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Eastman Kodak Pollution Prevention Framework
Project XL Progress Report – August 2003

In 1995, the U.S. Environmental Protection Agency (EPA) embarked on a series of innovative initiatives in an effort to test new ways to achieve greater public health and environmental protection at a more reasonable cost. Through Project XL, which stands for eXcellence and Leadership, EPA enters into specific project agreements with public or private sector sponsors to test regulatory, policy, and procedural alternatives that will produce data and experiences to help the Agency make improvements in the current system of environmental protection. The goal of Project XL is to implement projects that will test ways of producing superior environmental performance with improved economic efficiencies, while increasing public participation through active stakeholder processes. EPA Project XL Progress Reports provide overviews of the status of XL projects that are implementing Final Project Agreements (FPAs). The progress reports are available on the Internet via EPA's Project XL Web site at http://www.epa.gov/Project XL. Hard copies may be obtained by contacting the Office of Policy Economics and Innovation's Project XL general information number at 202–260–5754. Additional information on Project XL is available on the Web site or by contacting the general information number.

Background

Eastman Kodak is a leader in imaging, and a manufacturer of imaging systems (e.g., cameras, scanners) and media (e.g., film, photographic paper, photographic chemicals). Kodak employs 46,300 people in the United States and has manufacturing facilities in Rochester, New York; Windsor, Colorado; Peabody, Massachusetts; and White City, Oregon. Kodak's Health and Environment Laboratory (HAEL), in Rochester, which evaluates materials and equipment involved in manufacturing processes or under consideration for use in new products, is implementing this XL project. HAEL's functions include toxicology, environmental and safety testing, risk assessment, risk communication, and risk management. The HAEL staff is active in a number of community outreach activities, including annual neighborhood environmental awareness public meetings, environmental awareness education at local high schools, health and environmental sciences programs at the University of Rochester, and Rochester Institute of Technology.

As a leader in new technology development in the imaging industry, Kodak registers many new chemical substances with the EPA each year. Once approved, these substances may be used in one or several of the company's facilities; it is these substances that allow the company to develop and improve its products. The development of environmentally benign products is consistent with Kodak's vision of producing innovative new products for imaging while protecting the quality of the environment.

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The Experiment

Under the Toxic Substances Control Act (TSCA), EPA's Office of Pollution Prevention and Toxics (OPPT) is responsible for ensuring new chemicals do not pose an "unreasonable risk" to workers, consumers, and the environment. Consequently, EPA has developed screening methodologies based on a set of computerized risk screening tools to assist in characterizing the fate and hazards likely to arise from the manufacture, use, and disposal of new chemicals. This screening methodology is known as the Pollution Prevention Assessment (P2) Framework. The framework allows companies to (1) calculate or estimate important risk-related properties based on analyses of chemical structures and (2) design safer chemicals, reduce waste generation, and identify other pollution prevention opportunities. It is quick and easy to use, relatively inexpensive, and can be applied before a chemical is even synthesized.

In this project, Kodak continues to employ the P2 Framework to pre-screen new chemicals early in its product development cycle in order to develop more environmentally benign and cost efficient products. In addition to instituting full use of the P2 Framework at its facilities, Kodak is conducting three separate and independent outreach initiatives designed to make other industrial stakeholders aware of the source reduction, pollution prevention and economic benefits that result from use of the P2 Framework. Kodak continues to advocate use of the P2 Framework among its industry colleagues in the following ways.

1. *Kodak has been addressing the scientific community* by demonstrating how use of the P2 Framework can generate information previously unavailable to scientists in the chemical industry that helps generate comparative risk assessments of product alternatives that may lead to better pollution prevention outcomes.

2. *Kodak has been addressing the business community* by collaborating with EPA on a rigorous environmental cost accounting study to qualify the business and economic benefits gained from using the P2 Framework. The study provides information to industry sectors on understanding how they benefit from use of the P2 Framework through reduced product development costs, reduced liability, and reduced time to market.

3. *Kodak has been addressing industry senior managers* by communicating the benefits of applying the P2 Framework to chemical development at the highest levels of management within selected large companies. Kodak commissioned a management study of P2 programs in selected large companies which resulted in a report entitled "Pollution Prevention and Risk Reduction: Case Studies of Best Practice Companies." The study highlighted state-of-the-art P2 initiatives within leading firms, and included the business and risk reduction benefits of the P2 Framework.

This experiment has strived to show that increased use of the P2 Framework during the early stages of new chemical research and development, and dissemination of information about the P2 Framework within the industry, increases environmental decision-making, ultimately leading to the production of more environmentally friendly chemicals.

The Flexibility

Under Section 5 of TSCA, a prospective manufacturer must wait 90 days after submitting a pre-manufacture notice (PMN) before beginning to manufacture a product that contains a new chemical, during which time EPA must evaluate the report and identify potential risks of the new substance. Chemical manufacturers invest substantial resources into new product development before seeking EPA approval, and would like to minimize costs and risks associated with worker exposure, reporting, testing and recalls, and product liability. The flexibility in the project comes from shortening EPA's review period, which can represent a significant cost savings to the manufacturer, and increased efficiency in EPA's review process.

Often, EPA concludes its review of a PMN after 28 days for chemicals identified as "low risk drops." As a result of new and less toxic chemicals produced using the P2 Framework, Kodak expects that EPA would generally complete its review of Kodak's chemicals in 28 days or less. Kodak proposes that EPA allow Kodak to submit concurrently a PMN and a Test Marketing Exemption (TME) application for a new chemical substance, so that Kodak may commence manufacture for test marketing purposes 45 days after the TME is submitted and full-scale nonexempt commercial manufacture 90 days after the PMN is submitted. A shortened 45-day waiting period is available for chemicals for which EPA has no further concerns (i.e., no unreasonable risk, where EPA's review is completed in 28 days).

Promoting Innovation and Systems Change

Project XL provides EPA opportunities to test and implement approaches that protect the environment and advance collaboration with stakeholders. Three clear areas where the Project is promoting innovation and system change are in pollution prevention, reducing the regulatory burden, and stakeholder involvement. These are described below.

Pollution Prevention

EPA and Kodak believe that implementation of the P2 Framework across the industrial sector will change business practices, resulting in a greater focus on pollution prevention. The P2 Framework allows companies to improve the environmental performance (i.e., lower health hazard, lower environmental hazard, lower exposure potential) of products while reducing costs, decreasing potential liability, and improving market share.

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Reducing the Regulatory Burden

EPA and Kodak predict that the early use of the P2 Framework's screening tool by companies that submit PMNs will discourage the submission of PMNs for substances that might present an unreasonable risk to human health or the environment. Anticipating and addressing EPA's concerns prior to PMN submission greatly decreases the probability of adverse regulatory action later, and improves the efficiency of EPA's PMN review process.

Stakeholder Involvement

Directly involving business and technical stakeholders in the project is key to the goal of encouraging use of the P2 Framework during development of new chemicals submitted as PMNs to EPA. The sharing of this technology by EPA and the communication of its benefits by Kodak with other industrial stakeholders represents an unprecedented cooperative approach to pollution prevention.

Project Commitment Summary

Commitment	Status
Commitment #1 Apply P2 Framework in new product development	
Begin submission of P2 Framework evaluations with the first PMN submitted by Kodak after FPA signature.	Since the signing of the FPA, Kodak has reviewed materials that were possible candidates for commercialization using the P2 Framework. Of the materials that could have been commercialized, 24% were dropped early in the product development process. All PMNs submitted to EPA were cleared by the Agency through their standard review process. 100% of all notices, PMNs, LVEs, LoREXs, have been reviewed using the P2 Framework all of which were cleared by the Agency through their standard review process. Additionally, the program has been expanded to include P2 Framework review of new and existing intermediates, many of which may not be selected for future commercialization, and existing final chemicals, many of which may be deselected for future commercialization.
Provide copies of results of P2 framework model evaluations (e.g., computer printouts, where appropriate with PMNs.)	100% of all P2 Framework reviewed chemicals whether submitted to EPA or not use the analysis print outs during internal standard review programs for risk evaluations. With each PMN submission, Kodak included copies of the computerized P2 Framework analysis print outs for review by EPA staff.

Commitment # 2 **Communicating with, reaching out to and working with scientific and technical staff from a variety of companies to support awareness and implementation of the P2 Framework and or other risk screening methodologies**	
Kodak will engage in two or more outreach efforts within one year of FPA signature. To encourage early communications about the P2 Framework, outreach efforts conducted in anticipation of ratification of this FPA may be included in this milestone.	Kodak scientists have made more than 15 presentations on their use of the P2 Framework at scientific conferences and workshops. Note: conferences and publications are listed in the following section.
Commitment #3 **Completion of an Environmental Cost Accounting Study**	
Kodak, with support of EPA, will complete and disseminate an Environmental Cost Accounting Study within one year of FPA signature.	Kodak, working with EPA and the Tellus Institute in Boston, Massachusetts, completed the report in August 2000. The study is titled: Design for Competitive Advantage: The Business Benefits of the EPA Pollution Prevention Assessment Framework in New Product Development (August 2000).
Commitment # 4 **Development of a management study describing the challenges of integrating pollution prevention into business practices**	
Kodak will complete a management study within one year of signature of FPA.	Kodak, working with The Bloustein School of Planning and Public Policy at Rutgers University, completed its portion of the best practices management study in October 2000. The study is titled: Pollution Prevention and Risk Reduction: Case Studies of Best Practice Companies, by Dr. Michelle Ochsner. Department of Urban Studies and Community Health, Rutgers University (October 2000). This study was published as: Ochsner, Michelle 2001. Case Study: Chemical Screening at Eastman Kodak Company, In: Environmental Quality Management, pgs 23-33.

Environmental Performance

This section summarizes progress in meeting the environmental performance commitments described in the FPA for Kodak.

Under this project, Kodak committed to improve environmental performance in two significant ways:

1) To use the P2 Framework in its own product development program and submit PMNs to

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EPA based on P2 Framework analysis data; and

2) To promote understanding about the use of the P2 Framework in product development to scientists and senior managers within the chemical industry and around the country.

Applying the P2 Framework

At the initiation of the FPA, Kodak reviewed materials that were possible candidates for commercialization using the P2 Framework. Of the materials that could have been commercialized, 24% were dropped early in the product development process. Dropped considerations are based on a variety of factors including potential health and/or environmental issues. Of the materials that were carried through to commercialization as PMN submissions to EPA, all (100%) were cleared by the Agency through standard review processes. Although the project allows Kodak to receive a reduction in the time to commercial materials through simultaneous submission of a PMN and Test Market Exemption, no reduction was requested because use of the P2 Framework early during product development made the reduction in clearance time unnecessary.

Subsequently, Kodak has not only continued to review chemical substances that are candidates for commercialization using the P2 Framework, but has expanded its program to include 100% of all chemical registration notices including LVEs and LoREXs, in addition to PMNs. The program has also been expanded to include P2 Framework reviews of new chemical intermediates, many of which may not be selected for commercialization, and existing intermediates and existing final chemicals many of which may be deselected for future commercialization.

With each PMN submission, Kodak includes hard copies of the computerized P2 Framework analysis for review by EPA staff.

Outreach to Scientific, Technical and Senior Management Components of the Chemical Industry

Since 1994, Kodak has been piloting use of the P2 Framework in its product development program. Kodak scientists have made the following presentations to chemical industry scientific and technical staff about their experience using the P2 Framework:

Living With TSCA 1999 and 2000: Kodak made presentations on the Kodak-EPA Technology Transfer Project and the use and application of the P2 Framework at "Living With TSCA Conferences" in 1999 and 2000. "Living With TSCA" is a major annual forum for industry-EPA dialogue regarding key issues associated with industrial chemicals under TSCA. The conference is sponsored by EPA and major trade associations dealing with industrial chemicals. The conferences provided opportunities to encourage a broad variety of companies from a variety of industry sectors to

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apply the P2 Framework in product development efforts.

Globe 98: Kodak presented a paper on, and discussed risk reduction opportunities associated with application of the P2 Framework at GLOBE 98. GLOBE is a bi-annual international conference focused on pollution prevention and risk reduction issues.
The GLOBE conference was a forum for informing the international scientific and business community about the benefits afforded by the P2 Framework.

QSAR 98: Kodak presented a paper at QSAR 98, which described the benefits of the P2 Framework and discussed the optimal points in the product development cycle for application of the Framework toward P2 outcomes. The QSAR conference series is a forum for information sharing relating to advances in the use and application of structure activity relationships, such as those employed in the P2 Framework.

National P2 Workshops: Kodak presented the keynote address and actively participated in several P2 Framework national workshops sponsored by EPA at State and regional locations. Among other issues, Kodak described the application of the P2 Framework in risk screening, and demonstrated specific pollution prevention and risk reduction outcomes resulting from use of the P2 Framework. Industry sectors participating in the workshops include:

- machine tooling
- consumer products
- pharmaceuticals
- electronics
- dyes and pigments
- fabric finishing agents
- pulp and paper
- industrial chemicals
- automotive supply
- industrial laundry products
- specialty chemicals
- automotive fuel additives
- waste management
- microprocessors
- military applications
- synthetic rubber
- plastics
- paints and coatings
- photo-chemicals
- aerospace
- mining

American Industrial Hygiene Conference. (June 5, 2001; New Orleans, LA). Forum on Cost Effective Applications of Exposure Modeling and Exposure Assessment and OSHA Compliance. Kodak presented a paper on its experience using P2 Framework. EPA presented a paper on the P2 Framework from the perspective of the framework developer.

Society for Environmental Toxicology and Chemistry (SETAC) (November, 2001) Kodak presented a poster on Project XL at the 2001 SETAC Meeting in Baltimore, MD.

National SETAC Annual Meeting 2002 (Salt Lake City, UT): Kodak participated in a half-day workshop entitled “Best Practices in Chemical Risk Assessment”. Kodak presented results and overview in the risk assessment platform session.

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North East Regional SETAC Meeting 2002 (Portland, ME): Kodak presented a talk on "Project XL and the Use of the P2 Tools at Eastman Kodak".

Cornell University Graduate Environmental Science Program 2002 (Ithaca, NY): Kodak presented the "Use of the Pollution Prevention (P2) Tools at Eastman Kodak Company" to graduate students and faculty in the Institute for Comparative and Environmental Toxicology (ICET) at Cornell University.

Rochester Institute of Technology Aquatic Toxicology Program 2002: Kodak undergraduate student presented a paper on the use of the P2 Framework to class students who may eventually become a part of the scientific or business communities.

Along with other stakeholders. Kodak participated in a briefing session on the use of the P2 Tools to Linda Fisher, Assistant Administrator, USEPA on June 17, 2003, in Washington, DC.

Chemical Safety Assessment Symposium. Kodak will present a paper, "The Use of Computerized Tools for Chemical Safety Assessment During Product Development". Scheduled for September 2003.

Outreach in Support of State and Federal P2 Programs:

Waste Watch Conference: Kodak presented a joint paper with the EPA on P2 Technology Transfer at the 1997 Waste Watch Conference in Woods Hole, MA. The EPA, State P2 programs, and public interest groups interested in promoting P2 at State and local community levels sponsored this conference. The presentation focused on how States could become involved in promoting design for the environment activities through P2 Technology Transfer.

NYS DEC P2 Conference: Kodak gave a paper at the 12th Annual Pollution Prevention Conference sponsored by the New York State Department of Environmental Conservation. Kodak's paper discussed the risk reduction benefits afforded by the P2 Framework in product development efforts.

Congressional Review of Pollution Prevention. Kodak worked with Congressional staff members to develop a review of pollution prevention activities for members of Congress. In October 2000, Kodak contributed information about its experience using the P2 Framework to a study by the Government Accounting Office (GAO) on legislative actions that promote or inhibit pollution prevention. The report is available to the public: Environmental Protection. EPA should Strengthen Its Efforts to Measure and Encourage Pollution Prevention. U.S. General Accounting Office Report to Congressional Requesters (GAO-01-283 February 2001).

Outreach to business audiences

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Kodak and five other companies participated in a study commissioned by the EPA and conducted by the Tellus Institute in Boston, Massachusetts to learn if data generated by the P2 Framework could reduce development costs for new chemicals and lead to production of environmentally benign products. EPA shared the P2 Framework with the five major companies who frequently submit PMNs. EPA wanted to learn if industry could use the P2 Framework to generate previously unavailable chemical-specific data. Tellus found that the P2 Framework can substantially affect the way companies develop new chemicals and approaches to reformulating existing products. The study by Votta T.J. and White A.L, is titled: Design for Competitive Advantage: The Business Benefits of the EPA Pollution Prevention Assessment Framework in New Product Development, Tellus Institute, Boston, MA.

Kodak HSE management along with presenters from the EPA, the Synthetic Organic Chemical Manufacturers, and CERM presented a workshop to business managers from the chemicals sector on the use of the P2 tools and how participation in the Sustainable Futures Program could help them achieve business and environmental goals (Informex, New Orleans, February, 2003)

Outreach to senior managers of industry counterparts

Kodak conducted a management study of P2 Programs in selected large companies with the assistance of The Bloustein School of Planning and Public Policy at Rutgers University. The study, entitled: Pollution Prevention and Risk Reduction: Case studies of best practice companies, by Professor Michelle Oshsner, highlights state-of-the-art pollution prevention initiatives within leading firms, including the business and risk reduction benefits of the P2 framework. The case studies highlight the following:

- Approaches that are currently being used by industry leaders to weigh relative risk in establishing pollution prevention objectives

- Organizational factors that promote or impede integrating P2 considerations into business practices and organizational practices, structures, linkages and incentives that promote attention to risk in "leader" organizations.

- External influences that promote or impede integrating pollution prevention into decision-making.

The peer reviewed study has been published by Professor Ochsner (Ochsner, Michelle. 2001. Case Study: Chemical Screening at Eastman Kodak Company, In: Environmental Quality Management, pgs 23-33)

Stakeholder Participation

The commercialization of new chemicals is not limited to one facility alone, therefore, there is no discrete stakeholder community affected by this project. However, part of the project involves interaction with several business and technical stakeholders, thus directly involving other industry groups. In addition,

the Kodak facility in Rochester is keeping its neighbors informed of pollution prevention activities through its active Kodak Park Community Advisory Council. Kodak also uses the Kodak Park Community Advisory Council and its leadership group to involve stakeholder groups such as private citizens interested in the implementation of the project. Kodak will use its bi-monthly publication entitled "Update to keep the community notified about the project and to encourage continued participation during project implementation.

Kodak's Stakeholder Plan involves outreach to local, regional, and national stakeholders. The first stakeholder meeting for the Kodak XL project was held on July 11, 2000, in Rochester, NY. Notifications for the meeting were sent to the 13,500 recipients of the Update newsletter published by Kodak Park, and a public notice for the meeting was published in the *Democrat and Chronicle* newspaper on June 26, 2000. Since then, Stakeholder meetings have been conducted annually on June 2001, July 2002, and August 2003. Individual letters were sent to Rochester and Monroe County officials and to stakeholders within national environmental organizations who had previously expressed an interest in the Project XL program. Stakeholder representatives attending the meeting, included the Monroe County Health Department, NYS Department of Environmental, City of Rochester, and neighborhood groups. The attendees gave positive feedback and asked to be kept appraised of the project's progress which continues on annual basis.

A copy of the Kodak XL project proposal is available in the reading area of the Kodak Park Neighborhood Information Center. An additional meeting will be scheduled for 2003. Outreach to business and scientific stakeholders will be made through presentations at regional and national meetings.

Project Contacts

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- Bill Waugh, EPA Headquarters, (OPPT), (202) 260-1216
- Jennifer Thatcher, EPA Region 2, (212) 637-3593

Information Sources

The information sources used to develop this progress report include: 1) discussions with representatives of the U.S. EPA and Eastman Kodak Company, 2) the FPA for the Kodak XL project; 3) summary of first stakeholder meeting held on July 11, 2000 in Rochester, NY; 4) midcourse review report prepared by Kodak; and 5) a report authored by Votta T.J. and White A.L, entitled: *Design for Competitive Advantage: The Business Benefits of the EPA Pollution Prevention Assessment Framework in New Product Development*, Tellus Institute, Boston, MA. The information sources are current through August 1, 2003.

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Kodak Web Sites with P2 and Project XL Information

http://www.kodak.com/global/en/corp/environment/kes/pubs/pdfs/HSE2002.pdf
http://www.kodak.com/country/US/en/corp/annualReport00/corpInfo/hse/hse.shtml

Glossary

Toxic Substances Control Act (TSCA): TSCA was enacted by Congress in 1976 to give EPA the ability to track the 75,000 industrial chemicals currently produced or imported into the United States. EPA screens these chemicals and can require reporting or testing of those that may pose an environmental or human-health hazard. EPA can ban the manufacture and import of those chemicals that pose an unreasonable risk.

Premanufacture Notification (PMN): A notice to EPA of a new chemical material as required under Section 5 of TSCA. Prospective manufacturers (or importers) of a new chemical material must submit a Premanufacture Notice to EPA and wait 90 days before they can begin manufacture or import of a new chemical substance. EPA has 90 days to analyze the structure of the submitted chemical to identify potential risk to health or environmental risk.

Low Volume Exemption (LVE): The Premanufacture Notice (PMN) rule exempts certain categories of new low volume chemical substances (i.e., chemicals manufactured at 10,000 kg/yr. or less) from full PMN review under Section 5 of the Toxic Substances Control Act (TSCA).

Low Releases and Low Exposures (LoREX) – The substance is expected to have low release and exposure under the requirements at 40 CFR 720.50. Notification required, using the PMN form. Manufacturer may begin 45 days after notification for qualifying products.

Toxicology: The study of the nature, effect and detection of poisons and the treatment of poisoning.

Major Milestones

September 30, 1999 – Kodak XL Proposal Submitted
September 14, 2000 – Final Project Agreement signed
September 14, 2003 – FPA termination date

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