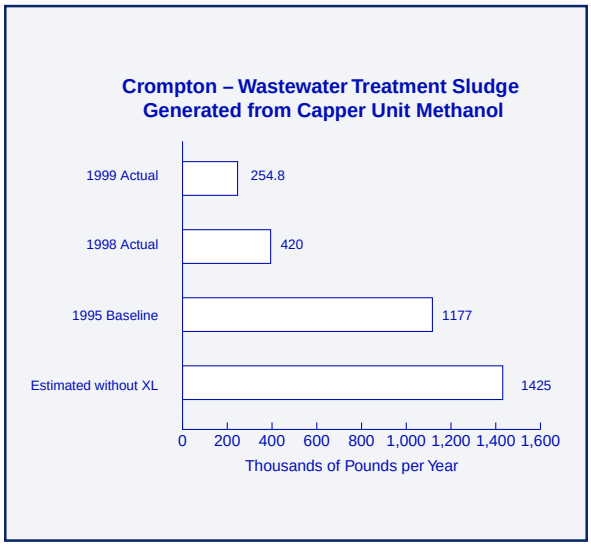


Figure 7

- Key focus areas for successful implementation of the FPA over the next six months include the third semiannual project report due January 31, 2001, the third annual project report due July 31, 2001, and the ongoing implementation of options identified in the WM/PP. EPA is expected to propose new MON standards in the first quarter of 2001. As per the FPA, Crompton will prepare a project reevaluation report within 90 days following the close of the comment period for the new standards. If EPA, West Virginia DEP, and other stakeholders agree to continue the project, the FPA will be amended to include new approaches to providing superior environmental performance.

Benefits for the Environment

- In 1998, Crompton reduced air emissions by 152,217 pounds, reduced wastewater treatment sludge by 542,783 pounds, and reused 424,254 pounds of methanol. (see Figures 6 and 7)

- In 1999, Crompton reduced air emissions by 205,350 pounds, reduced wastewater treatment sludge by 676,930 pounds, and reused 428,520 pounds of methanol. (see Figures 6 and 7)

- The final report of the WM/PP study states that of the 290 pollution prevention options identified, 19 have been deemed "not feasible," 87 "are feasible," and 184 still have their "feasi-

bility undetermined." The report includes 51 recent pollution prevention initiatives that are in various phases of implementation from "scoping" to "complete." The pollution prevention options that have already been determined to be technically and economically feasible are underway. To date, 370 pollution prevention options have been identified, of which 26 are at some stage of study and 67 have been implemented. The implemented "P2" opportunities have prevented a total of 2,943,921 pounds of waste and provided $1,010,000 of cost savings.

Crompton Corporation Sistersville Facility (formerly Witco) WM/PP Study Results* 1997-98 Capper Operations

Year Opportunity was Implemented	Recurring Wastes Prevented, Latest Estimates, lbs/yr	Recurring Cost Savings*, Latest Estimates, $/yr
Air Emissions and Sludge Reduction plus Methanol Recycle (Excludes capital savings from XL project) Actual for Calendar Year 1999	1,310,921	$16,000

Data presented are based upon information found in *Crompton Sistersville Plant Project XL Annual Report,* July 2000.

* Note that these savings do not consider the expense of implementing them. Hence net savings will be less. It is often difficult to assign that expense. For example, a totally new process unit may cost millions of dollars to construct. If that new process produces less waste, how much of the design and construction expense ought to be assigned to the P2 benefits? In the case of a process change being done explicitly for P2 reasons, the expense is more easily determined.

Crompton Corporation Sistersville Facility (formerly Witco) WM/PP Study Results*

Year Opportunity was Implemented	Number of New P2 Opportunities Implemented	Recurring Wastes Prevented, Latest Estimates, lbs/yr	Recurring Cost Savings*, Latest Estimates, $/yr
1997	10	376,000	$228,000
1998	11	111,000	$25,000
1999	32	930,000	$650,000
2000 Jan. – June	14	216,000	$381,000
Total	67	2,943,921	$1,010,000

Data presented are based upon information found in *Crompton Sistersville Plant Project XL Annual Report,* July 2000.

* Note that these savings do not consider the expense of implementing them. Hence net savings will be less. It is often difficult to assign that expense. For example, a totally new process unit may cost millions of dollars to construct. If that new process produces less waste, how much of the design and construction expense ought to be assigned to the P2 benefits? In the case of a process change being done explicitly for P2 reasons, the expense is more easily determined.

Benefits for Stakeholders

- A Sistersville Plant Project XL contact at the facility has been appointed to serve as a resource for the community, as well as to answer community inquiries about the XL project.
- Public files on the project have been established at both the Sistersville Public Library and the EPA Region 3 (Philadelphia) office.
- Crompton continues to keep stakeholders informed of project status by providing copies of semiannual and annual project reports.

Benefits for the Project Sponsor

- As a result of WM/PP efforts, Crompton saved $228,000 in 1997, $25,000 in 1998, $650,000 in 1999, $381,000 in the first half of 2000, and identified potential future cost savings of over $1 million per year.
- As a result of the RCRA deferral, Crompton expects future savings of about $700,000 over the life of the project.

Issues Needing Resolution

- Crompton incorporated a section into the WM/PP study that described regulatory barriers to implementing some of the study's findings, which will need to be addressed.
- Crompton needs to evaluate additional WM/PP opportunities identified in the study relative to other facility projects competing for capital funds.
- Federal and state agency stakeholders expressed interest in seeing greater participation in the XL project from the six surrounding communities. Currently only one community representative is involved in the project, but EPA and the West Virginia Department of Environmental Protection would like to see a minimum of one representative from each community.

Lessons Learned

- During the development of the FPA, project participants should:
  - Show more trust for each other.
  - Simplify the process.
  - Involve program offices early and throughout.
  - Meet face-to-face on a frequent basis.
  - Draft the legal implementation document and the FPA at the same time.
  - Keep the FPA simple; put the details in the legal implementation document.
  - Speed EPA Headquarters review times.
  - Work from drafted language; it is easier than discussing general concepts.
- EPA should encourage other project sponsors to include WM/PP studies in XL projects.
- One stakeholder noted that the key to community participation results from understanding local culture.
- Two community stakeholders noted that it would have been positive if EPA had interacted more with local officials earlier in the project.
- A company stakeholder emphasized that the Crompton XL project provided a means for EPA and Crompton to learn how to work together more effectively.
- For a variety of possible reasons, sometimes community residents simply will not participate in an XL project despite noteworthy efforts made by the project sponsor to encourage it.

Information Resources

The information in this summary comes from the following sources: (1) *Project XL Second Annual Report*, July 31, 2000; (2) *Project XL Stakeholder Involvement Evaluation—Final Draft Report*, May 2000; (3) the December 1999 *Project XL*

Progress Report—CK Witco Corporation (EPA 100-R-00-009); (4) the March 1999 *XL Project Progress Report—OSi Specialties* (EPA-100-F-99-009); (5) Witco's January 31, 1999, and July 30, 1999, reports; (6) focus group discussions in December 1998 with representatives of the Federal and state regulatory agencies, Witco, and public stakeholders involved in the project; and (7) the final report from Witco's WM/PP study dated December 1998.

Department of Defense: Elmendorf Air Force Base XL/ENVVEST[1] Project

FINAL PROJECT AGREEMENT SIGNED DECEMBER 15, 1999

Background

The Project Sponsor: Elmendorf Air Force Base (Elmendorf AFB) is located just north of Anchorage, the largest city in Alaska. Elmendorf AFB covers approximately 13,000 acres; it has more than 800 buildings, two runways, 150 miles of roads, and more than 7,500 personnel from all branches of the United States and Canadian armed forces. With civilian workers, retirees, and their families, the number of people associated with Elmendorf rises to nearly 25,000. The southern boundary of the base borders the Anchorage nonattainment area for carbon monoxide (CO) under the Clean Air Act (CAA) National Ambient Air Quality Standards. Elmendorf is not included in the nonattainment area, and therefore reductions in pollution levels for Elmendorf AFB are not required under Title V requirements, a national permit system that applies to major stationary sources of air pollution. Nevertheless, one of the goals of this project is emission reductions on the base, including CO emission reductions.

The Experiment: The Elmendorf AFB project aims to promote pollution prevention activities by using cost savings and paperwork reduction associated with simplified Title V requirements. Under the simplified requirements, the Elmendorf central heating and power plant (CH&PP) will be permitted as the base's only major stationary source, based on its emissions of nitrogen oxides (NO_x) and CO. The Alaska Department of Environmental Conservation (ADEC) will approve potential to emit (PTE) limits for the remaining sources. In total, these administrative changes are expected to result in savings of approximately $1.5 million over a six-year period. These savings will be invested in pollution prevention activities on base, with an emphasis on hazardous air contaminant (HAC) emission reduction. This XL/ENVVEST project will demonstrate the feasibility of alternative-fuel vehicles in the Anchorage area and reduce air pollution base-wide through pollution prevention at multiple minor sources.

The Flexibility: The XL/ENVVEST project will provide Elmendorf AFB with relief from ADEC's operating permit program for major stationary sources. The traditional Alaska operating permit program would treat the entire Elmendorf AFB installation as a single air contaminant emission source, with 106 sources of regulated contaminants addressed in its Title V permit. Under these circumstances, the costs of obtaining and maintaining a Title V permit would be substantial. Under this XL project, the Title V permit would apply to only a small segment of Elmendorf AFB, including one source that is a major stationary source, the CH&PP, and several others that are subject to new source performance standards. ADEC will establish PTE limits for the other sources at Elemendorf AFB to ensure that they are not considered major sources. To enable the regulatory changes under this XL/ENVVEST project, ADEC will work toward inclusion of the major source guidance for Elmendorf AFB into the Alaska Air Quality Control regulations.

Most of the flexibility provided by this project could have been obtained without Project XL through an August 2, 1996, policy guidance document entitled, *Major Source Determinations for Military Installations under the Air Toxics New Source Review, and Title V Operating Permit Programs for the Clean Air Act*, and with the imposition of PTE limits on Elmendorf AFB. However, by participating in this project, Elmendorf AFB obtains the flexibility to redirect money that would have

[1] As part of the Administration's reinvention initiative, EPA and the Department of Defense (DoD) signed a Memorandum of Agreement in 1995 that established how the two agencies would interact during implementation of DoD's Environmental Investment (ENVVEST) program. The ENVVEST program emphasizes regulatory compliance through pollution prevention and provides an alternative to prescriptive regulatory requirements through a performance based environmental management system designed to attain superior environmental results.

been spent on Title V costs into pollution prevention projects. Elmendorf AFB has agreed to invest the expected savings of $1.5 million into projects that will result in actual emission reductions. Without the XL/ENVVEST project, those programs probably would have not otherwise occurred.

The Superior Environmental Performance: Elmendorf AFB is committed to spending the savings derived from streamlining its environmental management costs on pollution prevention (P2) opportunities. A supplemental agreement setting forth the specific additional P2 opportunities to be implemented will be developed with the assistance of stakeholders.

Progress in Meeting Commitments

(As of August 2000)

- Elmendorf AFB is installing a compressed natural gas (CNG) fueling station, purchasing new CNG vehicles, and converting certain base fleet vehicles to be capable of using CNG as an alternative fuel.
- Elmendorf AFB began construction of the CNG fueling station in May 2000, with the ribbon-cutting scheduled for September 2000.
- Elmendorf AFB will convert the first set of five vehicles before the ribbon-cutting, with a total of 13 to 15 vehicle conversions expected before the end of the fiscal year.

Elmendorf AFB is considering the implementation of Clean Cam Technology Systems (CCTS). By replacing engine parts in diesel-powered engines, CCTS can dramatically reduce air emissions, including CO, NO_x, and particulate matter.

- Elmendorf AFB plans to install CCTS on at least one of the base's 86 generators to test the effectiveness of CCTS in the arctic climate, with an eye to using the technology if it proves appropriate.
- Elmendorf AFB has assembled a list of other feasible P2 opportunities available at the base, along with the estimated costs and environmental benefits of each opportunity.
- Elmendorf AFB has completed an Initial Progress Report, detailing progress in the CNG and HAC projects, as well as additional P2 projects under consideration.
- Elmendorf AFB is working with the ADEC to conduct an inventory of non-major sources and establish PTE limits.
- Elmendorf AFB expects to continue implementation of CNG vehicle conversion on base and procure additional dual-fuel vehicles and negotiate and select additional pollution prevention activities with stakeholders.

Benefits for the Environment

- The use of CNG-powered vehicles in place of gasoline-powered vehicles will contribute to reduced CO, NO_x, non-methane organic gases, particulate matter, and CO_2 emissions for Elmendorf. Vehicles will be tested before and after conversion to ensure that emissions are reduced.
- Elmendorf AFB has implemented a base-wide switch-over to high solids/low volatile organic compound paints where technically feasible. These paints have significantly lower levels of HAC solvents, such as toluene, xylene, and methyl ethyl ketone.
- Elmendorf AFB has purchased an automatic paint gun washer that recycles cleaning solvents otherwise released to the atmosphere.
- Elmendorf AFB has also purchased 12 new high-volume/low-pressure spray guns to reduce the amount of paint required per unit of coverage.

Benefits for the Stakeholders

- The use of CNG-powered vehicles at Elmendorf AFB will demonstrate to the general public that this level of technology is achievable and beneficial.
- Regular meetings of the Restoration Advisory Board inform community members of pollution prevention activities resulting from this project.

Benefits for the Project Sponsor

- Reduced administrative and regulatory costs associated with the management of Elmendorf AFB's Title V permit are resulting in the implementation of pollution prevention activities across the base.

- Elmendorf AFB is able to leverage the construction of a CNG fueling station on base for the acquisition of additional new CNG-capable vehicles.

Information Resources

The information in this summary comes from the following sources: (1) the Final Project Agreement for the Elmendorf AFB XL/ENVVEST project (December 1999); (2) supplementary proposal materials, and (3) the *Initial ENVVEST Progress Report* (March 24, 2000).

Department of Defense: Vandenberg Air Force Base XL/ENVVEST[2] Project

FINAL PROJECT AGREEMENT SIGNED NOVEMBER 3, 1997

Background

The Project Sponsor: The 30th Space Wing at Vandenberg Air Force Base (Vandenberg AFB) conducts and supports space and missile launches, operates the Western Test Range, and responds to worldwide military contingencies. Vandenberg AFB covers more than 98,000 acres and is the Air Force's third-largest installation. It is located in Santa Barbara County on the central coast of California, 150 miles northwest of Los Angeles.

The Experiment: Through this XL/ENVVEST project, Vandenberg AFB will use money to achieve superior environmental performance that otherwise would be spent complying with the administrative requirements of Title V of the Clean Air Act (CAA) — permitting, record keeping, monitoring, and training. Vandenberg AFB will apply advanced emission control technologies to stationary sources to reduce annual emissions of ozone precursors. In the first two years of the project, Vandenberg AFB focused on obtaining reductions from boilers, furnaces, and process heaters. Since then, Vandenberg AFB has focused on pollution prevention opportunities from a variety of other sources of ozone precursors, including internal combustion engines and solvent and surface coating applications. Details of the program are specified in an enforceable emission reduction plan prepared by Vandenberg AFB and in the annual and semiannual status reports prepared by Vandenberg AFB.

The Flexibility: Vandenberg AFB, like other military installations, differs from civilian or industrial stationary sources in that the base hosts and supports a unique and wide variety of functions and activities. These activities include residential housing, schools, recreational parks, wildlife reserves, shopping centers, industrial maintenance facilities, airfield operations, and various other mission-related activities. Therefore, Vandenberg AFB creates criteria pollutants normally associated with residential, commercial, and light industrial operations. Most of the stationary source ozone precursor emissions, primarily nitrogen oxides (NO_x), are generated by boilers, furnaces, process heaters, and internal combustion engines. For purposes of permitting under Title V of the Clean Air Act (CAA), EPA and the Santa Barbara County Pollution Control District (the District) historically have considered Vandenberg AFB and all of its individual emission units to be a single stationary source. However, Vandenberg AFB does not fit the single stationary source definition as generally applied to civilian or industrial sources. Vandenberg AFB, in cooperation with the District and EPA Region 9, determined that if the actual emissions that are used to make a major stationary source determination for the base could be reduced to minor source levels, then Vandenberg AFB would be eligible to comply with rules that entail significantly less of an administrative burden. Together, the District, EPA Region 9, and Vandenberg AFB applied EPA's "Guidance for Major Source Determinations at Military Installations under the Air Toxics, New Source Review, and Operating Permit Programs of the Clean Air Act" (memorandum issued on August 2, 1996, by John Seitz, Director of EPA's Office of Air Quality Planning and Standards) to group different base activities as separate stationary sources for purposes of Title V applicability only. This guidance states that certain personnel-related activities at military installations (e.g., base amenities like grocery stores, gas stations, housing,

[2] As part of the Administration's reinvention initiative, EPA and the Department of Defense (DoD) signed a Memorandum of Agreement in 1995 that established how the two agencies would interact during implementation of DoD's Environmental Investment (ENVVEST) program. The ENVVEST program emphasizes regulatory compliance through pollution prevention and provides an alternative to prescriptive regulatory requirements through a performance based environmental management system designed to attain superior environmental results.

theaters, shopping centers, etc.) may be considered not to be support facilities, and therefore can be considered separate sources. In addition, the District amended its regulations to exclude from its major source determination emissions that meet EPA's definition of "non-road engine," including equipment used for tactical support, infrastructure, and maintenance. The District's Rule 370, Potential to Emit—Limitations for Part 70 Sources, allows stationary sources that emit minor source levels of criteria pollutants to comply with Rule 370 requirements rather than having to obtain a Title V operating permit, thereby decreasing the permit administrative requirements for Vandenberg AFB.

The Superior Environmental Performance: Vandenberg AFB will improve the air quality of Santa Barbara County by using innovative technologies and pollution prevention to reduce annual emissions of ozone precursors by 10 tons or more by November 30, 2002.

Progress in Meeting Commitments
(As of July 2000)

- Vandenberg AFB met its commitments to (1) complete an initial assessment and cost feasibility study of emission reduction planning and permitting; (2) complete an evaluation of 29 preselected candidate boilers to determine their feasibility for retrofit or replacement with low-NO_x technology; (3) implement the boiler retrofit and replacement program; (4) submit a Rule 1301 emission reduction plan to the District; (5) implement a program to reduce emissions from solvents, surface coatings, and other sources of volatile organic compounds (VOCs); (6) implement a program to reduce mobile source emissions of VOCs by replacing cars and trucks with electronic vehicles (EVs); and (7) prepare progress reports every six months.

- Vandenberg AFB committed to reducing annual emissions of ozone precursors (NO_x and VOCs) by 2 tons per year by April 30, 2000, and by 10 tons per year or more by November 30, 2002. As of April 2000, Vandenberg AFB had achieved 2.29 tons of emissions reductions through implementation of the boiler retrofit and

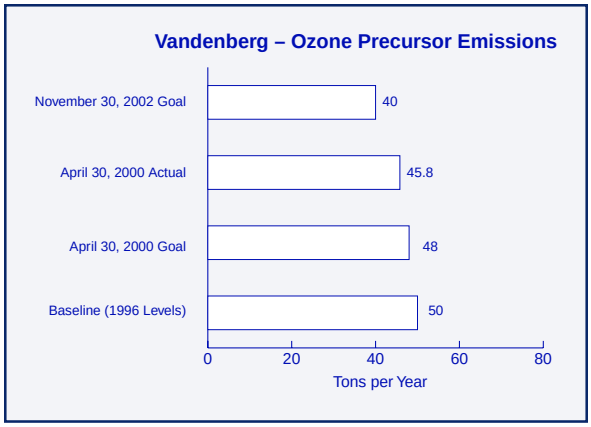


Figure 8

replacement program. An additional 1.92 tons of emissions had been reduced by April 2000 through the implementation of zero-VOC paint and coating substitution (1.27 tons of VOC emissions), paint booth consolidation (0.50 tons of VOC emissions), and construction of a wastewater reclamation system adjacent to a satellite launch facility (0.15 tons of NO_x and VOC emissions). When these 1.92 tons of emissions are combined with the 2.29 tons of emissions reductions achieved through implementation of the boiler retrofit and replacement program, this results in a total of 4.21 tons of real and quantifiable emission reduction credits. (see Figure 8)

- However, only the boiler retrofit and replacement program emission reductions are considered surplus, sustainable, and therefore, enforceable for purposes of the ENVVEST Program. Realizing this, Vandenberg AFB re-evaluated the technical approach and implemented economically viable and sustainable initiatives and found that the goals of the program would not be achieved with the remaining budget and milestone schedule. Therefore, on August 25, 1999, Vandenberg AFB presented an alternative proposal to purchase 12 tons of registered NO_x emission reduction credits (ERCs) from another source located in Santa Barbara County. The application of these 12 tons of purchased ERCs, combined with the 4.21 tons of emissions achieved thus far would result in a total of 16.21 tons of emissions reductions achieved within the air basin. Vandenberg AFB proposes to apply the purchased ERCs to ENVVEST to fulfill the program's 10-ton reduction goal. After that milestone has been achieved, the balance of ENVVEST program funds (approximately $1,000,000) would be used to implement the Mobile Source Reduction Measures at Vandenberg AFB.

The key focus areas for continued successful implementation of the FPA over the next six months will be the following:

- Continue stakeholder meetings.
- Prepare the next XL/ENVVEST project semi-annual progress report for October 2000.
- Negotiate an agreement on Vandenberg AFB's alternative proposal to achieve Milestone # 5.
- Continue implementing the EV loaner program to help evaluate the applicability of EVs.
- Install the necessary infrastructure to support the procurement of a larger-scale pilot fleet of 25 EVs during fiscal year 2000.
- Expand the EV Pilot Program to the extent practical with the availability of ENVVEST Program funds identified in the FPA through fiscal year 2001.

Benefits for the Environment

- Emissions of the ozone precursor, NO_x, have been reduced by retrofitting or replacing those boilers with the highest potential for emission reductions.
- Emissions of the ozone precursors, VOCs, have been reduced by zero-VOC paint and coating substitution, paint booth consolidation, and construction of a wastewater reclamation system adjacent to a satellite launch facility.
- Reduction of ozone precursor emissions may help to prevent Santa Barbara County from being reclassified as an ozone nonattainment area.

Benefits for Stakeholders

- Stakeholders have access to progress reports from the base and will be invited to public meetings.
- Vandenberg AFB personnel conduct briefings on a quarterly basis with the Vandenberg Citizens Advisory Board (CAB) and the Community Advisory Council (CAC), a panel consisting of citizens appointed by the Santa Barbara County Air Pollution Control District board members.

Benefits for the Project Sponsor

- Vandenberg AFB will be able to use resources that otherwise would be spent complying with the administrative requirements of CAA Title V to upgrade combustion technologies to newer, low-NO_x emission technologies.

- Contingent upon meeting the milestones of the FPA and reducing annual emissions of ozone precursors by at least 10 tons by November 30, 2002, Vandenberg AFB will be classified as a minor stationary source rather than a major stationary source for purposes of CAA Title V. This will result in much less future administrative work (reporting, monitoring, record keeping, training) for the base.

- Vandenberg AFB negotiated a protocol for source testing and validation with the District that is cheaper ($600 per test) than the standard EPA test ($3,000 per test).

Issues Needing Resolution

- As of January 1999, the identification of 10 tons of emission reductions was behind schedule. After further evaluation and research for emission reduction opportunities from stationary sources, Vandenberg AFB calculated that this goal would not be achieved with the remaining budget and milestone schedule. Therefore, on August 25, 1999, Vandenberg AFB presented an alternative proposal to meet this goal, which includes the purchase of 12 tons of ERCs from another source with the balance of ENVVEST program funds to be applied to Vandenberg AFB's Mobile Source Reduction Program.

- Vandenberg AFB is updating the original emissions reduction plan submitted to the District pursuant to the first FPA milestone requirement. The original plan was partially approved by the District on February 28, 1998. This plan is being updated to reflect inclusion of the alternative implementation strategy and will be submitted to the District in the summer of 2000. The purchased ERCs will be applied to the fifth program milestone. Upon receipt of the updated emission reduction plan, the District shall be asked to review, approve, and forward the plan to EPA Region 9 for inclusion in the State Implementation Plan (SIP) for the purpose of fulfilling ENVVEST Program goals. As of August 2000, EPA Region 9 is awaiting submittal of an updated emission reduction plan for review. The review and SIP approval process could take several months.

- Overall EPA, participating Vandenberg AFB personnel, and board members of both the CAB and CAC were satisfied with the process leading up to the signing of the FPA. However, CAB and CAC board members expressed interest in seeing greater opportunities for citizen involvement.

- During FPA development, EPA was concerned about the heavy reliance on preexisting Vandenberg community boards, which possibly precluded participation of citizens not associated with the base or county agencies.

- One stakeholder expressed a desire to see an increased level of communications between stakeholders as well as more lead time for stakeholders to consider ideas and proposals affecting the project.

- Due to staff shortages in EPA Region 9, there has been decreased amount of stakeholder communication and facilitation activities undertaken by the Region for this project.

Lessons Learned

- From the DoD perspective, the cost of developing the project was very high, and may ultimately outweigh the benefits. This happened, in part, because this was the first XL/ENVVEST project.

- Since Vandenberg AFB's pollution prevention manager had to spend most of his time on XL/ENVVEST during the first 18 months of the project, there were other pollution prevention opportunities the base could not pursue.

- Even though the project is designed to significantly reduce, if not eliminate, the possibility of citizen lawsuits, the potential for them created anxiety among those in DoD wanting to try innovative approaches.

- The FPA negotiation process needs to be streamlined. The involvement of too many people slowed negotiations, and the DoD chain of command is long. Support from EPA and DoD Headquarters offices is important during negotiations.

- Participants need to know early in the negotiation process their roles and responsibilities and understand which regulations cannot be changed.

- Active support from EPA Headquarters is needed throughout implementation.

- The project probably could not have happened without the EPA/DoD Memorandum of Agreement.

- The FPA allows for continued flexibility during project implementation, which will help in overcoming obstacles.

- True research and development is costly and time consuming.

- There is a perception by many other DoD installations that the ENVVEST program is a tool for avoiding Title V requirements, though this is not the case.

- EPA and DoD have different approaches to, and definitions of, stakeholder involvement.

- The concept of Federal facilities broadening community involvement beyond cleanup and restoration is worthwhile.

- The different public stakeholder advisory board members felt the stakeholder involvement process was a success. Overall, they felt that the issues were reasonably straightforward and that the project as a whole did not require their intense review.

- Early on, one environmental group expressed concerns about the proposed elimination of the facility's Title V major source status. The group was soon after satisfied with Vandenberg AFB's response to the questions and concerns raised and decided not to participate further in the project.

- Vandenberg's positive reputation in the community may have reduced nearby community members' interest in the project.

Information Resources

The information in this summary comes from the following sources: (1) *Project XL Stakeholder Involvement Evaluation—Final Draft Report*, May 2000; (2) focus group discussions in January 2000 with representatives of the Federal and local regulatory agencies, Vandenberg AFB, and TetraTech, Inc., a contractor for Vandenberg; (3) the March 1999 *XL Project Progress Report—Vandenberg Air Force Base—ENVVEST* March 1999 (EPA-100-F-99-008); (4) the December 1999 *XL Project Progress Report—Vandenberg Air Force Base—ENVVEST* (EPA-100-R-00-007); (5) focus group discussions in January 1999 with representatives of EPA, DoD, the "District," and Vandenberg AFB; (6) interviews with members of the CAB and a CAC about the stakeholder process; and (7) annual and semiannual status reports prepared by Vandenberg AFB.

ExxonMobil Corporation

FINAL PROJECT AGREEMENT SIGNED MAY 25, 1999

Background

The Project Sponsor: Exxon Company USA, now known as ExxonMobil Corporation (ExxonMobil), is responsible for all domestic oil and gas operations in 12 states, the Gulf of Mexico, and the Pacific Ocean off southern California and Alaska. The Sharon Steel Fairmont Coke Works Superfund Site, located in Fairmont, West Virginia, was placed on the EPA's National Priorities List (NPL) on December 23, 1996. ExxonMobil is the only potentially responsible party (PRP) working with EPA and the West Virginia Division of Environmental Protection under an Administrative Order on Consent to address environmental concerns at this site. ExxonMobil is the first XL project related to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), also known as Superfund.

The Experiment: To facilitate and increase the likelihood that interested developers will use the site after cleanup for commercial or industrial development, ExxonMobil proposes to (1) demolish buildings on-site without a finding of environmental risk, (2) engage the services of redevelopment consultants and companies to determine how best to make the site most amenable to development, and (3) work with local stakeholders to identify redevelopment options by preparing, among other things, a "potential for redevelopment" site assessment, an environmental assessment of the property, and a real estate market overview of the site with market options. ExxonMobil has used innovative stakeholder involvement techniques such as public availability sessions to explain project plans and obtain input on future site uses. This project has received a high degree of local community support. In addition, ExxonMobil will use Superfund "non-time critical" removal authorities to accelerate the cleanup of the site. Changes to the traditional Superfund process will be made, affecting (1) the site characterization and cleanup, (2) the risk assessment procedures, (3) the management of on-site landfills, (4) the mitigation requirements onsite for EPA-created wetlands, (5) the stakeholder and community involvement process, (6) the reduction of paperwork requirements, and (7) the quality assurance process. With these changes, this project strives to demonstrate a streamlined Superfund process that results in the reduction of potential risk to human health and the environment in a shorter time frame.

The Flexibility: Superfund sites are typically approached in a phased process. After a site has been listed on the NPL, a remedial investigation/feasibility study (RI/FS) is conducted at the site to assess risk and evaluate alternative technologies for remediation. The RI/FS culminates in a record of decision (ROD), which outlines the actions to be taken and documents the rationale behind the decision to take action at the site. Subsequently, the remedial design (RD) phase determines the specifications for cleanup actions that are implemented during the remedial action (RA) phase. These phases involve the submittal and approval of various documents and public comment periods. It is not uncommon for this process to require several years. Another cleanup approach in the Superfund program is the removal action, which can be completed in significantly less time. ExxonMobil has proposed to conduct the cleanup of this Superfund site as a series of short removal actions. An RI/FS and ROD are not required for a removal action. EPA and the State of West Virginia will provide ExxonMobil with flexibility regarding (1) the use of streamlined removal processes in order to expedite cleanup actions at the site, (2) the mitigation processes for wetlands created by EPA during previous removal actions, (3) the data validation reporting requirements, and (4) the risk assessment criteria and analyses. Long-term remediation will occur if deemed necessary. This flexible approach is expected to reduce the time and cost needed to complete the cleanup.

The Superior Environmental Performance: ExxonMobil will clean up the site in approximately half the time a normal cleanup would take, which will reduce the exposure time period and expedite risk reduction to human health and the environment. In addition, ExxonMobil is focusing on the future use of the site and will incorporate the redevelop-

ment strategy into site remediation. ExxonMobil will continue to work actively to ensure and maintain involvement of key stakeholders and the general public during the site cleanup. ExxonMobil will directly fund the State of West Virginia's involvement in the project and will work with the Fairmont Community Liaison Panel and EPA in every stage of the cleanup process.

Progress in Meeting Commitments

(As of July 2000)

- ExxonMobil has demolished most of the buildings and structures on-site.
- Completed in Spring of 2000, ExxonMobil conducted an Engineering Evaluation/Cost Analysis of proposed removal actions at the waste management areas located on the western portion of the site.
- In June 2000, EPA outlined the non-time critical removal workplan in an Action Memorandum. ExxonMobil has begun the removal action.
- Wetlands in the area have been surveyed and evaluated. EPA has determined that the wetlands are part of existing drainage systems; therefore, mitigation will not be required. However, during remediation, these areas may need to be graded to improve drainage.
- Market valuation of the property has been completed to facilitate redevelopment.
- The focus over the next six months will be to complete the non-time critical removal action at the western portion of the site and to begin work on the second engineering evaluation/cost analysis (EE/CA) to assess the risks at the eastern process area. In addition, the stakeholders will continue to hold meetings approximately every month.

Benefits for the Environment

- Due to the streamlined XL experiment, the risks to human health and the environment at this Superfund site are expected to be addressed in half the time.
- In addition, deed restrictions have been placed on the property to ensure that future activities do not result in exposure to unacceptable levels of risk.

Benefits to Project Sponsor

- Reporting requirements have been reduced, and stakeholders have relied on electronic communication, which expedites review of decision documents.
- The streamlined process will result in a shorter cleanup time and will possibly result in long-term cost savings. In addition, the sooner the cleanup is completed, the sooner investors may purchase and redevelop the property.

Benefits for Stakeholders

- This XL project provides environmental benefits to the community that are not typical for Superfund sites, such as demolishing on-site structures to facilitate redevelopment. The stakeholders hope that such aesthetic improvements will spur investor interest in the site.
- Stakeholders have the opportunity to influence the implementation of the project by participation in a 25-person advisory panel that meets monthly to discuss the project, thereby invoking a sense of trust and respect among stakeholders.
- Citizens can also discuss concerns directly with ExxonMobil by using ExxonMobil's toll-free project hotline set up explicitly for the community.
- Citizens were given a unique opportunity early on in the project to provide input into matters such as the future use of the property, on-site demolition of buildings, and the site cleanup process.

Issues Needing Resolution

- EPA had difficulty obtaining agreement from its internal enforcement offices during the development of the FPA. Internally, EPA must

be able to balance the priorities of the XL program offices with the priorities of the enforcement office.

- Some of the environmental reporting requirements are seen as excessively burdensome and could be streamlined. EPA has since suspended the quarterly status reports because the minutes from the monthly stakeholder meetings provide sufficient information.
- One stakeholder noted that the required environmental reports do not keep up with the actual work taking place and therefore cannot serve as EPA enforcement records.
- Inability to determine whether a nearby artificial wetland can legally be removed has caused delays.
- One stakeholder emphasized the need to ensure that the stakeholder group more accurately reflects a cross-section of the community.

Lessons Learned

- Hosting more than one public meeting to identify stakeholders and technical experts would have been useful.
- The community gained confidence in ExxonMobil through its willingness to interact with the community. The quick, candid dialogue with the stakeholder panel facilitated this trust.
- Certain stakeholders felt that more time should have been spent at the beginning of the project to clarify the roles of the stakeholders participating in the process.
- It can be difficult to identify all parties and the decision maker for each party wishing to participate.
- One stakeholder noted that if agreement is reached regarding what the contaminated site will be used for before or during the site investigation and removal stages, the amount of time needed for the removal and remediation process can be reduced.
- Projects can run more smoothly and efficiently with organized stakeholder involvement.
- One stakeholder emphasized the need to have buy-in from all major parties before moving further into the stakeholder process.
- Another stakeholder emphasized the value of having experts from different agencies involved to enable the community to better understand the different issues.
- Electronic reporting provides real-time communication and expedites review.

Information Sources

The information in this summary comes from the following sources: (1) the Final Project Agreement for the ExxonMobil XL project; (2) *Project XL Stakeholder Involvement Evaluation—Final Draft Report*, May 2000; (3) focus group discussions in December 1999 with representatives of ExxonMobil Corporation, Federal and state regulatory agencies, and representatives of the local community; and (4) the December 1999 *Project XL Progress Report Exxon Company USA* (EPA 100-R-00-015).

HADCO Corporation

FINAL PROJECT AGREEMENT SIGNED OCTOBER 2, 1997

Background

The Project Sponsor: The HADCO Corporation, headquartered in Salem, New Hampshire, is a leading manufacturer of printed wiring boards (PWB) and electronic interconnection products. Founded in 1966 as a three-person operation in Cambridge, Massachusetts, HADCO has grown to employ more than 8,000 employees in the United States and Malaysia. Three HADCO facilities currently are involved in the project: Owego, New York; Derry, New Hampshire; and Hudson, New Hampshire.

The Experiment: The HADCO project is examining whether valuable copper metals can be recovered more safely and cost effectively through direct reuse by a primary metals smelter rather than through following the current requirement to first ship copper sludge wastes long distances to intermediate processors. EPA will be able to develop a framework to address the potential transferability of this type of regulatory flexibility to other PWB manufacturers.

The Flexibility: To improve recycling and reduce risks to the surrounding communities, EPA, the State of New York, and the State of New Hampshire are offering flexibility in solid waste disposal from three HADCO facilities. Testing of the facilities' sludge from wastes from electroplating processes indicate that these sludges have a high concentration of several valuable metals, especially copper, and relatively low toxicity in comparison to typical electroplating sludges. New Hampshire has determined that the sludge is eligible for a solid waste variance or a conditional delisting. New York has determined that the sludge is eligible for a solid waste variance. If petitions from the facilities for a variance or delisting are approved, the sludges will not have to be sent to a pretreatment facility prior to recycling.

The Superior Environmental Performance: HADCO has committed to using all savings realized from this project to expand its pollution prevention and recycling programs. HADCO has also committed to recycling copper dust, which is another byproduct of its operations, and to examining the potential of installing sludge dryers to reduce the volume of sludge wastes.

Progress in Meeting Commitments

(As of July 2000)

- HADCO met its commitments to submit samples of its sludge waste for analysis.

- HADCO filed a petition seeking a conditional delisting in the State of New Hampshire, but this process is not complete. In order achieve delisting eligibility, HADCO is required to obtain information from other printed wiring board manufacturers located in New Hampshire and New York concerning the potential transferability of the project. HADCO has committed all of its expected project savings to the reclamation of its copper dusts, through pollution prevention methods, or overall reduction of amounts of waste produced. Additionally, HADCO will verify the environmental benefits attributable to dust reclamation or pollution prevention implementation. HADCO will record its progress in instituting these activities and submit a petition for delisting (FPA paragraphs 28 and 29).

- The New York facility filed for a solid waste variance in the State of New York on September 28, 1999. Once issued by New York State Department of Environmental Conservation, HADCO will begin to recycle its F006 sludge at primary metals smelters or other metal reclamation facilities in hopes that through direct recycling, additional environmental benefits will follow.

- HADCO provided baseline data regarding its voluntary effort to reduce air emissions associated with both direct recycling of F006 sludge and the reduction in the numbers of sludge shipments to processing facilities in its annual report submitted to EPA on January 7, 2000. The report contains data concerning the number of sludge shipments from both the New York and New Hampshire facilities. The Owego, New York facility has had a sludge dryer in operation since mid 1995. A decrease in sludge shipments from the Owego facility has not been apparent, however, due to an overall increase in production as well as relocation/construction activities at the plant that put the dryer out

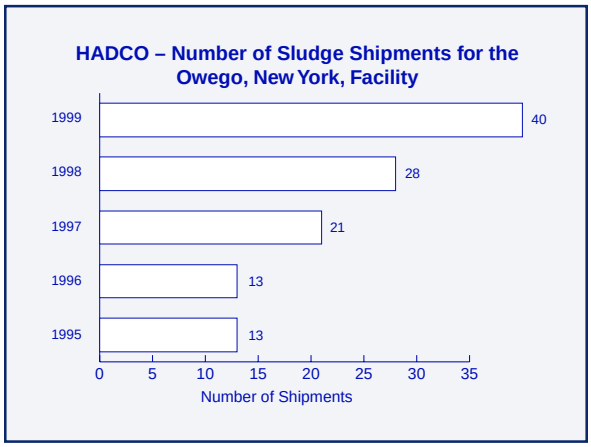


Figure 9

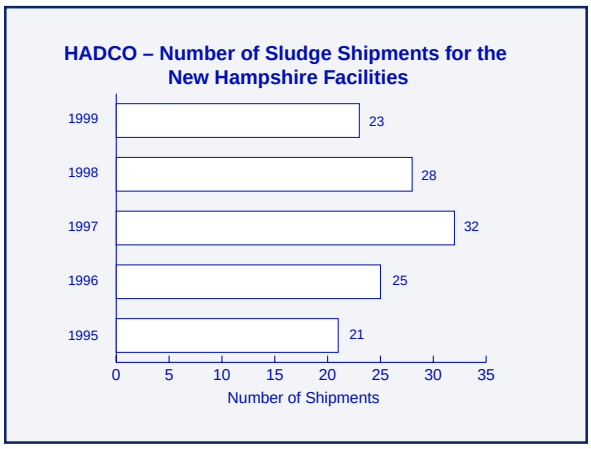


Figure 10

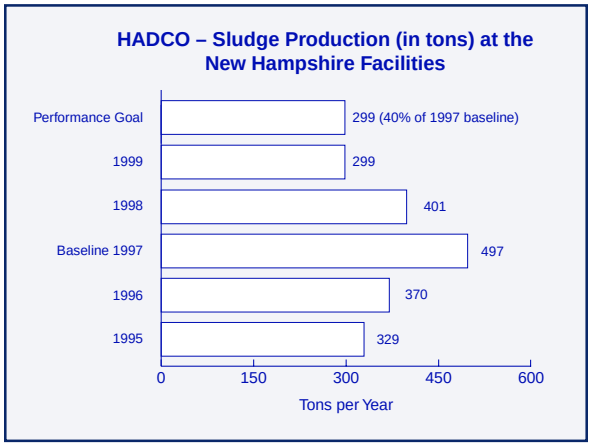


Figure 11

of service from September 1998 through June 1999. After regulatory relief is provided, data from the Derry, New Hampshire, facility will be used to determine if the installation of sludge dryers is economically feasible for each of HADCO's facilities. (see Figures 9 and 10)

- HADCO has submitted to EPA and the states the details of the company's contracts with smelters that can accept the sludge for recycling.
- Once HADCO has the conditional delisting, the solid waste variance, and the appropriate contracts in place, the company will follow through on the following environmental commitments:
  - Cost savings resulting from reduced transportation or recycling under the project will be used to increase copper reclamation activities at the HADCO facilities.
  - HADCO has voluntarily committed to examining ways its New Hampshire facilities may be able to use sludge dryers in order to reduce the quantity of sludge transported. The New York facility currently is operating with a sludge dryer. Prior to this project, HADCO installed one sludge dryer in the Derry facility. Once delisting is granted, the goal is to reduce the sludge from the New Hampshire facilities by 40 percent from the 1997 baseline. HADCO expects cost savings due to the reduction of the number of sludge shipments to processing facilities. HADCO will begin the installation of additional sludge dryers in each of its facilities if it determines that the sludge dryers are technically and economically feasible. HADCO also has committed to minimizing and reclaiming copper drilling, sawing, and edging. The company will begin to reclaim copper dusts and evaluate additional pollution prevention or technology improvements within eight months of the date that each facility is granted regulatory flexibility. (see Figure 11)
- The company will be increasing its current level of stakeholder communication through mailings and inviting stakeholders to visit and tour the facilities.

Benefits for the Environment

- HADCO may reduce mobile source air emissions associated with waste disposal.
- HADCO has improved its pollution prevention efforts by voluntarily installing a sludge dryer in its Derry, New Hampshire, facility, which reduced the quantity of electroplating sludge shipped offsite by 16,000 pounds.
- HADCO will use 100 percent of the cost savings to reclaim non-RCRA regulated copper dusts.

Benefits for Stakeholders

- Stakeholders are able to gain more knowledge about the PWB industry and facility operations.

Benefits for the Project Sponsor

- HADCO has experienced cost savings from reducing the number of sludge shipments due to the sludge dryer's implementation and use.
- HADCO expects to see cost savings associated with sending the sludge directly to a recycler instead of an intermediate processor. The XL project will reduce HADCO's Toxic Release Inventory off-site releases by recycling much of its copper dust wastes, which were formerly sent to a landfill.

Issues Needing Resolution

- HADCO must improve communications with its stakeholders by providing them with information on the sludge tests and analyses.
- Although the delisting process has been delegated to the regions, regional staff will continue to need the expertise of Headquarters delisting staff during the implementation of the HADCO project.
- Putting contracts in place between HADCO and appropriate metal smelters is taking longer, and is more complex, than anticipated. Waste processors and metal smelters seem to be part of a horizontally integrated market, leading to delays in HADCO obtaining the new contracts necessary to implement the project.

Lessons Learned

- Data collection has taken more time than anticipated.
- Clear project goals outlined in a preproposal phase will provide for a smoother negotiation process and shorten the time spent on developing the FPA.
- Clear lines of communication and a decision-making process should be established early on in the negotiations and should be understood and accepted by all project participants.
- Stakeholder outreach and education should be as extensive as possible to attract stakeholders and ensure their continued participation.
- The project structure should have been planned in more detail to ensure that complete interaction was achieved between all parties. Since the project involves multiple jurisdictions—two states, two EPA regions, and EPA Headquarters—some participants felt as though their necessary level of involvements was not always appropriate.
- Stakeholders want more resources (e.g., paid travel) in order to be better involved and more knowledgeable about the different facilities involved.
- The use of communications technology, such as teleconferencing, is a valuable asset for a project that may involve multiple facilities in different locations and may serve to increase involvement of private citizens.
- EPA Headquarters' knowledge of RCRA waste regulations was important to project negotiations and will continue to be important during project implementation.
- Involvement of EPA's upper management can help move negotiations along and can improve the decision-making processes.
- Building consensus among the involved EPA offices at critical junctures of a project must be effectively facilitated by EPA Headquarters to sustain project momentum.

Information Sources

The information in this summary comes from the following sources: (1) the December 1999 *XL Project Progress Report—HADCO Corporation* (EPA-100-R-00-008); (2) HADCO Corporation—Annual Report January 2000; and (3) focus group discussions in January 1999 with representatives of the Federal and state regulatory agencies, HADCO Corporation, and stakeholders involved in the project.

Intel Corporation

FINAL PROJECT AGREEMENT SIGNED NOVEMBER 19, 1996

Background

The Project Sponsor: Intel Corporation (Intel), the world's largest semiconductor manufacturer, has operated the 720-acre Ocotillo site in Chandler, Arizona, since 1996. The largest facility on the site, FAB12, is the company's newest chip fabrication facility. Intel's Project XL agreement applies to the entire Ocotillo site, including any new semiconductor-related facilities that may be built at the site. In the highly competitive semiconductor industry, success is directly related to a manufacturer's ability to bring new technologies to the marketplace quickly.

The Experiment: The Intel project's goal is to implement an Environmental Management Master Plan that includes a facility-wide cap on air emissions to replace individual permit limits for different air emission sources. The Intel project provides a test case for two innovations for improving air permitting: the elimination of case-by-case review of specific manufacturing process changes, if emissions remain under a capped amount, and preapproval of a major plant expansion, if emissions remain below a capped amount for the entire site.

The Flexibility: EPA, the State of Arizona, and the Maricopa County Environmental Services Department have revised Intel's air quality permit covering preconstruction review under the Clean Air Act. The revised air quality permit provides a sitewide cap on air emissions for nitrogen oxides (NO_x), sulfur dioxide (SO_2), carbon monoxide (CO), particulate matter, and volatile organic compounds (VOCs) at levels that ensure that the current site, including any future semiconductor manufacturing plants built on the site, remains in compliance. The air quality permit also provides flexibility to make equipment and process changes and construct new facilities without triggering air quality permit reviews, as long as the air emission caps are not exceeded. This is exemplified by Intel's plan to build a new production manufacturing facility. Early this year, Intel announced it will build its first 300-millimeter, high-volume production manufacturing facility at the Chandler site. The company said it will invest $2 billion to build and equip the wafer fabrication facility. It is expected that Intel will seek this expansion under the Chandler facility's existing air emissions cap, which was established by the original Project XL permit in 1996. Intel has noted that the new facility will allow the company to maintain its leadership in the extremely competitive world of semiconductors.

Other Innovations: (1) *Consolidated Reporting:* The project allows Intel to consolidate reporting for Federal, state, county, and city permitting and regulatory programs into one annual and four quarterly reports. (2) *Stakeholder Input in Reporting:* The new data and reporting formats were designed in conjunction with the EPA, the Arizona Department of Environmental Quality, the Maricopa County Bureau of Air Pollution Control, the City of Chandler, the Gila River Indian Community Department of Environmental Quality, and area residents who are part of the stakeholder team. (3) *Internet Reporting:* In addition to filing its quarterly and annual reports with regulatory authorities, Intel has also made the reports available on a Web site dedicated to this project. The Web site also includes historical information pertaining to the FPA, such as minutes of previous public meetings and public comments and responses.

The Superior Environmental Performance: As long as Intel remains within the air emissions caps, the site will remain a minor stationary source of criteria air pollutants. Intel has also committed to meet other environmental goals that are designed to improve the area's water quality, conserve water, reduce the generation of hazardous and nonhazardous waste, and improve the general environmental performance of the facility.

Progress in Meeting Commitments
(As of July 2000)

Overall, Intel has been very successful in meeting its environmental commitments under the project.

- Intel committed to capping the air emissions for the entire facility as follows: VOCs at 40 tons per year (TPY), NO_x and CO at 49 TPY, SO_2 and particulates at five tons TPY, phosphine at 4 TPY, sulfuric acid at 9 TPY, and organic hazardous air pollutants (HAPs) and inorganic HAPs capped at 10 TPY. For all of these commitments, Intel's facility has remained well under the limit for 1997, 1998, and 1999.

  – Intel has achieved its water quality and water use commitments, with one minor exception. Intel originally committed to use 100 percent treated effluent water for its semiconductor manufacturing cooling tower and for landscaping. Although the facility achieved only 80 percent of wastewater reuse in 1997, Intel achieved 97 percent of wastewater reuse in 1998. Based on a review of the system design and after spending $300,000 annually for phosphate treatment, the company informed stakeholders that it would not likely be able to achieve more than 95 percent consistently without spending significant resources on additional treatment systems. Stakeholders agreed to change the goal from 100 percent to 95 percent. Intel was able to reach a level of 99 percent in 1999.

  – Intel achieved its solid waste recycling goals. Intel's goals are to increase recycling to 40 percent in 1997, 55 percent in 1999, and 60 percent in 2001. In 1997, the facility exceeded its recycling goal, and by the end of 1998, Intel exceeded its commitment for 2001. In 1999, Intel continued its progress toward increased recycling by achieving a level of 98 percent. At the beginning of the project the company struggled to meet these goals, which led to creative, effective solutions. For example, to meet the solid waste recycling commitments, Intel found a box manufacturer that

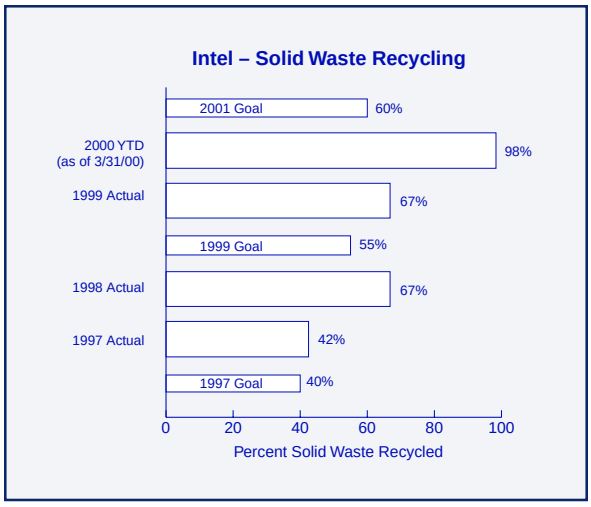


Figure 12

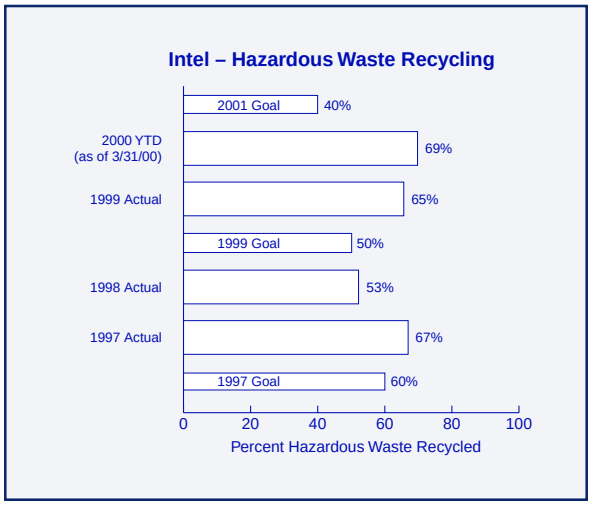


Figure 13

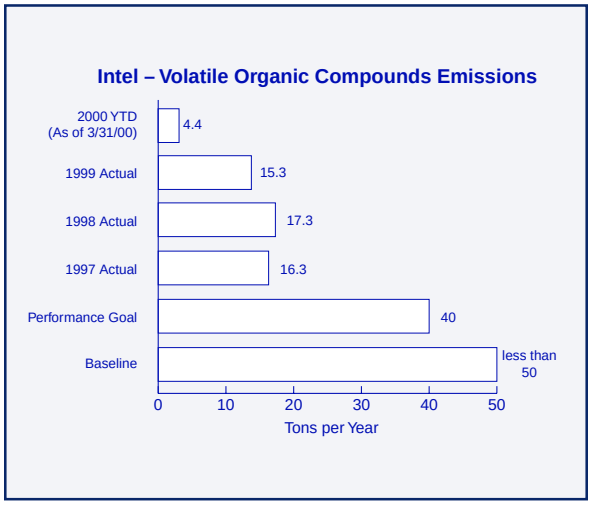


Figure 14

transforms packaging wood into landscaping tree boxes. (see Figure 12)

– Intel's goals are to recycle 60 percent of hazardous wastes generated at the facility in 1997, 50 percent in 1999, and 40 percent in 2001. The specified percentages in the recycling goals decrease because Intel anticipates reducing the hazardous waste generated at the facility through pollution prevention measures. The facility achieved beyond the 60 percent recycling goal for 1997. In 1998, the company started a new manufacturing process module that produced a nonrecyclable waste stream. Intel executed several projects to reduce these wastes, and as a result almost achieved the 1999 goal by the end of 1998 (it achieved a 53 percent recycling rate). In 1999, Intel continued its aggressive hazardous waste recycling efforts and exceeded its recycling goal by achieving a level of 65 percent. (see Figure 13)

– Intel's goals are to recycle 25 percent of nonhazardous chemical waste in 1997, 50 percent in 1999, and 70 percent in 2001. The facility exceeded its 1997 and 1999 goals. Intel achieved a rate of 58 percent in 1997 and a rate of 78 percent in 1999.

• In addition to the site-wide cap on air emissions, Intel voluntarily established a production-based performance standard called the production unit factor (PUF). The purpose of the PUF is to ensure that air emissions per unit of production will not increase. The PUF is expressed annually as tons of emissions (VOCs or HAPs) per year per unit of annual production. In 1997, a baseline PUF was established using the indexing method. For any given year, the production-based emissions would be indexed to a base year. For reporting purposes, the report would show the based year as an index of 1.0, and subsequent years should be 1.0 or less. Each year Intel reports the annual PUF for the reporting year relative to the base year. For example, the VOC and HAP PUFs for 1998 relative to the base year index of 1.0 were 0.3 and 0.7, respectively. This means that the VOC and HAP emissions released in 1998

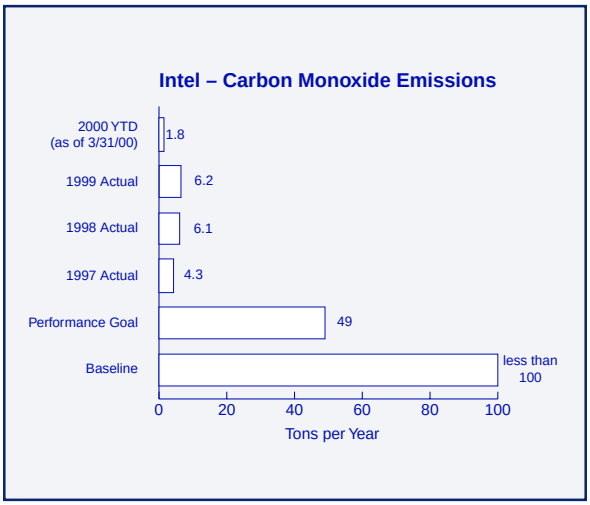


Figure 15

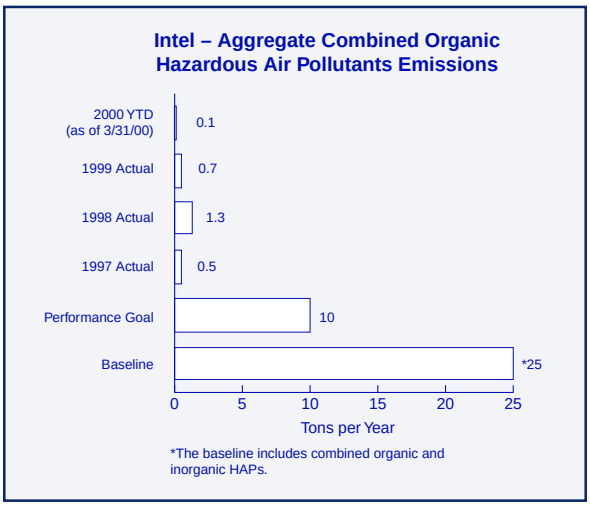


Figure 16

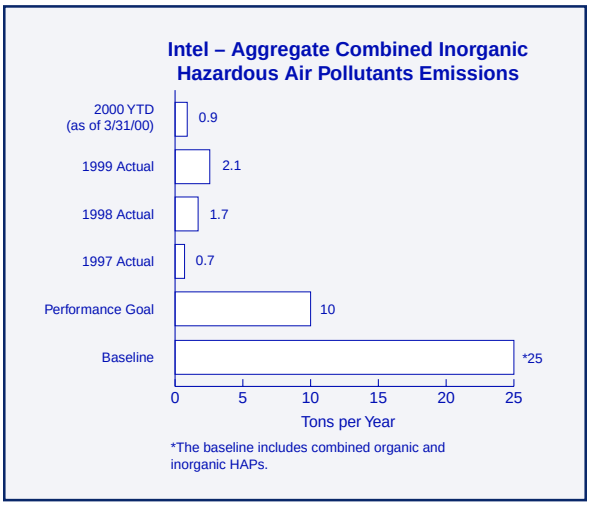


Figure 17

per unit of production for 1998 are less than the VOC and HAP emissions released in the base year per unit of production. The value for VOCs for 1999 relative to the base year was 0.26. This means that the VOC emissions released in 1999 per unit of production in 1999 was less than that for both the base year and 1998. (see Figure 14)

- Intel will continue to meet its commitment to share information and work with concerned parties by completing quarterly progress reports within 60 days after the close of each quarter, planning and implementing a semiannual stakeholders and general public meeting in October 2000, and planning quarterly stakeholder meetings for August and November 2000.
- Intel has fulfilled its commitment to cap CO emissions at less than 49 TPY for the entire site, by achieving a total of 4.3 TPY in 1997, 6.1 TPY in 1998, and 6.2 TPY in 1999. (see Figure 15)
- Intel has far exceeded its commitment to cap aggregate combined organic HAPs at 10 TPY by achieving a total of 0.5 TPY in 1997, 1.3 TPY in 1998, and 0.7 TPY in 1999. (see Figure 16)
- Intel has far exceeded its commitment to cap aggregate combined inorganic HAPs at 10 TPY by achieving a total of 0.7 TPY in 1997, 1.7 TPY in 1998, and 2.1 TPY in 1999. (see Figure 17)

Benefits for the Environment

- Air emissions for criteria and hazardous air pollutants are being maintained at levels that ensure that the current site, including any future semiconductor manufacturing plants built there, remains a minor air emissions source, as defined by the Clean Air Act.
- Intel's recycling activities for hazardous wastes, solid waste, and water are successful. In particular, water conservation is a priority environmental goal in this arid Arizona region, and Intel's activities in this area are well regarded by the City of Chandler.
- Intel is currently in the process of expanding its production capabilities by adding a new process to the existing facility. The new process is designed to adhere to the emissions cap under the permit. The new process allows Intel to incorporate new technologies into their processes to remain competitive without additional impact to the environment.

Benefits for Stakeholders and the Local Community

- Stakeholders continue to have real input into decisions being made involving the Intel project.
- Intel's emphasis on water conservation has been very valuable for the city of Chandler. The Stakeholder Team meets on a quarterly basis to ensure that Intel is meeting the project's superior environmental performance goals and to ensure that quarterly reports will be easily understood by the public.
- Intel renewed its commitment to provide up-to-date environmental project information to the public by making its project Web site more user-friendly.
- Local stakeholders and the surrounding community will continue to enjoy increased economic benefits by Intel's decision to build another semiconductor manufacturing facility at the Ocotillo site. This decision was due in part to the success of the Intel XL project facility emissions cap innovation.
- The nearby community is enjoying reduced risk because of Intel's decision to switch to SDS arsine technology.
- The community has better access to information through Internet reporting and a stakeholder-developed, easy-to-understand format for the consolidated reports.
- Intel has established a Stakeholder Team to ensure the involvement of national, regional, and local regulatory authorities and private citizens as full partners in the project's implementation. This team meets once a quarter to review the project's progress reports.

- Intel has participated in or led a number of activities designed to enhance the local community's environment and education. For example, Intel donated a total of 1,663 personal computer systems through the Arizona Students Recycling Used Technology (StRUT) Program to nonprofit organizations and K-12 schools in 1998 and 2,060 personal computer systems in 1999. Several of these computers are no longer needed at Intel and would normally be disposed of, but Intel refurbishes these computers so they can be used by other organizations.

Benefits for the Project Sponsor

- Intel will build its first 300 millimeter, high-volume production manufacturing facility at the Chandler site under its existing air emissions cap, which was established under the 1996 XL permit.
- Intel has avoided millions of dollars worth of production delays in the competitive, quick-to-market semiconductor industry by eliminating 30 to 50 reviews per year.
- Intel can minimize delays in the expansion of the facility.
- Intel feels that the stakeholder involvement process has been valuable to the facility.
- Intel has found the innovations being tested at the Arizona facility to be so beneficial, that the company is implementing performance-based concepts for air emissions at two other company facilities.
- Intel feels the flexibility allows it to redirect resources toward emissions reductions rather than paperwork.

Spin-off Benefits

- The City of Chandler has received a grant to study the industrial reuse of wastewater. The XL project was used to advance the study.
- The project prompted the City of Chandler's fire department to establish a new overall approach to hazardous waste handling.

Key Issues Needing Resolution

- Certain stakeholders feel that Intel has limited their influence over the project. For example, Intel's decision to change from using arsenic to arsine gas in one of its processes was made without consulting the Stakeholder Team. Several stakeholders noted that more consultation would have been appropriate.
- Certain local industries have noted that not being granted the same regulatory flexibility as Intel is unfair. Some wish to be granted the same level of regulatory flexibility, without necessarily going through the same process. However, several stakeholders strongly object to such action.
- Some stakeholders would prefer that a greater emphasis be placed on water consumption and waste minimization instead of water recycling and waste reduction.
- Most stakeholders believe that greater public participation would improve the project. However, several barriers have prevented this, including lack of time, appropriate level of technical understanding, and resources (including funds for citizen reimbursement and technical support).
- One stakeholder had major concerns about the public availability of timely and detailed information on process changes initiated by Intel. While the specific concern was addressed by Intel through sharing more detailed information about the process change, the stakeholder is still uncomfortable with the long-term implications of this form of public participation. The stakeholder wants more technical details to be available to the public, as well as the technical assistance to interpret it, so that the community can evaluate the potential impacts on health and the environment and then influence the company's decision-making process for choosing among different available technologies or chemicals.
- Except for the small stakeholder team, the public has not shown interest nor attended public meetings. While there is speculation as to why

this is the case (the project is too technical in nature for sustained interest; the sponsor already has the broad trust of the community regarding the project; the public does not have enough access to information in order to be active), the reasons for this trend are not yet well understood.

- Stakeholders stated that project reports could be improved by more narrative descriptions of the company's Design for the Environment commitment, the basis of the air quality standards, and the water and hazardous waste portions of the project.

- There are continuing stakeholder concerns about the state standards (i.e., the Arizona Ambient Air Quality Guidelines) as applied to the fenceline standards used for the project.

Lessons Learned

- Stakeholder concerns can be addressed by providing sufficient information. For example, even though stakeholders were notably concerned about Intel's decision to switch to arsine gas, stakeholder concerns were relieved after Intel made considerable efforts to address them.

- It is important to set ground rules and deadlines at the beginning of the stakeholder process and to make efforts to ensure that all stakeholders fully understand them.

- FPA development could have been expedited if earlier in the process public stakeholders had received education and training on environmental terminology and issues and on the technical and business characteristics of the semiconductor industry.

- Public stakeholders report high costs in terms of their personal time, since they are volunteers.

- Without ongoing technical assistance, the general public's ability to understand the impacts of the project's changes on human health and the environment is limited.

- Through the process of developing the agreement, Intel and the regulatory agencies have developed a better understanding of stakeholder concerns and resource needs to participate in environmental projects.

- The air permit approach is probably applicable to other semiconductor manufacturing facilities but might not be practicable for facilities that experience frequent changes in air emission levels.

- In reference to the introduction of SDS arsine technology, citizens noted that the FPA process worked the way it was intended.

- Report centralization is a good practice.

Information Resources

The information in this summary comes from the following sources: (1) the December 1999 *XL Project Progress Report—Intel Corporation* (EPA-100-R-00-005); (2) focus group discussions in December 1998 and December 1999 with representatives of the Federal, state, and local regulatory agencies, Intel Corporation, and stakeholders involved in the project; (3) data from Intel Quarterly Reports, and the 1997, 1998, and 1999 Annual Reports; and (4) *Project XL Stakeholder Involvement Evaluation—Final Draft Report*, May 2000.

Jack M. Berry, Inc.

FINAL PROJECT AGREEMENT SIGNED AUGUST 8, 1996;
PROJECT CLOSED OUT JUNE 2, 1999

Background

The Project Sponsor: Jack M. Berry, Inc. (Berry), is a midsized citrus juice-processing company. The company's facility in LaBelle, Florida, is the site of the Project XL pilot. It is located 30 miles east of Fort Myers at the site of Berry's largest grove, consisting of about 10,000 acres of orange and grapefruit trees.

The Experiment: The Berry project's goal was to establish a process by which Berry would prepare a Comprehensive Operating Permit (COP) in partnership with the Florida Department of Environmental Protection, South Florida Water Management District, and EPA. The COP would have been a multimedia permit that was part of a streamlined permitting approach that was expected to better integrate plant operation and compliance procedures, as well as eliminate unnecessary administrative requirements.

The Flexibility: Under the COP, the State of Florida and EPA would have relieved Berry of administrative and procedural rules that require the preparation and certification of multiple permit renewal applications every few years. Flexibility in Florida regulations governing the permit application process would have allowed Berry to accelerate its permit application process. The streamlined permitting approach was anticipated to result in cost savings that Berry would have reinvested in new environmentally beneficial operating procedures. The burden on EPA and the State of Florida to review and issue permits would have been reduced as well.

Other Innovations: (1) *Reduction in Reporting Burden*: The State of Florida would have allowed Berry to use nonstandard forms for reporting environmental performance, which would be simplified and part of the approved COP. The State of Florida might not have required Berry to have its environmental reports certified by a professional engineer, because the COP would have been more comprehensive than a certified professional engineer's application. (2) *Environmental Management System (EMS)*: Berry had committed to instituting the International Organization for Standardization (ISO) 14000 EMS program as a means to systematically manage continuous environmental performance, including pollution prevention and source reduction strategies. (3) *Standard Operating Procedures*: Berry had intended to complete detailed yet easy-to-follow work instructions for implementing the COP that ultimately would have been linked to the EMS, to raise the level of employee environmental awareness and contributions to permit compliance.

The Superior Environmental Performance: Berry would have reduced air emissions of volatile organic compounds (VOCs), SO_2, and NO_x through voluntary installation of updated equipment and implementation of updated citrus-processing procedures. Berry would have also reduced the amount of hazardous and solid waste generated by the facility through pollution prevention, reduction, and recycling.

Progress in Meeting Commitments

(As of closeout on June 2, 1999)

- The Berry project was unique in that it was the only XL project that experienced a change in management. Through a lease agreement signed in 1997, Cargill, Inc.,[3] became the new operator of Berry's LaBelle, Florida, facility. As a result, for the Berry XL pilot project to continue, Cargill would have had to become a party to the FPA. Work on development of the COP was put on hold in late 1997 pending a decision by Berry and Cargill regarding continuing the project. Getting to a final decision on the project's future, however, proved elusive. Since further progress appeared unlikely, three years after the project agreement was signed, EPA and the State of Florida chose to

[3]Cargill is an international marketer, processor and distributor of agricultural, food, financial and industrial products with some 80,600 employees in more than 1,000 locations in 65 countries and with business activities in 130 more.

terminate the agreement in June 1999. Therefore, the LaBelle facility remains part of the traditional regulatory system under Federal, state, and local regulations.

- The Berry facility met some of its project commitments even though work on the COP was not completed. In 1997, Berry reported that the facility had:
  - developed some standard operating procedures and detailed work instructions;
  - eliminated an 88-acre spray field in 1997 that had been used for wastewater disposal since 1974;
  - reused treated industrial wastewater produced by the facility for irrigating a 1,400-acre section of citrus groves;
  - installed a more efficient peel dryer to reduce citrus processing VOC emissions;
  - begun work on meeting commitments to reduce disposal of solid waste and increase scrap metal recycling; and
  - begun work to reduce the number and types of solvents and lubricants used on-site.
- Because the COP had not been completed, there was no progress by Berry on:
  - preparing an emissions reduction strategy for SO_2, NO_x, and VOCs and reporting on its results;
  - providing information on the amount of solid waste and scrap metal recycled by December 1998 (In February 1997, the company reported that solid waste recycling was initiated and scrap metal recycling was increased.);
  - providing information on the quantities of hazardous materials eliminated through a self-audit program, on the preparation of an inventory of spray-can solvents and lubricants used on-site, and on the replacement of some hazardous materials with environmentally friendly alternatives;
  - establishing a target date for completing the documentation of implementing the new ISO 14000 EMS;
  - involving stakeholders in the development and implementation of the final COP; and
  - voluntarily meeting drinking water standards equal to half of the maximum contaminant levels (MCLs) allowed under the Safe Drinking Water Act (SDWA) and the Florida Administrative Code. Test data indicated that, except for radionuclides, Berry either met a voluntary drinking water standard equal to half of the MCLs allowed under the SDWA or was not able to detect the contaminant. However, there was information on progress toward reducing radionuclide levels.

Benefits for the Environment

- In 1997, the company reported that the effort to develop easier-to-follow work instructions had led to continuous improvement in environmental performance by reducing incidences of minor environmental violations.
- The elimination of the 88-acre spray field removed an odor problem.
- Treated industrial wastewater produced by the facility was reused to irrigate a 1,400-acre section of citrus groves.

Benefits for Stakeholders

- The stakeholder participation for this project was not evaluated, because it would have been linked to the COP development, which never occurred.

Benefits for the Project Sponsor

- In 1997, Berry reported that the preparation of standardized work procedures increased the Berry facility staff's awareness of the environmental aspects of their jobs. The improved work procedures also standardized environmental testing at the facility and raised its level of compliance by reducing its incidences of minor violations of environmental regulations.

Key Issues Needing Resolution

- Not Applicable

Lessons Learned

- Ultimately, for the Berry project to have gotten back on track, each organization involved would have to had made a new or renewed commitment, with well-defined roles and responsibilities of each partner and a new clear timeline for accomplishing the various tasks involved.

- While the organizations involved had different perspectives about the project's implementation, all of them agreed on the following: testing the COP concept is *still* a good idea; FPAs for XL projects need to describe the steps that should be taken by the signatories should a change in a facility's owner or operator occur; and EPA needs to clarify XL's incentives to attract and maintain the interest of small businesses like Berry.

- For all XL projects, the commitment of all parties, the division of responsibility, and timelines must be very clear from the beginning. Also, the EPA and state regulators must make an accurate assessment of the resources available and the internal capabilities of the company to implement the project.

- If a facility management changeover occurs during a project, the EPA and state regulators must start working with the new company as soon as possible to ease the project's transition.

- XL FPAs must include language that spells out the time frame for making a decision about proceeding with the project when the management of the facility changes.

Information Resources

The information in this summary comes from the following sources: (1) the March 1998 *XL Project Progress Report—Jack M. Berry, Inc.*, (EPA-100-F-99-003); (2) focus group discussions in December 1999 with representatives of the Federal and state regulatory agencies, Jack M. Berry, Inc., and Cargill, Inc.; and (3) the *Project XL Preliminary Status Report* (EPA-100-R-98-008).

Lucent Technologies

FINAL PROJECT AGREEMENT SIGNED AUGUST 19, 1998

Background

The Project Sponsor: The Microelectronics Group of Lucent Technologies, Inc., (Lucent) designs and manufactures integrated circuits and other electronic components for the computer and communications industries. This project will be implemented in a phased approach over a five-year period through site-specific demonstration projects at Lucent facilities in Allentown, Reading, and Breinigsville, Pennsylvania; and Orlando, Florida.

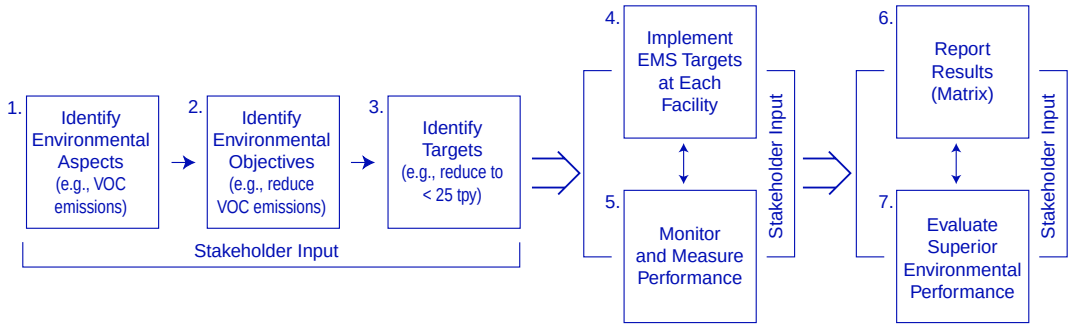
The Experiment: The Lucent Microelectronics Group will operate an environmental management system (EMS), third-party-certified to the International Organization for Standardization's (ISO) 14001, to manage environmental impacts for all media at all of the company's facilities so as to achieve environmental performance superior to that required by its current permits. Specifically, this project will test whether use of a high-quality EMS will create a more efficient, more transparent, more easily understandable, and more flexible system that not only meets the requirements of existing statutes and regulations, but also achieves superior environmental performance. The project will use the unique strategy of integrating regulators into the EMS process to set environmental goals and to track performance. Also, as part of the EMS approach, Lucent is gaining input from a facility-based Local Environmental Advisory Group (LEAG) composed of local stakeholders including environmental organizations, community groups, employees, and other interested citizens. Ultimately, the Lucent project will identify over the five-year period whether and how a high-quality EMS can be the basis for an integrated approach, embodied in a single document, governing environmental management in all media at all Microelectronics facilities.

The Microelectronics EMS is managed by the following four main components, as presented in the flow chart below:

- Identifying and determining the significance, or priority, of "environmental aspects," those environmentally related characteristics of the facility's operations, products, and services (e.g., inputs such as raw materials, water, energy, and chemicals; outputs such as products, emissions, discharges, and wastes);
- Identifying environmental "objectives" that address the performance goals for all environmental aspects;
- Identifying "targets," the programs that define how the objectives will be achieved over time; and
- Continually monitoring and measuring performance of how well objectives are identified and targets implemented.

The Flexibility: The "umbrella FPA" provides an overarching framework for individual Lucent facilities. Each Lucent facility seeking flexibility under the project will develop a "site-specific adden-

Flow Diagram:
Lucent EMS Process Overview



dum" to the umbrella FPA. The Allentown facility will be the location of the first site-specific demonstration project. As successes are generated at Allentown, site-specific projects will be developed at the other Microelectronics facilities in Breinigsville, Reading, and Orlando. It is anticipated that the EMS will provide a vehicle for consolidating all Federal and state permits over time into a single Microelectronics-wide multimedia permit to be based on targets set jointly each year by the company and regulators. This would result in an annual review of the permit rather than the current system of multiyear renewals of individual permits. The EMS also will provide a streamlined process for incorporating new regulatory flexibility approaches and consolidating reporting requirements businesswide. As of the spring of 2000, the Allentown facility submitted a draft addendum to EPA. EPA and the Pennsylvania Department of Environmental Protection are reviewing the draft and will be providing comments to Lucent by August 2000.

The Superior Environmental Performance: The umbrella FPA is a multi-regional attempt to incorporate high-quality environmental management practices, through Lucent's EMS, across the entire business unit. This will drive multimedia superior environmental performance. The parties anticipate that the EMS will foster superior environmental performance by identifying opportunities to reduce Lucent's environmental impacts in a variety of areas, both regulated and nonregulated. Facility-specific addenda to the umbrella agreement will be the vehicles for achieving superior environmental performance and considering regulatory flexibility at the individual facilities.

Information Resources

The information in this summary comes from the following sources: (1) the December 1999 *XL Project Progress Report—Lucent Technologies* (EPA-100-R-00-012) and (2) the Final Project Agreement for Lucent Technologies XL Project.

Massachusetts Department of Environmental Protection, Environmental Results Program

FINAL PROJECT AGREEMENT SIGNED OCTOBER 6, 1998

Background

The Project Sponsor: The Massachusetts Department of Environmental Protection (Massachusetts DEP) is the state agency responsible for protecting human health and the environment by ensuring clean air and water, the safe management and disposal of solid and hazardous wastes, the timely cleanup of hazardous waste sites and spills, and the preservation of wetlands and coastal resources. Massachusetts DEP's role under Article 97 of the Massachusetts Constitution is to guarantee the people's right to "clean air and water," as well as "the natural scenic, historic and aesthetic qualities of the environment."

The Experiment: This project will test a process to streamline permitting and reporting and improve and better measure compliance rates across the state for business sectors. Massachusetts DEP developed the Environmental Results Program (ERP), a multimedia, whole sector-based regulatory system that replaces case-by-case permits with industry-wide environmental performance standards and an annual certification of compliance. Through ERP, Massachusetts DEP will convert permit requirements into industry-wide performance standards. For the first time ever, senior-level company officials will be required to annually self-certify that the participating companies are, and will continue to be, in compliance with all applicable air, water, and hazardous waste management performance standards throughout the facility. Massachusetts DEP anticipates that participating firms will achieve superior environmental performance, because by converting the permit requirements to performance-based standards, facility managers will be aware of their environmental obligations before they make decisions about modifying equipment and operations, rather than at the end of a long, expensive permitting process. This will give companies more flexibility to choose cost-effective compliance strategies for themselves, thereby reducing the "time to market" for new products and removing regulatory obstacles to pollution prevention. In addition, ERP companies will be accountable for reporting any releases or exceedances of discharge or emission standards to the Massachusetts DEP. Violations of appropriate standards will be reported and a "Return to Compliance Plan" submitted to Massachusetts DEP if any such violations are either outstanding at the time of certification or discovered thereafter. Beginning with a demonstration project of 23 companies, industry representatives cooperated with the Massachusetts DEP in establishing criteria for reporting compliance with state standards without developing permits for each facility. The project reduces the reporting burden for affected facilities and the Massachusetts DEP while fostering superior environmental performance by identifying and encouraging opportunities for pollution prevention. The first three small-company sectors are dry cleaners, photo processors, and printers. The Massachusetts DEP is currently developing project agreements and regulations for two more sectors—firms that discharge industrial wastewaters (IWW sector) to sewers and firms installing or modifying boilers (combustion sector). Massachusetts DEP expects to apply ERP to the combustion sector in the Fall of 2000. The IWW sector is being addressed under a larger watershed initiative and is expected to be applied to ERP in 2001.

The Flexibility: The umbrella FPA will be expanded through addenda that will provide the necessary regulatory flexibility and specify requirements for superior environmental performance for each sector. [For example, the umbrella agreement lists anticipated flexibility for the following sectors: dry cleaners—decreased record retention time and extension of time under the maximum achievable control technology (MACT) rule under the Clean Air Act (CAA) for newly constructed sources to notify the state from 30 to 60 days; photo processors—no flexibility needed;

and printers—expedited State Implementation Plan (SIP) approval and the volatile organic compound (VOC) limit on alcohol-free fountain solution.] After evaluation and revision, the program may be transferred to other industry sectors throughout Massachusetts.

The Superior Environmental Performance: Massachusetts estimates that the program will yield significant reductions in the use of smog-forming solvents and alcohol in fountain solutions among commercial printers. The shift to ERP is expected to reduce wastewater discharges of silver by 99 percent of all unregulated photo processors, which make up 15 percent of all photo processors, and achieve a 43 percent reduction in emissions of perchloroethylene from dry cleaners.

Progress in Meeting Commitments
(As of July 2000)

Overall, Massachusetts DEP has successfully met their commitments through the implementation of ERP components to achieve superior environmental performance. ERP provided extensive outreach and technical assistance to participating sectors to promote pollution prevention and successfully eliminated a significant number of permits in the printing sector. A summary of the ERP commitments in the initial umbrella project agreement is provided below. In May 2000, Massachusetts DEP presented its own preliminary assessment of the ERP program to EPA. The preliminary graphical information as well as supporting data that are presented below on the status of ERP are taken from the May 2000 Massachusetts DEP presentation.

- Massachusetts DEP committed to provide clear performance standards and compliance assistance to companies in the participating sectors through outreach and technical assistance.
  - DEP established workgroups of industry and government representatives that worked to formulate industry performance standards for the dry cleaning and photo processing sectors. As part of ERP, Massachusetts DEP developed environmental business practice indicators (EBPIs), industry-specific measures that provide a snapshot of a facility's environmental per-

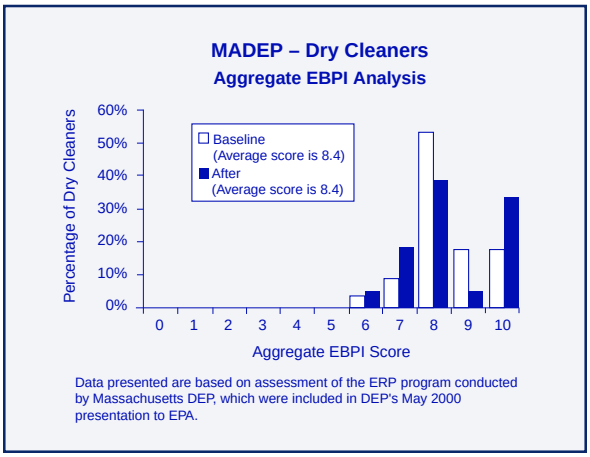


Figure 18

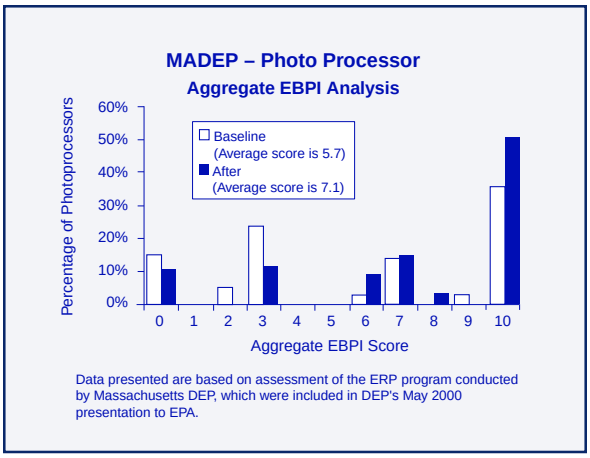


Figure 19

formance. These standards, which can be regulatory requirements or "beyond compliance" measures, were derived using compliance inspection findings, and certification form data for each of the participating sectors. DEP is using the EBPIs to measure and evaluate ERP compliance and environmental results. There are 16 EBPIs for printers, 16 for dry cleaners, and eight for photo processors. The EBPIs compliance requirements have been simplified in an easy-to-read format in the industry workbook and compliance statement.

– In addition, DEP has promulgated regulations with extensive review by the public and industry sectors. During the first year of implementation in each sector, DEP conducted workshops to provide guidance and assistance to industry representatives in understanding and complying with the standards.

– DEP's certification requirements, well-designed workbooks and outreach efforts, have helped firms to establish compliance management procedures, accountability, and records.

- Massachusetts DEP committed to promote corporate accountability and self-evaluation of environmental performance by requiring annual compliance self-certification.

  – Under ERP, Massachusetts DEP established a self-certification process for three sectors. ERP provides the compliance assistance tools that enable businesses in the participating sectors to determine what rules are applicable to them and what is required to comply. Because firms must certify annually, the ERP requires companies to conduct an environmental review annually. ERP includes similar components as an environmental management system where compliance obligations are established and audited on a regular basis. Because the certification forms require the signature of a high-level owner or manager, the process has improved senior management's attention to environmental management.

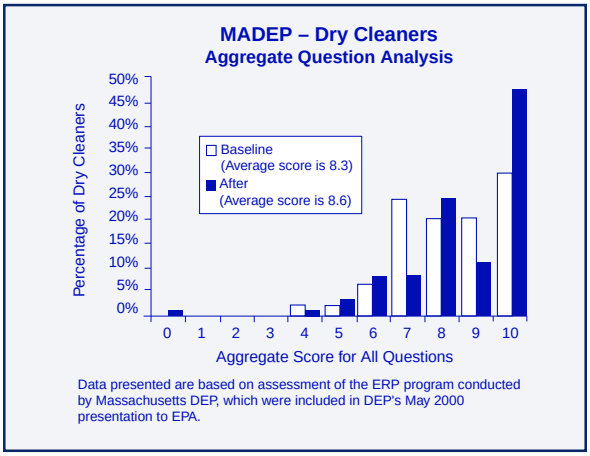


Figure 20

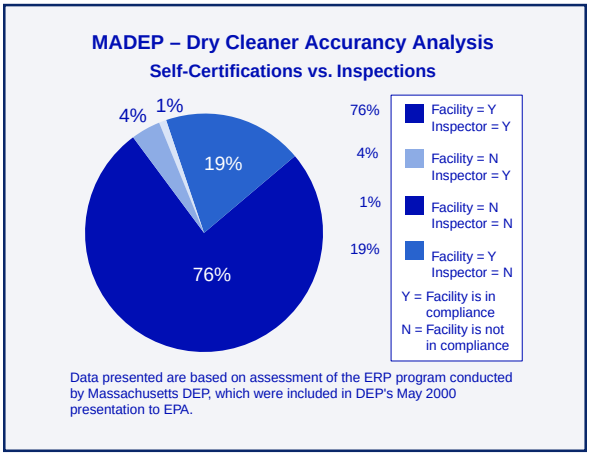


Figure 21

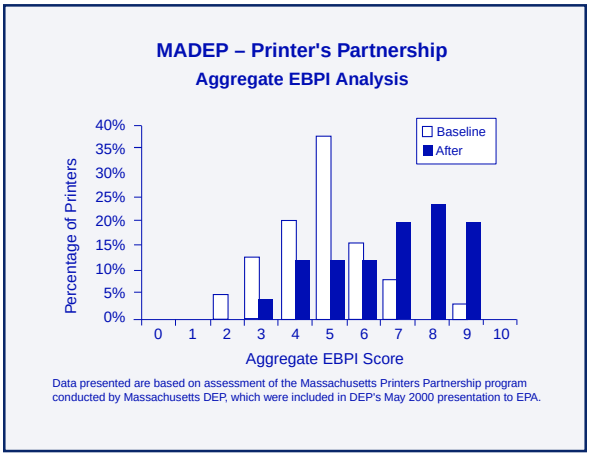


Figure 22

- Massachusetts DEP committed to encourage the adoption of pollution prevention techniques via sector-specific guidance and implementation manuals and inclusion in performance standards (EBPIs).
  - DEP developed workbooks that provide step-by-step guides to compliance and pollution prevention techniques. These outreach efforts were developed through extensive interaction with related industry experts. In the dry cleaning sector, the workbook was translated into Korean to accommodate the large percentage of Korean-owned businesses.
  - Nine specific pollution prevention (P2) measures have been incorporated into EBPIs for the printer sector.
- Massachusetts DEP committed to improve compliance assurance and enforcement by better identifying the universe of firms in each sector, conducting random inspections, and targeting non-reporters and deficient certifiers.
  - In DEP's initial outreach work, the universe of firms under the department's oversight increased by approximately 340 percent. DEP applied the ERP to three small business sectors for which it had little information, yet working with trade associations and other sector stakeholders, Massachusetts DEP identified a more complete universe of firms. It is estimated that the ERP allows DEP to track environmental performance for 80 to 90 percent of the firms in a sector compared to less than 33 percent prior to ERP. To date, based on data collected by Massachusetts DEP, the ERP program has more than 2,500 participating companies—approximately 1,300 printers, 650 dry cleaners, and 550 photo processors. The number of companies exceeds those that were traditionally regulated by DEP prior to the implementation of ERP as shown in the following table. The inclusion of a more complete universe of firms in ERP leads to greater sector-wide compliance.
  - Under ERP, Massachusetts DEP's strategy to ensure compliance includes continued field presence by way of targeted and random inspections, review and analysis of certification data (including Return to Compliance forms), and using the agency's enforcement protocols as appropriate. ERP targets inventoried entities that have not filed certifications, firms whose certifications are incomplete or technically deficient, and companies that have been the subject of complaints. From the program's inception to July 1999, approximately 160 Notices of Noncompliance were issued to dry cleaners and photo-processors that failed to certify. Most facilities responded to the actions. In addition, there have been two high-visibility enforcement actions taken as a result of questions raised in DEP's review of annual certifications.

ERP Universe Identification*

Sector	DEP-Identified Universe Pre-ERP	DEP-Identified Universe Post-ERP
Printers	~250	~1,300
Dry Cleaners	~30	~650
Photo processors	~100	~550
Total	**~380**	**~2,500**

* Information provided in the table is based on *Learning from Innovations in Environmental Protection, Research Paper Number 1, Evaluation of the Massachusetts Environmental Results Program*, by Susan April and Tim Greiner of Kerr, Greiner, Anderson & April, Inc., prepared for the National Academy of Public Administration, dated June 2000.

- Massachusetts DEP committed to conduct an evaluation of the program to measure and evaluate compliance and environmental results.
  - The first year analysis of the ERP program with respect to the dry cleaning and photo-processing sectors also shows significant improvements in compliance and pollution prevention practices and quantifiable emissions reductions. This study uses the Environmental Business Practice Indicators to measure, track, and assess program results and sector performance. Specifically, it compares baseline data (which include EBPIs) collected during random inspections *before* ERP certification to data collected during random inspections *after* outreach and certification under ERP. Facility scores and industry-wide scores (such as "before ERP" dry-cleaner scores versus "after ERP" dry-cleaner scores) have been calculated and are presented in the following graphs. (see Figures 18, 19, and 20)
  - In addition to calculating facility- and industry-wide scores, the first year preliminary analysis included an accuracy analysis. It compares results of data collected from facilities during random inspections *after* ERP to the answers on the certification forms from those facilities to determine the overall level of accuracy of the certification data. In the dry cleaner sector, there is agreement between the certification form and the inspector 76 percent of the time as shown in the chart. (see Figure 21)
  - Two quantitative studies performed on the printing sector [relating to Massachusetts Printing Partnership (MP2) participants] show significant improvements in compliance practices, pollution prevention practices, and quantifiable emission reductions. The graphic displays the analysis of aggregate EBPI scores for the printer sector based on MP2. The graphic shows the comparison of the aggregate EBPI scores for printers *before* the partnership, compared to the aggregate scores *after* the partnership. The information presented in the graph is based on a preliminary assessment conducted by Massachusetts DEP. (see Figure 22)
  - Massachusetts DEP is continuing analysis of EBPI data for the printing sector.
  - Massachusetts DEP is exploring how to make the certification information available to the public.
  - The original intent of ERP was to operate the self-certifications electronically, thus eliminating/minimizing FTE resources required for permit review and facilitating the process of providing public access to these certifications. However, barriers to security, consistent technology accessibility, signatory verification, and business information concerns prevented the electronic mechanism.
  - Information on the progress of ERP is posted on the Massachusetts DEP Web site *(www.state.ma.us/dep/erp)*. The site includes publications, ERP sector regulations, and certification packets, press releases, and other background material. It does not include specific information on facilities participating in the program or any data from the certifications.
- Massachusetts DEP continues efforts to implement their ERP in other industry sectors. In the fall 2000, Massachusetts DEP expects to roll out ERP to boilers; rollout of ERP to IWW sector is projected by late 2001.

Benefits for the Environment

Participating firms must evaluate their environmental systems annually and certify compliance to stringent performance standards. ERP's requirement for stricter practices regarding waste-handling, equipment maintenance and operation, and leak checking should reduce emissions and minimize the likelihood and impact of spills and workplace exposure, specifically:

- ERP requires printers to use low-VOC press cleaning solutions that reduce VOC emissions. Massachusetts DEP predicts that ERP will reduce VOCs by 10 percent, or 168 tons per year.

- ERP requires dry cleaners to use leak test equipment to conduct leak checks weekly, a stricter requirement than the pre-ERP monthly sniff test requirement. It is estimated that using this leak detection technique and conducting repairs as needed could reduce perchloroethylene emissions by roughly 500 tons per year.

- ERP's improved waste-handling practices, especially in the dry-cleaning sector, should improve hazardous waste management, yielding benefits from reduced perchloroethylene-laden waste disposal that has contributed to the creation of numerous hazardous waste sites and water supply closings in the state.

- For the photo processing sector, ERP includes standards to reduce silver discharges to publicly owned treatment works (POTWs), as well as to reduce illegal discharges to septic systems, to the ground, or to surface water. Photo processors have reduced silver discharge through more frequent replacement of silver recovery canisters. Based on an estimate that 15 percent of photo processors had no silver recovery equipment, ERP regulations that require such units are estimated to reduce silver discharges by 99 percent.

Benefits for Stakeholders

- ERP eliminated a significant number of permits in the printer sector. ERP gives printers the flexibility to add or modify certain equipment without waiting for DEP approval.

- Firms in all three rollout sectors are no longer required to obtain permits for industrial wastewater. Prior to ERP, many of the firms in these sectors were required to have IWW permits, yet very few had them or even knew of these requirements. Under ERP, these firms are regulated more equally through the flexibility of the self-certification process. Firms benefit by a level playing field.

- ERP's annual certification requirement and well-designed workbooks help firms establish procedures, accountability, and records similar to components of a small scale environmental management system (EMS). As firms conduct the frequent compliance reviews documented in ERP workbooks, they help ensure that their business is in compliance with all applicable multimedia regulations.

- Participating firms that were already in the DEP system have recognized net savings through the ERP. For example, prior to ERP, a mid-sized printer paid a $300 small-quantity generator-fee, $150 to $450 for air permits, and $1,300 for an IWW permit. Under ERP, those fees were replaced with an annual fee of $200 (printers have gradation in fees depending on the size). Printers who were not already in the system, however, will see the ERP fee as a new cost.

- Firms in participating ERP sectors have the opportunity to assist in the development of performance standards, as well as comment and review regulations proposed for their sector.

- The community has better access to information through the Massachusetts Web site. Information on the progress of ERP is posted on the Massachusetts DEP Web site (*www.state.ma.us/dep/erp)*. The site includes publications, ERP sector regulations and certification packets, press releases, and other background material. It does not include specific information on facilities participating in the program or any data from the certifications

- The ERP has brought improved public relations to Project XL in that it has brought the concept of ERP to a wider, national audience. ERP has raised awareness and brought attention to Project XL and displayed the ERP concept to a national audience. This exposure fosters the possibilities for great environmental gains through other state XL projects.

Benefits for the Project Sponsor

- Massachusetts DEP created a more complete database of the universe of firms in each sector.
- Massachusetts DEP now has the capability to track the environmental performance for 80 to 90 percent of the firms in the dry cleaning, photo processing, and printing sectors. This is a significant increase to the universe of firms identified prior to ERP (which is estimated to be less than one-third).
- Massachusetts DEP will be able to focus their resources on non-responding entities and accuracy of certification, thus targeting entities that are more likely to be in noncompliance with environmental standards.

Key Issues Needing Resolution

- Massachusetts DEP and EPA have invested significant resources in the XL effort, yet XL as a regulatory flexibility mechanism has encountered barriers in the implementation of ERP. Under ERP, multi-facility, sector-wide XL agreements, which include Federal regulatory flexibility, are still being explored.
- The most significant issue that has arisen during the execution of ERP is the state's request for flexibility in the dry cleaning sector requirements that are covered by EPA's air toxics maximum achievable control technology (MACT) rule. In consideration for the more stringent state standards established under ERP for the dry cleaning sector, and in an effort to offer the dry cleaners some regulatory relief in exchange, DEP agreed to pursue two areas of flexibility. The dry cleaning addendum requests a decrease in the federally required record retention time from five years to three and also seeks to allow new sources 60 instead of 30 days to report to the state under the MACT. However, because record retention limit is a statutory requirement, DEP was told by EPA that they must submit an application for delegation of the air toxic program [the section 112(l) delegation under the Clean Air Act]. Massachusetts DEP is currently evaluating the delegation.
- Massachusetts DEP is reviewing the feasibility of widespread permit retirement as part of ERP. There are significant barriers to the elimination of permits including federal permitting requirements, the need to take into account site considerations for large-scale operations and/or plants that are controversial to their communities, and DEP air-permit staff's preference for best achievable control technology (BACT) review over ERP's process-specific standards (especially for large sources).

Lessons Learned

- DEP found it difficult to develop "pure" performance standards. Many of the regulatory standards resemble general permits or those with source-specific standards. These standards are based on technology or performance, or some of both.
- Building on the success of the Massachusetts Printing Partnership, DEP's effort to include a more complete universe of firms in each sector has leveled the playing field between firms complying with regulations and those that have gained a competitive advantage by ignoring their regulatory responsibility.
- Stakeholder relationships have suffered with ERP expansion. DEP's involvement of stakeholders was key to getting the ERP program off the ground. Throughout the initial design of ERP, DEP convened a multi-stakeholder design group consisting of members of EPA, environmental advocacy groups, business and industry, consulting firms, and the legal community. However, after the first 18 months the group has not met on a regular basis. In order to sustain ERP, DEP has recognized the need for continued stakeholder involvement and support. As a result, DEP has assigned sector managers to develop communications plans to improve communication with and among stakeholders after sector implementation.

Information Resources

The information sources used to develop this project summary include (1) the FPA for the Massachusetts DEP XL project; (2) an ERP brochure and report entitled *Evaluation of the ERP Demonstration Project* from the Massachusetts DEP Web site; (3) Project XL background information and a press release dated October 6, 1998, from the U.S. EPA Project XL Web site.; (4) Learning from Innovations in Environmental Protection, Research Paper Number 1, Evaluation of the Massachusetts Environmental Results Program By Susan April and Tim Greiner of Kerr, Greiner, Anderson & April, Inc. prepared for the National Academy of Public Administration dated June 2000; (5) the December 1999 *Project XL Progress Report Massachusetts Department of Environmental Protection* (EPA 100-R-00-013); and (6) Massachusetts DEP Environmental Results Program (ERP) briefing presented by Steve DeGabriel, Director, Business Compliance Division, Bureau of Waste Prevention, Massachusetts DEP, May 2000.

Merck & Company, Inc., Stonewall Plant

FINAL PROJECT AGREEMENT SIGNED DECEMBER 15, 1997

Background

The Project Sponsor: Merck & Co., Inc. (Merck), is a worldwide, research-intensive, health-products company that discovers, develops, manufactures, and markets human and animal health products. Merck's Stonewall Plant near Elkton, Virginia, was established in 1941. The plant employs more than 900 people in a range of pharmaceutical manufacturing activities such as fermentation, solvent extraction, organic chemical synthesis, and finishing operations. The Stonewall Plant is located within 2 kilometers of the Shenandoah National Park, which has experienced substantial air quality degradation and related resource impacts over the past several decades.

The Experiment: In this project, Merck's air quality permit includes a site-wide cap on the facility's total emissions of criteria air pollutants [volatile organic compounds (VOCs) as a surrogate for ozone, particulate matter-10, carbon monoxide (CO), sulfur dioxide (SO_2), lead, and nitrogen oxides (NO_x)]. The company aims to reduce emission levels for SO_2 and NO_x to protect visibility and reduce acid deposition in nearby Shenandoah National Park and the neighboring community. To gain operational flexibility under the cap, Merck will convert its coal-burning powerhouse to natural gas, a much cleaner-burning fuel, at a capital cost of approximately $10 million. As long as emissions remain below the caps, Merck will no longer need to obtain prior approval from EPA or the Virginia Department of Environmental Quality (VADEQ) for changes at the facility that cause changes in emissions.

The Flexibility: EPA and the State of Virginia issued a site-specific rule, variance, and permit under the Clean Air Act's (CAA) Prevention of Significant Deterioration (PSD) program to authorize site-wide caps and an innovative best achievable control technology (BACT) approach. Existing air permitting regulations require that most changes to the manufacturing process be reviewed and approved by the VADEQ prior to being implemented. This requires a considerable effort by the facility as well as the regulators to frequently prepare and review permit applications for many process modifications. EPA and the State of Virginia also provided flexibility in complying with RCRA air emission requirements that apply to certain existing hazardous waste management units.

The Superior Environmental Performance: Merck will improve air quality in the Shenandoah National Park and surrounding community by operating under the site-wide emissions cap and permanently reducing criteria air pollutant emissions by approximately 300 tons per year, a 20 percent reduction. The conversion of the facility's coal-burning powerhouse to natural gas is expected to result in an initial reduction of SO_2 and NO_x emissions by 900 tons per year, a 65 percent reduction, and a reduction of hazardous air pollutants by 47 tons per year. The emission subcaps guarantee at least a 25 percent reduction of SO_2 and 10 percent reduction of NO_x.

Progress in Meeting Commitments

(As of July 2000)

- EPA has met its commitment to propose a site-specific PSD and New Source Review (NSR) rule, which provides an alternative means of compliance with state and Federal air standards for the Merck Stonewall Plant. EPA promulgated the final rule on October 8, 1997. In addition, EPA delegated full authority to Virginia for implementing and enforcing the PSD rule on November 24, 1997.

- The State Air Pollution Control Board of Virginia issued a variance on September 10, 1997 consistent with EPA's rule; VADEQ granted the PSD permit to the Merck Stonewall Plant on February 10, 1998.

- The Merck Stonewall Plant in Elkton, Virginia, has met its commitment to replace its coal-fired boilers with natural gas boilers. The conversion was completed in July 2000. Within the first few weeks of burning natural gas, Merck significantly reduced SO_2 and NO_x air emissions and has committed to a cap of total emissions of criteria air pollutants (except lead) at a level 20 percent below baseline levels. The facility's actual emissions averaged over 1992 and 1993 were used to establish a baseline level of 1,503 tons per year for total criteria pollutants. Under the new facility-wide cap, total criteria pollutant emissions will be maintained at levels below 1,202 tons per year. In addition to the facility-wide cap on total criteria pollutants, subcaps will be placed on Merck's emissions of SO_2, NO_x, and particulate matter. Baseline levels for these criteria pollutants are the average actual emissions during 1992 and 1993. The new subcaps will limit SO_2 emissions to 539 tons per year (a 25 percent reduction) and NO_x emissions to 262 tons per year (a 10 percent reduction). The particulate matter subcap initially will be placed at the baseline level of 42 tons per year. There will be an automatic, one-time increase in the particulate matter subcap of 1 to 10 tons per year to account for condensable particulate matter emissions that the new gas-fired boilers could generate at their full capacity. The cap on total criteria pollutant

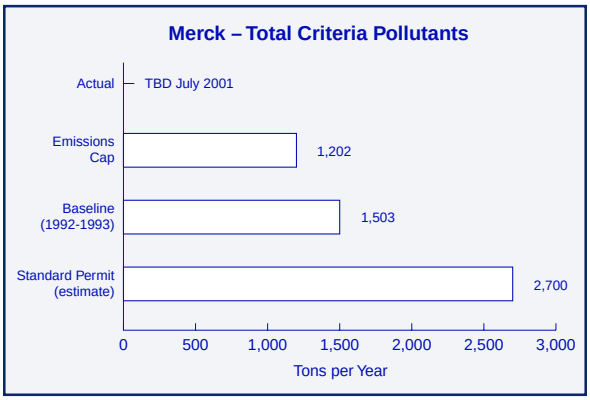


Figure 23

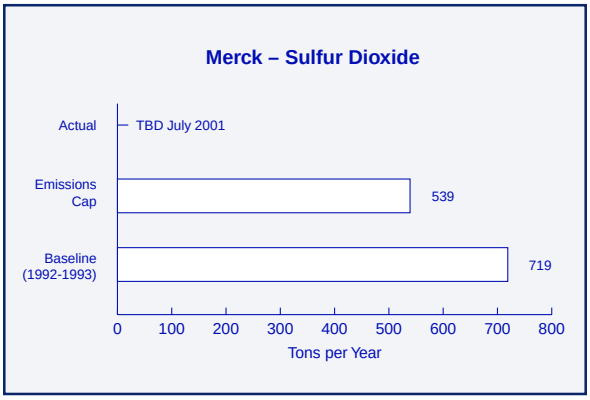


Figure 24

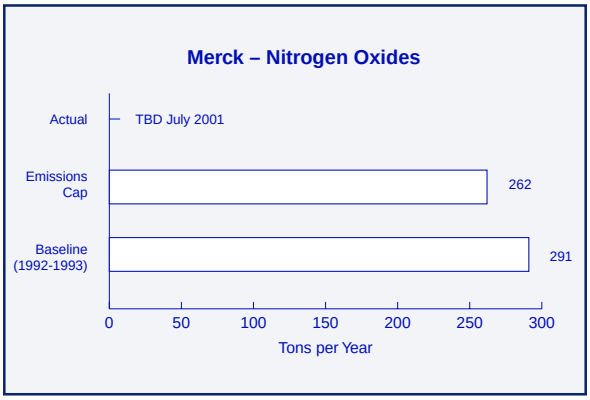


Figure 25

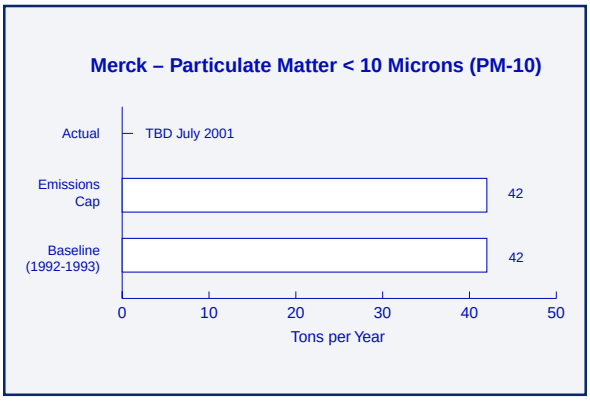


Figure 26

emissions will not be changed by this automatic increase in the particulate matter subcap. Facility-wide and subcap air emissions will be determined monthly. (see Figures 23, 24, and 25)

- The new PSD permit and associated caps will be fully effective no later than 12 months after the conversion to natural gas, or before that date should Merck begin to report emissions below the permit caps sooner. As soon as Merck begins operating under the emissions caps, they will be allowed to make changes to their processes that could result in air emissions increases without prior approval, as long as they remain below the caps. Additionally, once the caps are in effect, the Stonewall Plant will be required to operate under the caps and increase the frequency of their monitoring, record keeping, and reporting if criteria pollutant emissions trigger more frequent data-collection requirements. Part of the project is a comprehensive monitoring, record keeping, and reporting system that increases in stringency as actual emissions approach the cap.

- Also, because of concerns expressed by stakeholders about VOC emissions and the potential reduced visibility and increased vegetation impacts caused by greater ozone formation, Merck will assess air quality impacts on nearby Shenandoah National Park if VOC emissions reach certain specified levels. Due to recent changes in production mix, VOC emissions decreased substantially in January 2000.

- The focus for the next six months will be to monitor facility-wide air emissions and notify the stakeholders when emissions are reduced below the caps specified in the new permit. Merck will submit semiannual emission reports and annual progress reports beginning in 2001.

Benefits for the Environment

- The facility-wide cap will limit total emissions of criteria air pollutants to levels 20 percent below baseline levels, SO_2 emissions to levels 25 percent below baseline levels, NO_x emissions to levels 10 percent below baseline levels, and particulate matter to levels approximately equal to baseline levels. The caps are not enforceable until July 2001, because the conversion was completed in July 2000, unless Merck notifies the DEQ that its emissions have been reduced below the caps sooner. While quantitative emissions cannot be reported yet, it should be noted that directly upon conversion to natural gas, SO_2 and NO_x air emissions were significantly reduced. (see Figure 26)

- The conversion to natural gas will reduce total criteria air pollutant emissions for the powerhouse by 900 tons per year, will virtually eliminate lead emissions, and will reduce the combined emissions of the hazardous air pollutants, hydrogen chloride and hydrogen fluoride, by 65 percent. The conversion to natural gas is anticipated to cost Merck approximately $10 million in capital investment, but is not required by regulations or as a result of operational problems.

- A comprehensive monitoring, record keeping, and reporting program will increase in stringency as actual criteria pollutant emissions approach the cap. This provides an incentive for Merck to minimize air emissions.

- Air quality in the Shenandoah National Park will improve. This XL project has the potential to improve visibility and vegetation damage in the park by reducing SO_2 and NO_x air emissions.

- Merck will assess the air quality impacts in Shenandoah National Park if VOC emissions reach specified levels.

Benefits for Stakeholders

- Stakeholders will have better access to environmental information through Merck's comprehensive monitoring, record keeping, and reporting program.

- Stakeholders will receive information on an ongoing basis that enables them to evaluate Merck's performance under the facility-wide emission caps and the impact of incentives to minimize facility air emissions.

- The Merck stakeholder group can participate in periodic reviews of performance in meeting limits set under Merck's PSD permit. The stakeholder group will meet every five years to evaluate the project's implementation and to mutually agree on whether project changes are needed.

Benefits for the Project Sponsor

- Merck expects to avoid millions of dollars worth of potential production delays in the competitive first-to-market pharmaceutical industry by eliminating repetitive permit reviews.
- Merck is provided flexibility to make production changes without first obtaining permitting approval, as long as emissions remain below capped levels.
- The permit streamlines content requirements of the application for Merck's Title V operating permit and compliance certification.

Issues Needing Resolution

- It is unclear how this project will address the recently issued pharmaceutical maximum MACT requirements. Merck, EPA, and the State of Virginia are working to ensure that XL project flexibility gains can continue under these recently issued regulations.
- Because the facility-wide caps do not place an individual subcap on VOCs, the community and National Park Service are concerned about the potential impacts of increased VOC emissions. Actual VOC emissions will be tracked closely, and VOC impact analyses will be updated as needed.
- Stakeholders believed that it was premature to try to identify barriers to project implementation in 1998, since Merck's PSD permit has just been issued by the Commonwealth of Virginia.
- The stakeholders did not anticipate the length of time needed to secure a natural gas supply connection to the boilers. The delay led to more limited interaction between Merck and some of the stakeholder groups, including the National Park Service and local community members, presumably due to a lack of information to report.

Lessons Learned

- Technical support for community stakeholders is needed early in the process.
- EPA needs to communicate clear goals at the beginning of project development negotiations.
- Third-party facilitation would have helped the negotiation process.
- Transaction costs for community stakeholders were particularly high.
- An incentive-based permit provided Merck with the motivation to purchase the lowest emission technology available.
- Community stakeholders felt they were not included in some crucial negotiations.
- For this XL project, stakeholders did not anticipate the delay in securing a natural gas line. Nonetheless, the conversion was completed before the August 2000 deadline. Stakeholders caution others to anticipate worst case scenarios and to build in time for potential delays.

Information Resources

The information in this summary comes from several sources, including (1) the December 1999 *Project XL Progress Report—Merck Stonewall Plant* (EPA 100-R-00-010); and (2) focus group discussions in December 1999 with representatives of EPA and the Merck Stonewall Plant.

Molex Incorporated

FINAL PROJECT AGREEMENT SIGNED AUGUST 8, 1998

Background

The Project Sponsor: Molex Incorporated (Molex) is a multinational company that operates 47 facilities worldwide, manufacturing electroplating, metal stamping, fiber optics, plastic molding and other products. The Molex project covers an electroplating facility in Lincoln, Nebraska.

The Experiment: Molex electroplates coatings of nickel, copper, and tin and lead on substrate materials for a variety of manufacturing purposes. The process generates large volumes of wastewater containing metal contaminants, which are subsequently captured in wastewater treatment systems and become a RCRA hazardous waste. Molex previously operated a wastewater treatment system that combined the wastewater streams from nickel, copper, and a tin/lead composite plating processes. These wastestreams were treated in a single wastewater treatment process that generated a hazardous multiple-metal waste material from which only one of the metals could be recovered with the rest disposed. By switching to a process that segregates the wastewater streams from the plant's multiple electroplating processes and treats each one separately, Molex is able to recover metal contaminants separately, reduce the amount of metal disposed of, and reduce metal contaminant levels in the effluents discharged from the facility's wastewater treatment systems to the city's publicly owned treatment works (POTW). Molex has requested a variance from hazardous waste regulations in order to reduce the costs of storing and shipping these wastes and to increase the rate of metals recovery from the multiple wastestreams.

The Flexibility: EPA, pursuant to RCRA Section 3005(b), has authorized the State of Nebraska's Department of Environmental Quality (NDEQ) to carry out Nebraska's Hazardous Waste Management Program in lieu of the Federal program. Under this authority, the NDEQ issued a variance to Molex granting it a temporary exemption from the classification as hazardous waste of segregated sludges generated during wastewater treatment. Without this variance, the sludge materials would be subject to the NDEQ's generator requirements for storage and shipment of hazardous wastes. By obtaining approval from the NDEQ under RCRA to classify its segregated process sludge as a "commodity-like" material rather than as a hazardous waste, Molex can ship the sludges using common carriers rather than hazardous waste haulers, who are subject to additional RCRA regulations. Additionally, Molex is permitted to ship the hazardous materials on an as-needed basis, rather than every 90 days as is typically required for hazardous waste.

On July 10, 2000, Molex requested a two-year extension of the temporary variance which had remained in effect for two years and was set to expire August 7, 2000. In the request for this extension, Molex noted that it is expanding the production area of the plating department at the Uplands facility. This expansion, Molex stated, may offer an opportunity to continue to gather data under a greater process flow. In response, on August 2, 2000, EPA and NDEQ issued a six-month extension of the variance. The additional six months will allow Molex time to complete the final report. After reviewing Molex's final report, EPA and NDEQ have the option to issue an additional two-year variance.

The final data will be examined to determine the effect that separate treatment of Molex's waste streams has on metal content in wastewater effluents. Data gathered will also be examined to demonstrate whether the segregated system produces a recyclable sludge with market value. Ultimately, data gained through this project will provide the information necessary to assess whether modifications to national or state performance standards are possible.

The Superior Environmental Performance: In the Molex project, the treatment of segregated wastewater streams should result in at least a 50 percent reduction in mass loadings of metal contaminants in wastewater effluents, as well as in lower tin/lead composite sludge disposal costs because pure metal sludges can be sold directly to processors. Molex is making a significant up-front investment for longer-term benefit. The pure tin/lead composite sludge does not require disposal and thus, no disposal fee; however, the operational and compliance costs of a segregated waste treatment system are higher than those associated with a single wastewater treatment process.

Progress in Meeting Commitments
(As of September 2000)

- Overall, Molex has been successful in meeting its environmental commitments under the project.

- *Note about the baseline data*: It is important to note that sludge volumes between the combined treatment process and the baseline segregated treatment process are not strictly comparable, because the combined treatment sludges were dried, but the segregated treatment sludges were not. Data from 1999 were measured based on four Molex quarterly reports, which covered project performance from August 7, 1998, to August 7, 1999. Data from 2000 were measured based on four Molex quarterly reports, which cover project performance from August 8, 1999, to August 7, 2000.

  – Molex estimated that the segregated treatment system would generate a total of 71,328 pounds of sludge, but 1999 actual generation rates based on the quarterly reports indicate that actual sludge generation rates were 10.3 percent higher (78,709 pounds) than the estimated baseline for the segregated system. In 2000, the total amount of metals sludge generated was 112,498, a 58 percent increase over the estimated baseline. Based on the quarterly reports, it is estimated that the segregated treatment system has resulted in an average 65 percent reduction in the concentration of copper, tin and lead, and nickel in the effluent discharged by the POTW in 1999 and an average 76 percent reduction in 2000.

  – Molex estimated that 13,376 pounds of copper sludge would be generated with the segregated treatment system. However, 1999 actual generation rates were 59 percent higher (21,242 pounds) than the estimated baseline. For 2000, Molex has generated 35,200 pounds of copper sludge, a 163 percent increase from the baseline data. Based on the quarterly reports, and since this sludge is recycled, it is estimated

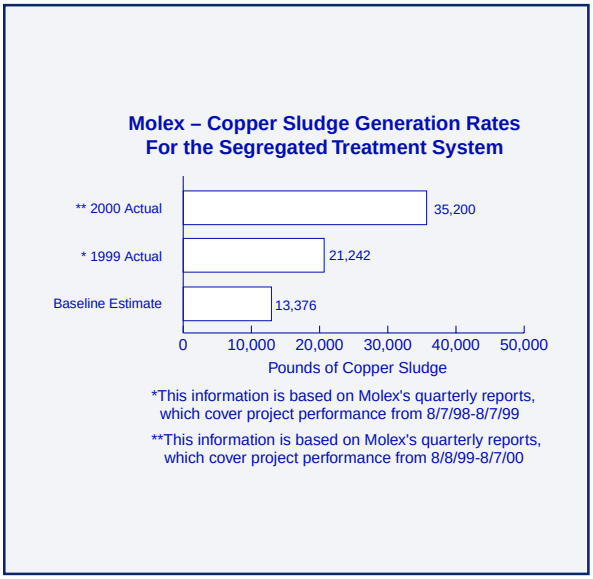


Figure 27

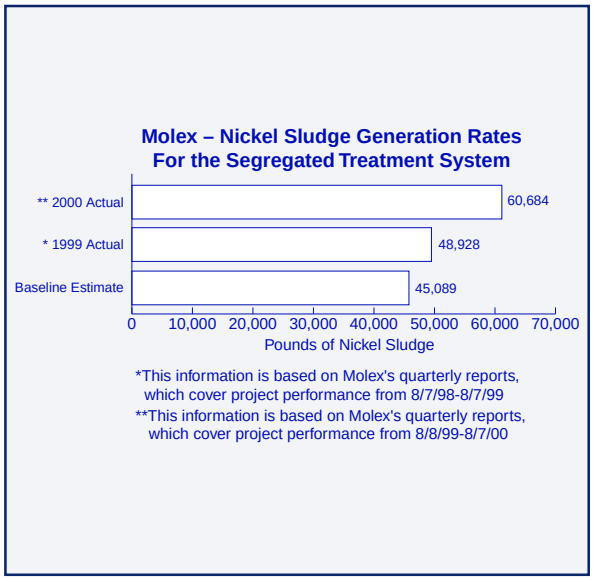


Figure 28

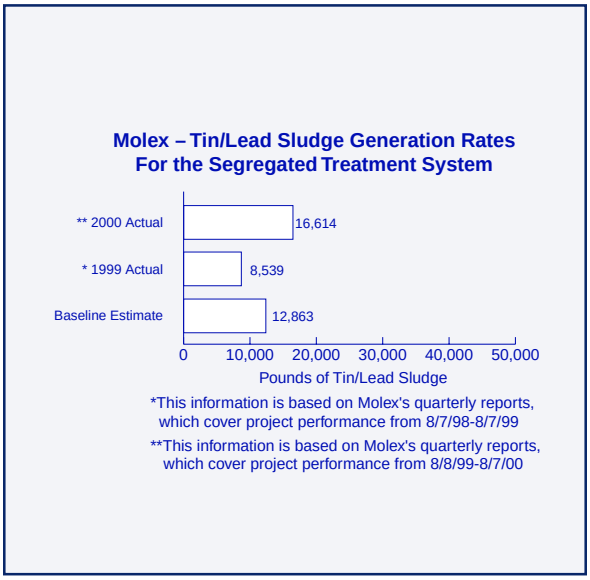


Figure 29

that the use of the segregated system has resulted in decreased copper concentrations in the POTW's effluent by 66 percent in 1999 and an average 76 percent reduction in 2000, compared to baseline. (see Figure 27)

– Molex estimated that 45,089 pounds of nickel sludge would be generated with the segregated treatment system. However, 1999 actual generation rates were 8.5 percent higher (48,928 pounds) than the estimated baseline. In 2000, a total of 60,684 pounds of nickel sludge have been generated. Based on the quarterly reports, and since this sludge is recycled, use of the segregated system has resulted in decreased nickel concentrations in the POTW's effluent by 67 percent in 1999 and 82 percent in 2000. (see Figure 28)

– Molex estimated that 12,863 pounds of tin and lead sludges would be generated with the segregated treatment system. Actual generation rates in 1999 were 34 percent lower (8,539 pounds) than the estimated baseline. However, in 2000, Molex has generated 16,614 pounds of tin and lead sludges. Based on the quarterly reports, and since this sludge is recycled, use of the segregated system in 1999 has resulted in estimated decreased concentrations of tin (98 percent) and lead (29 percent) in the effluent being discharged by the POTW. In addition, in 2000 the use of the segregated system has resulted in estimated decreased concentrations of tin (98 percent) and lead (44 percent) in the effluent. (see Figures 29 and 30)

– Molex estimated that it would be able to recycle 71,328 pounds of metals sludges in a year. However, the quarterly reports indicate that between August 1998 and August 1999, a total of 78,709 pounds of sludge were sent to the recycler, 10.3 percent more than estimated. In addition, in 2000, a total of 134,988 pounds of sludge were sent to the recycler, 89 percent more than expected. (see Figure 31)

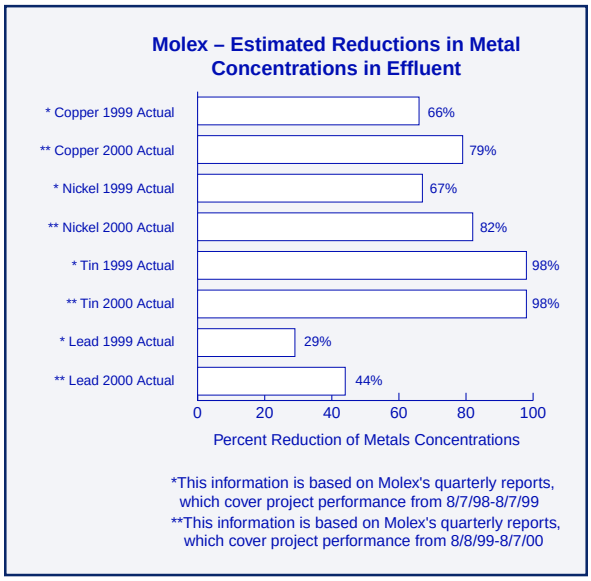


Figure 30

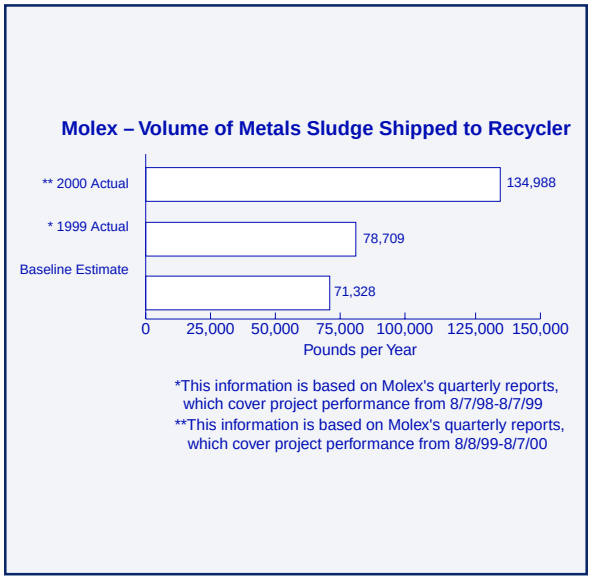


Figure 31

- In the next six months, NDEQ and EPA will review the analytical data and the final report provided by Molex in accordance with requirements in the temporary variance and the FPA. Among the factors to be considered in any final variance determination following the expiration of the existing temporary variance are (1) the degree of processing the material has undergone and the degree of further processing that is required, (2) the value of the material after it has been reclaimed, (3) the degree to which the reclaimed material is like an analogous raw material, (4) the extent to which an end market for the reclaimed material is guaranteed, (5) and the ability to handle the reclaimed material in a manner that minimizes loss.

Benefits for the Environment

- The amount of metals discharged to Lincoln, Nebraska's POTW have been reduced.

- A total of 213,697 pounds of sludge have been sent to the recycler since project inception. This direct recycling of mono-metals bearing sludges by reclamation facilities has decreased the need for mining of ores and the use of other virgin materials.

Benefit to Project Sponsor

- Molex has been allowed to handle the nonprecious mono-metals-bearing sludges as precious metals-bearing sludge and not as a RCRA hazardous waste. This results in a reduced cost of storing and shipping the sludge.

Benefits for Stakeholders

- Stakeholders were involved in the environmental design and impact assessment of the XL project and were given opportunity to participate fully in project development.

- The public will have access to periodic reports submitted by Molex to EPA through the XL Web site.

Key Issues Needing Resolution

- The two-year temporary variance was set to expire on August 7, 2000. EPA and NDEQ have granted an additional six-month variance. Molex has formally requested a two-year extension to continue the XL project under increased production. A decision by NDEQ and EPA on extending the variance an additional two years is expected after Molex has completed the final report.

Lessons Learned

- One stakeholder suggested that it would have been more helpful to give EPA Region 7, as opposed to EPA Headquarters, greater responsibility over the project.

- All parties involved in FPA development should know their roles and responsibilities at the beginning of FPA development.

- Late involvement of national groups delayed implementation of the project. However, this may have been avoided if EPA had encouraged national stakeholders to hold discussions with local stakeholders from the beginning of the project.

- One stakeholder noted that the project may have advanced more smoothly if more time was spent up front talking through the issues.

Information Resources

The information in this summary comes from several sources: (1) The December 1999 *Project XL Progress Report—Molex Incorporated* (EPA 100-R-00-011); (2) focus group discussions in December 1999 with representatives of the Molex Company, EPA Regional and Headquarters staff, World Resources (a national environmental group), Nebraska Department of Environmental Quality, and the City of Lincoln; and (3) Molex Project XL quarterly reports through September 2000.

New England Universities Laboratories

FINAL PROJECT AGREEMENT SIGNED SEPTEMBER 21, 1999

Background

The Project Sponsor: Boston College, the University of Massachusetts-Boston, and the University of Vermont make up the New England Universities Laboratories XL consortium. The management and disposal of chemical waste from laboratories is a significant issue for the universities; laboratory waste management accounts for the most substantial expense for their environmental, health, and safety programs. Boston College, with 14,000 students, has approximately 130 research and teaching laboratories. The University of Massachusetts-Boston has 13,000 students and 144 laboratories, and the University of Vermont has 10,000 students and 538 laboratories.

The Experiment: The Universities Laboratories project intends to test the integration of some of the current RCRA hazardous waste regulations with current Occupational Safety and Health Act (OSHA) regulations by requiring that the universities develop a plan similar to the OSHA required Chemical Hygiene Plan (CHP). As a result of the harmonization of the OSHA CHP and the RCRA-oriented Laboratory Environmental Management Plan, the new system will actively encourage chemical reuse and recycling, reduce costs, increase efficiency, and better educate laboratory professionals and researchers. In addition, the new system is expected to provide a better management approach for laboratories and to result in increased pollution prevention while still ensuring protection of human health and the environment.

The Flexibility: EPA published a new site-specific rule that creates a pilot performance-based system for managing laboratory waste at these three universities. This new Laboratory Environmental Management Standard defines criteria for the effective management of laboratory waste and incorporates requirements detailing the organizational responsibilities and the training requirements of each participating university laboratory. EPA and the states are providing the universities with a temporary conditional deferral from two specific RCRA regulations dealing with Hazardous Waste Determinations and Satellite Accumulation Provisions. Participating universities will be allowed to formally defer the hazardous waste determination from the laboratory to a central on-site location. This should allow the universities' Environmental Health and Safety professionals to more effectively manage the laboratory waste at the institutional level and thus increase reuse and recycling opportunities. Under the XL rule, the permissible time for waste pickups when stored laboratory waste reaches 55 gallons is extended from just 3 to 30 days. This flexibility allows for a more coordinated and efficient pickup and delivery system, which frees up staff time and prevents many of the compliance problems associated with hasty, last-minute pickups.

The Superior Environmental Performance: By offering regulatory flexibility to the participating universities in conjunction with the Environmental Management Plans, EPA, the Massachusetts Department of Environmental Protection, and the Vermont Department of Environmental Conservation will be able to evaluate the effectiveness of offering flexibility in waste determination and accumulation in order to encourage the more efficient management of hazardous waste at the university level as well as recycling, reuse, and pollution prevention efforts at universities. The information that will be gained on environmental benefits and cost savings experienced by the universities under this project may be used by EPA to develop a framework to address the potential transferability of this type of regulatory flexibility to university laboratories at large.

Progress in Meeting Commitments

(As of August 2000)

- The universities have met their commitment to complete a baseline report of current laboratory waste collection and disposal practices, the amount of waste generated and disposed of by each university, a "hazardous chemical of concern" inventory, and a survey of laboratory workers' environmental knowledge. (see Figures 32, 33, and 34)
- Vermont has promulgated a state-specific rule through revisions to the Vermont Hazardous Waste Management Regulations covering the participation of the University of Vermont.
- Massachusetts Department of Environmental Protection has issued a "Letter of Forbearance" as an interim measure until a state-specific rule that incorporates the terms of the Federal rule is finalized.
- The Laboratory Environmental Management Plans have been submitted to EPA and the appropriate state agencies for review and comment in order to ensure that the requirements of the Laboratory Environmental Management System have been met.
- The universities will be finalizing and implementing the Environmental Management Plans in the 2000-2001 academic year, including meeting the Minimum Performance Criteria in the laboratories and implementing the laboratory inspection program.

Benefits for the Environment

- The universities will reduce the overall amount of hazardous waste generated from participating laboratories by 10 percent (from baseline) over the life of the project.
- The universities will increase the reuse of laboratory waste by 20 percent (from baseline) over the life of the project. Currently, less than 1 percent of all laboratory waste produced in university labs is estimated to be reused.

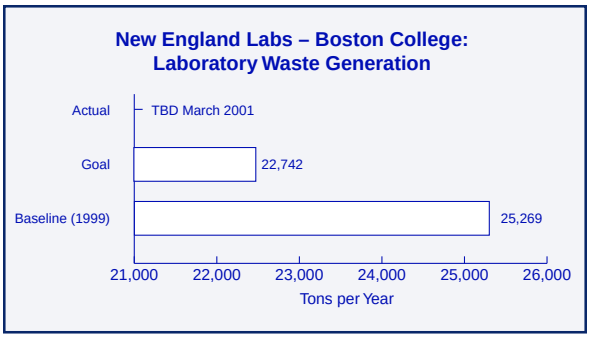


Figure 32

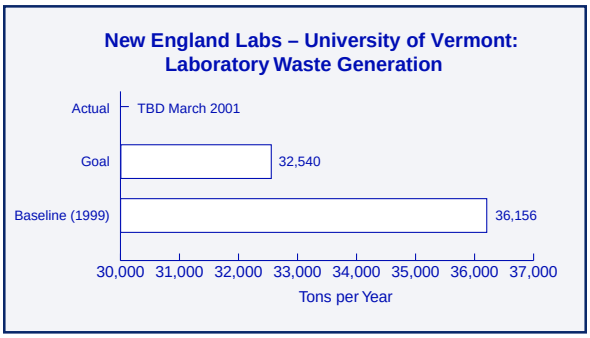


Figure 33

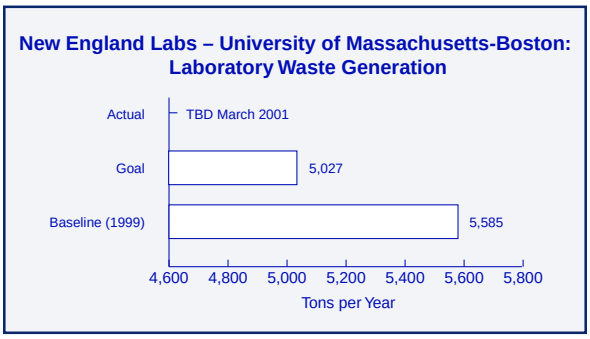


Figure 34

Benefits for Stakeholders

- Implementation of the Environmental Management Plans in each of the laboratories on campus will increase laboratory workers' familiarity and knowledge of proper laboratory waste disposal methods and increase awareness of possibilities for chemical reuse and recycling.

Benefits for the Project Sponsor

- Deferral of hazardous waste determination from the laboratory to a central on-site location will allow the more effective management of laboratory waste at the institutional level and thus increase reuse and recycling opportunities.

- Increase of permissible time for waste pickups from 3 to 30 days will allow for a more coordinated and efficient pickup and delivery system, which frees up staff time.

- The benefits of this project include the development of infrastructure and training designed to increase waste minimization and an organized and coordinated campus-wide chemical reuse system.

Information Resources

The information in this summary comes from the following sources: (1) the FPA for the New England Universities Laboratories Project, September 1999; (2) Project XL Site Specific Rulemaking for University Laboratories, Final Rule, published in the Federal Register September 28, 1999; (3) Amendments to Vermont's Hazardous Waste Management Regulations, March 2000; (4) Boston College's Draft Environmental Management Plan, April 2000; and (5) New England Laboratories Project XL Baseline Assessment, June 28, 2000.

New York State Department of Environmental Conservation

FINAL PROJECT AGREEMENT SIGNED JULY 12, 1999

Background

The Project Sponsor: The New York State Department of Environmental Conservation (New York State DEC) was created on July 1, 1970, to bring together in a single agency all state programs directed toward protecting and enhancing the environment. The New York State DEC is responsible for administration and enforcement of the New York State Environmental Conservation Law. The New York State DEC has three main functions: natural resource management, environmental quality protection, and the promotion of human health, safety, and recreation.

The Experiment: The New York State DEC project would allow public utilities located in New York State to consolidate hazardous wastes generated at remote locations (e.g., manholes). The project will allow the utilities to consolidate the waste at a central collection facility for up to 90 days before transport and disposal, rather than having to transport piecemeal such wastes directly to permitted hazardous waste treatment/disposal facilities.

The Flexibility: RCRA regulations generally require utility companies that generate hazardous wastes at remote locations (e.g., manholes) to transport such wastes directly to treatment, storage, or disposal facilities (TSDFs). Under this project and its site-specific rule, the participating utilities will instead be able to transport the waste to off-site central collection facilities, where they may consolidate waste within 90 days. In addition, participating utilities will be allowed to submit a single Biennial Report for the central collection facility, rather than for each remote location from which hazardous waste is generated.

The Superior Environmental Performance: The project requires each participating utility to reinvest one-third of its direct cost savings into one or more new environmentally beneficial projects; reduces the risk of hazardous waste releases at remote locations (e.g., manhole covers) while avoiding traffic disruptions; allows the consolidation of similar wastes at central collection facilities, which will reduce the number of vehicle trips to often distant treatment, storage, and disposal facilities; and simplifies existing paperwork and reporting requirements.

Progress in Meeting Commitments

(As of July 2000)

- EPA has published a final rule that will allow participating New York State utilities to consolidate hazardous waste generated at remote locations. The rule became effective January 10, 2000.
- On February 23, 2000, New York State DEC issued an enforcement directive that allows the state to proceed with implementing the XL project until it publishes its own state rule.
- On October 7, 1999, the Atlantic States Legal Foundation and other parties filed a Petition for Review of EPA's final Project XL Rule for New York State Public Utilities in the U.S. Court of Appeals for the District of Columbia Circuit. EPA is currently exploring the option of settlement with these petitioners.

Benefits for the Environment

- This project will increase public safety by facilitating and requiring the expeditious removal of hazardous wastes from remote locations.

Benefits for Stakeholders

- Public utilities should realize considerable direct-cost savings through more efficient transportation use from centrally consolidating hazardous wastes and thereby reduce the number of lengthy trips made by waste transporting vehicles.

- The project also will eliminate the need to report remote locations under separate identification numbers and will allow the participating utilities to biennially report waste generated at separate remote locations.

- Overall, the results of this project will minimize unnecessary paperwork and more efficiently use time and labor resources.

Benefits for the Project Sponsor

- This project will bring about a significant reduction in paperwork and savings in time and labor, both for public utilities and environmental regulatory agencies, who can then redirect such resources to other environmental needs.

Key Issues Needing Resolution

- The outcome of the Petition for Review may impact the implementation of this Project. In light of this, New York State DEC has placed a moratorium on accepting applications from utilities to participate in the project.

Information Resources

The information sources used to develop this progress report include: (1) the December 1999 *Project XL Progress Report—New York State Department of Environmental Conservation* (EPA-R-00-0017) and (2) the Final Rule adopted by EPA on July 12, 1999.

Weyerhaeuser Company Flint River Operations

FINAL PROJECT AGREEMENT SIGNED JANUARY 17, 1997

Background

The Project Sponsor: The Weyerhaeuser Company (Weyerhaeuser) is one of the largest private owners of forest, with 5.4 million acres in the United States. Among its products are timber, paper, and pulp. Weyerhaeuser's Flint River pulp manufacturing facility in Oglethorpe, Georgia, manufactures 320,000 tons per year of absorbent fluff pulp used in diapers. The facility was opened in 1981 and is located 100 miles southwest of Atlanta, Georgia.

The Experiment: Weyerhaeuser is striving to minimize the environmental impact of its manufacturing processes on the Flint River and the surrounding environment by pursuing a long-term vision of a minimum impact mill (MIM). Minimum impact manufacturing contains the elements of a comprehensive pollution prevention program designed to minimize the use of raw materials and to stop waste generation rather than to rely on "end-of-pipe" remedies. MIM involves multidisciplinary teams employing a systems engineering approach, waste reduction, and a commitment to continuous improvement rather than the more traditional "project" focus. Specifically, the Weyerhaeuser project tests a facility-wide permitting approach addressing water effluent discharges, air emissions, and solid waste generation that is designed to promote the MIM concept.

The Flexibility: EPA Region 4 and the State of Georgia have revised Weyerhaeuser's National Pollution Discharge Elimination System (NPDES) permit both to include more stringent effluent limits on biological oxygen demand (BOD), total suspended solids (TSS), and adsorbable organic halides (AOX), and to streamline the permit renewal process. EPA Region 4 and the State of Georgia have modified the facility's existing air quality permit to include dual emission caps for air pollutants. The dual emission caps are (1) a cap that allows the recovery furnace, smelt dissolving tank, calciner, and combination boiler (the facility's four major sources of emissions) to be operated to their design capacity without triggering permit review and (2) a cap covering all facility sources except those four major sources. The dual emission caps contain separate limits for particulate matter, sulfur dioxide (SO_2), nitrogen oxides (NO_x), carbon monoxide (CO), volatile organic compounds (VOCs), and total reduced sulfur (odor-causing pollutant). The modified air quality permit also streamlines the permit renewal process, includes alternate excess emission reporting protocols, and includes a protocol for conducting manufacturing process experiments without triggering a permit review. EPA Region 4 and the State of Georgia have agreed to provide Weyerhaeuser the flexibility to demonstrate hazardous air pollutant (HAP) emission reductions that would use innovative pollution prevention approaches rather than end-of-pipe HAP controls. Weyerhaeuser will prepare an alternative compliance plan that will present the HAP emission reductions to be achieved by the facility following the April 15, 1998, promulgation of the maximum achievable control technology (MACT) cluster rule for the pulp and paper industry. EPA will use a site-specific rulemaking or similar mechanism to authorize alternative MACT compliance. EPA Region 4 and the State of Georgia will modify Weyerhaeuser's solid waste permit to allow nonhazardous industrial wastes containing free liquids to be disposed of in a permitted, onsite landfill.

Other Innovations: (1) *Reporting Burden Reduction*: The Weyerhaeuser project allows the facility to consolidate reporting for some of the applicable Federal, state, and local permitting and regulatory programs into two comprehensive reports each year. Also, the facility is allowed to eliminate fish tissue sampling requirements due to improvements in process technologies that have eliminated detectable dioxin levels in effluents, remove a requirement for additional assimilative capacity studies, and perform annual compliance certification in lieu of periodic discharge monitoring reporting (DMR) due to the company's 16-year history of meeting all required discharge levels. (2) *Environmental Management System (EMS):* Weyerhaeuser will voluntarily institute an Interna-

tional Organization for Standardization (ISO) 14001 EMS at the Flint River facility. The facility is developing a comprehensive procedures manual that conforms to the ISO 14001 standard, which will, in turn, provide data for EPA's evaluation of options for an Agency policy on EMS. (3) *Best Management Practices:* Weyerhaeuser will also reduce solid and hazardous waste generation and improve forest management practices in more than 300,000 acres of timberland. EPA will participate in review and evaluation of feasibility studies with potential applicability of results across the pulp and paper industry.

The Superior Environmental Performance: Weyerhaeuser will (1) reduce allowable air emissions by 60 percent under the dual emissions caps, (2) cut bleach plant effluent by 50 percent over a 10-year period, (3) reduce water usage by 1 million gallons a day, (4) cut solid waste generation by 50 percent over a 10-year period, and (5) prepare and implement a facility-wide plan to reduce energy use.

Progress in Meeting Commitments

(As of June 2000)

- Overall, Weyerhaeuser has been very successful in meeting its environmental commitments under the project.
  - Weyerhaeuser's site-wide air quality permit for the Flint River facility in Olgethorpe, Georgia, includes dual emission caps for air pollutants. The following caps are based on a 60 percent reduction from the levels a standard permit would allow—particulate matter at 589 tons per year, total reduced sulfur at 62 tons per year, SO_2 at 879 tons per year, NO_x at 1,300 tons per year, CO at 2,516 tons per year, and VOCs at 778 tons per year. In 1998, the Flint River facility's actual emissions were the following: particulate matter at 395 tons, total reduced sulfur at 35 tons, SO_2 at 303 tons, NO_x at 814 tons, CO at 1,599 tons, and VOCs at 632 tons. Weyerhaeuser will report the 2000 actual emission values at the end of 2000. (see Figure 35)

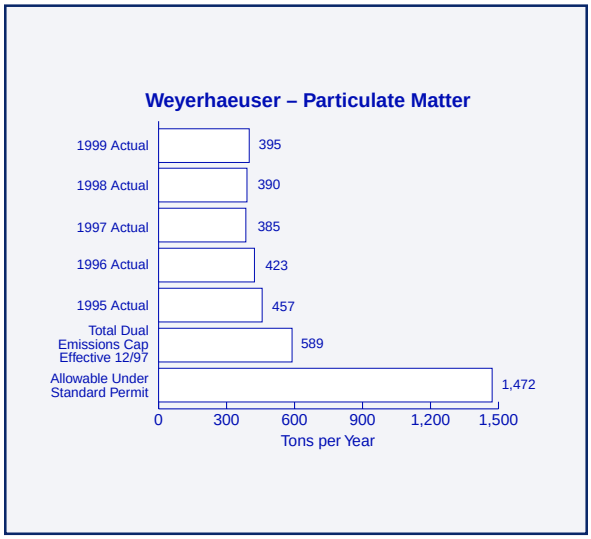


Figure 35

– Weyerhaeuser will (1) reduce the allowable air emissions by 60 percent under the dual emission caps and (2) continue to look for new developments that may help reach the goal of reducing bleach plant effluent by 50 percent over a ten-year period. Weyerhaueser has committed to researching the feasibility of implementing future technological developments in the industry that may allow the facility to reduce its bleach plant effluent flow by 50 percent to 10 cubic meter per air dried metric ton (ADMT) of finished product (fluff pulp used to make diapers) by the year 2006. The environmental benefits projected include a reduction in water usage (the bleach plant accounts for approximately half of the plant's water usage) and reductions in effluent limits on BOD, TSS, and AOX. To reach its goal, Weyerhaeuser has conducted feasibility studies on its water use. The results of these studies will be used by EPA, the State of Georgia, and Weyerhaeuser to negotiate a NPDES permit to be issued in 2002. An ultrafiltration pilot test has been initiated at another Weyer- haeuser facility; these results may be used to reduce bleach plant effluent flow at the Flint River facility. Weyerhaeuser already has modernized several components of the pulping process, reducing the amount of BOD, TSS, and AOX in bleach plant wastewater. The facility's January 1998 NPDES permit allows the discharge of 3.8 pounds of BOD per ADMT of finished product and 4.09 pounds of TSS per ADMT of finished product. In 1998, the facility reduced BOD in its effluent to 2.13 pounds per ADMT and TSS in its effluent to 2.80 pounds per ADMT. In 1999, the BOD in effluent slightly increased to 2.83 pounds per ADMT and TSS in effluent increased to 3.87 pounds per ADMT. For the first six months of 2000, the BOD increased to 4.01 pounds per ADMT and TSS increased to 4.60 pounds per ADMT. The permit also allows the discharge of 0.15 kilograms of AOX per ADMT. In 1998, adsorbable organic halide levels peaked at 0.13 pounds

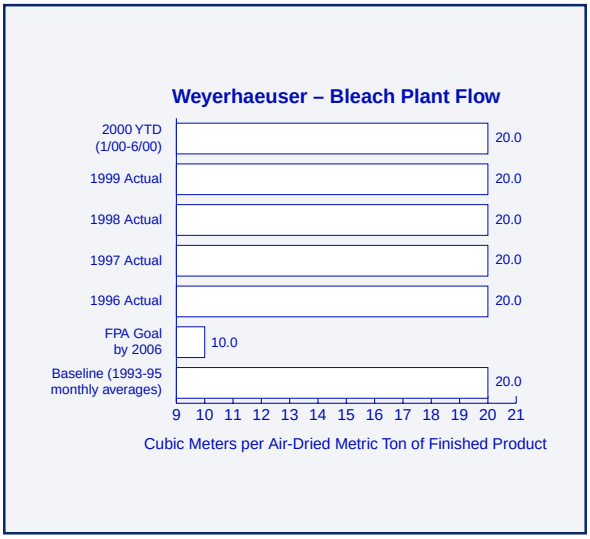


Figure 36

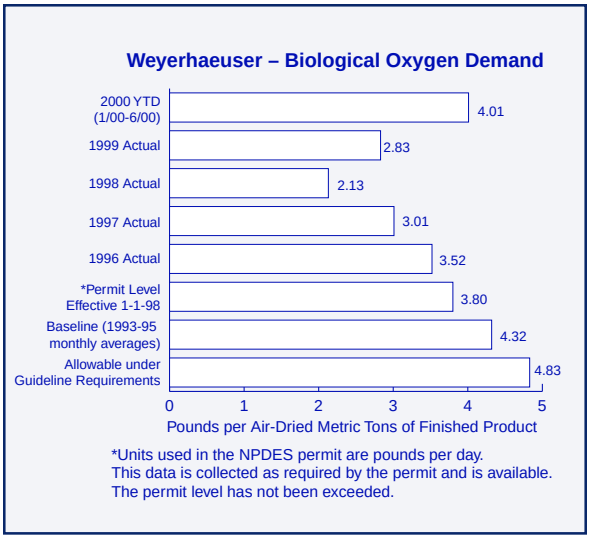


Figure 37

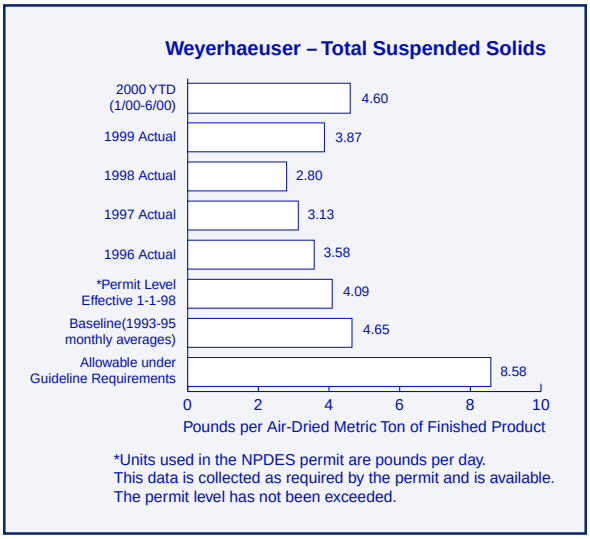


Figure 38

per ADMT due to an increase in customer demand for high-brightness pulp. As a result, the facility has altered its use of brightening chemicals in the bleach plant area and has been able to regain the project average of 0.10 kilograms of AOX per ADMT. In 1999, AOX remained at 0.10 kilogram per ADMT. AOX has decreased to 0.09 kilogram per ADMT through June 2000. (see Figures 36, 37, 38, and 39)

– Weyerhaeuser also committed to reduce the facility's use of water from the Flint River to 11.5 million gallons a day (MGD) monthly average which, in turn, will reduce the quantity of treated wastewater discharged back into the river. Weyerhaeuser's long-term goal is to reduce water withdrawal from the Flint River to a voluntary limit of 10.18 MGD monthly average. Baseline water withdrawal at the facility was 11.18 MGD monthly average based on average monthly values for 1993 through 1995. Water use reductions anticipated from modernization projects were not sufficient to offset increased water usage from other facility process areas, which resulted in 1997 raw water use of 11.74 MGD monthly average. In 1998, the total usage returned to 11.49 MGD monthly average through the daily water conservation focus of the production operators. In 1999, the water use increased to 11.92 MGD monthly average. The primary cause for this increase was a customer demand for a higher-brightness pulp. In February 2000, the Flint River facility initiated several water usage reforms that have reduced average daily water usage by 500,000 gallons per day by the end of June 2000, bringing the total to date raw water usage to 11.47 MGD. Water use reductions will continue to be a focus area within the MIM Phase V feasibility studies. (see Figure 40)

– Weyerhaeuser's goal is to reduce its 1995 level of solid waste generation by 50 percent by the year of 2006. This goal will be accomplished through source elimination

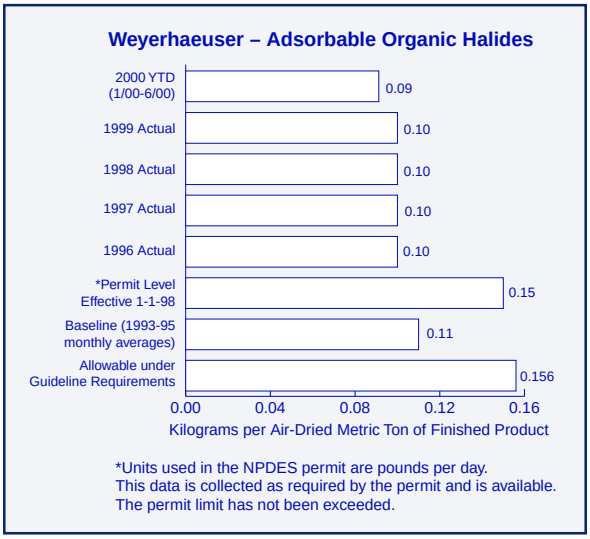


Figure 39

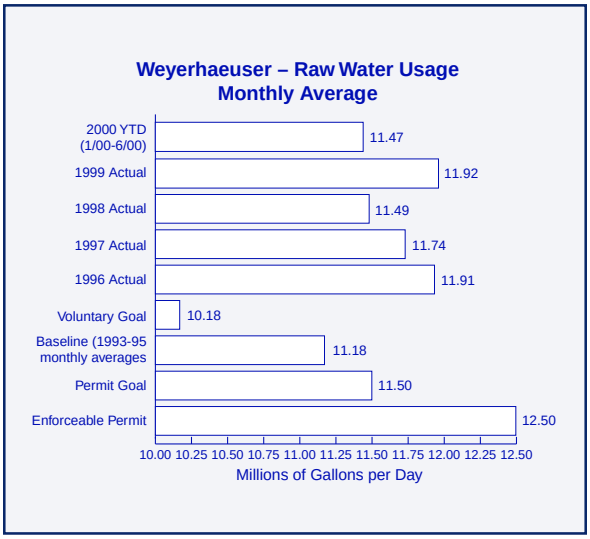


Figure 40

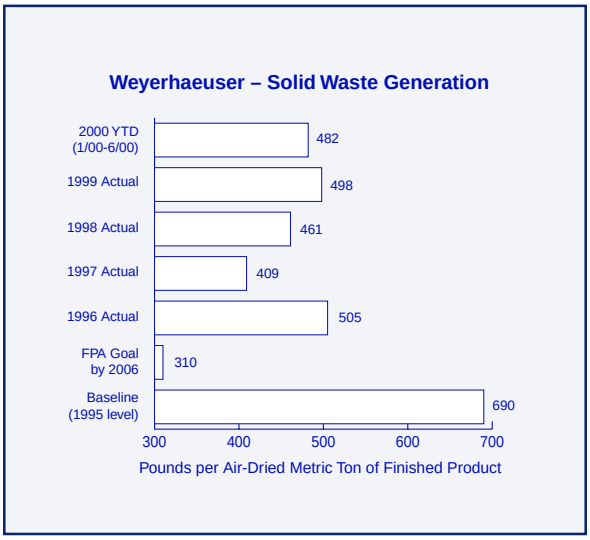


Figure 41

and byproduct recycling and reuse. Weyerhaeuser has modernized several components of its pulping process, which has generally reduced the amount of solid waste generated by the plant. The facility has begun recovering and reusing lime muds used in its manufacturing processes. The solid waste generation for 1999 was 498 pounds per ADMT of production. This is an increase over the 1998 level of 461 pounds per ADMT, but below the baseline of 690 pounds per ADMT generated. This increase was caused primarily by continued calciner operating and mechanical issues and an increase in wastewater primary clarifier sludge. Other reductions achieved in 1999 were approximately 126 tons in screening room knots and 630 tons of power boiler fly ash. Through June 2000, solid waste generation decreased to 482 pounds per ADMT. The mill will be initiating a major study in the second half of 2000 to determine the scope required to meet the 2006 solid waste goal. In addition, the plan to refine composting methods and cost was completed in the first half of 2000. If possible, approval will be sought during 2001. In addition, the power boiler advanced control study is in progress to investigate ways to reduce combustion of fly ash from the boiler. The study is expected to take approximately one year to complete. In addition, wood yard sticks from the debarking room are currently being recovered back to the fiberline via the log flume. (see Figure 41)

- Weyerhaeuser also will be required to reduce hazardous air pollutant emissions equivalent to the reductions that would have been achieved under the MACT pulp and paper cluster rule. Specific methods for attaining reduced levels will be determined based on a site-specific assessment conducted by the facility, an alternative compliance plan developed by the facility, and EPA and the State of Georgia's approval of that alternative compliance plan through a site-specific rulemaking or similar mechanism. On schedule, Weyerhaeuser has submitted the site-specific compliance plan. During the past six months, a draft site-specific MACT rule has been written to formalize this agreement, as specified in the FPA, and is in circulation for approval within EPA. Weyerhaeuser already has modernized several components of the pulping process, which has reduced emissions from its pulp bleach plant.

- Weyerhaeuser has feasibility studies in progress on composting facility byproducts and applying the composted material on timberlands. This trial is continuing into the second growing season. Soil sampling and growth rate measurements have been conducted on a quarterly basis. Weyerhaeuser has observed no effect on the mortality rate of seedlings during the first growing season. In subsequent years, the growth rate is expected to be positively impacted.

- Weyerhaeuser has completed three small-scale energy conservation studies, and it has completed a facility-wide energy conservation study. As an outcome of the Energy Conservation Study, an energy goal of 20,000 pounds of steam/ADMT has been set. Weyerhaeuser has included one energy conservation project in the plant's major capital funding plan for consideration in 2001.

- Weyerhaeuser has met its commitments to upgrade equipment, study process changes, reduce effluent discharges, reduce air emissions, reduce hazardous substance use, recycle solid wastes, implement timberland management practices, conduct stakeholder meetings, and prepare progress reports.

- Weyerhaeuser is working towards reorganizing and documenting the Flint River EMS to conform to the ISO 14001 standard. Most of the high-level documentation has been completed and significant environmental aspects have been identified, 50 percent of which have been documented. The plant has prepared a training package on EMS responsibilities for plant leadership, team leaders, and all mill employees. An initial EMS audit is scheduled for November 2000. Weyerhaeuser plans to have a fully functioning EMS that conforms to ISO 14001 completed by the end of 2000.

- In the next six months, Weyerhaeuser plans to identify and implement water conservation measures to drive towards the goal of 10.18 MGD total water usage and define possible water reuse and reduction opportunities that would reduce bleach plant effluent flow. In addition, Weyerhaeuser will continue efforts in energy conservation and complete the effort to convert Flint River Operation's EMS into ISO 14001 EMS in 2000.

Benefits for the Environment

- As of January 2000, the amounts of BOD and total suspended solids per ton of finished product have been reduced to 34 percent and 17 percent, respectively, from the baseline.
- As of June 2000, the amount of solid waste generated has been reduced by 30 percent.
- Over the course of the project, actual air emissions of particulate matter, total reduced sulfur, NO_x, and CO, have been reduced with decreases ranging from 10 percent for total reduced sulfur to 2 percent for NO_x.
- After initiating several energy conservation measures by June 2000, the total plant steam usage has decreased by 4 percent and the power boiler steaming rate has decreased by 27 percent.

Benefits for Stakeholders

- Stakeholders have a better understanding of facility operations.
- Stakeholders continue to have better access to project information directly from the facility in a simplified, consolidated report
- Stakeholders also continue to have the opportunity to learn more about the project and its progress in meeting project goals status by attending Weyerhaeuser Company's annual stakeholder meeting.

Benefits for the Project Sponsor

- Weyerhaeuser achieved an estimated savings of $176,000 in reporting burden costs during the first year of operation as a result of the successful revision and reissue of the facility's air quality and wastewater discharge permits.
- Weyerhaeuser foresees avoiding $10 million in future capital spending; while it expects to spend $10 million on new water equipment, it will also save $20 million that it otherwise would have had to spend on air pollution equipment.
- The "bubble" concept for air emission regulations (i.e., the dual emissions cap) allows the company to avoid costly unnecessary permit reviews.
- The MACT applicability assessment and site-specific rule will allow the company to meet or exceed the environmental benefits that would have resulted from new regulations in a manner that is less costly for the facility.
- EMS implementation has begun to increase staff education and awareness of the environmental aspects of their jobs.

Spin-off Benefits

- The cooperative relationship between regulators and the company has had benefits beyond the company because of the company's efforts to educate other pulp and paper facilities and timber suppliers. Specifically, Weyerhaeuser is working with other timber suppliers and the Georgia Forestry Commission to promote best management practices on timberland and plantations.
- The Weyerhaeuser approach to solid and hazardous waste reduction (e.g., recovering lime muds) is providing a case study that the State of Georgia will use with other pulp and paper mills.
- By working directly with a state-of-the art facility, EPA is gaining real-world information and experience about pulp and paper facilities.

Key Issues Needing Resolution

- The delays in conducting feasibility studies for the air emissions and part of the solid waste portions of the project have occurred in part because Weyerhaeuser has a set budget and must prioritize staff time. Also, it takes time to get the permits needed to initiate and conduct the studies.

- Three energy conservation projects—the recovery boiler sootblower steam, power boiler advanced controls, and the turbo generator exhaust pressure control—are currently in progress to improve the efficient use of steam in the plant. Weyerhaeuser is monitoring these projects to determine if they result in less steam generation. A major steam-saving project will be initiated in 2001 if the necessary funding is approved.

- At this time, it is not known how much cost savings Weyerhaeuser will gain through implementing the dual emissions cap as a result of facility expansion, because no expansion is planned at this time.

Lessons Learned

- Site visits early in FPA negotiations helped to build trust and educate regulators about facility operations.

- Stakeholders want more education (i.e., technical assistance) early in the FPA negotiation process.

- Including permit language in FPA appendices was very important for smooth implementation of the project commitments by Weyerhaeuser, EPA, and the state.

- Conducting studies on changes to manufacturing processes takes more time than the project participants expected.

- The facility has a set budget, and therefore staff time has to be prioritized for implementing different parts of the FPA, particularly the voluntary and feasibility study commitments.

- All employees should be involved in the development of an integrated EMS.

Information Resources

The information in this summary comes from the following sources: (1) the December 1999 *XL Project Progress Report—Weyerhaeuser Flint River Operations* (EPA 100-R-00-006); (2) Focus group discussions on December 1998 with representatives of the Federal and state regulatory agencies, Weyerhaeuser Flint River Operations, and a local stakeholder involved in the project; (3) annual and midyear reports prepared by Weyerhaeuser Corporation available through August 2000; and (4) focus group discussions in January 2000 with representatives of the Federal and local regulatory agencies, Weyerhaeuser, and a local stakeholder.