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Industrial Pollution Prevention Project (IP3)

Summary Report

NOTE TO READER:

The format of this summary report has been designed so that the findings and conclusions of each IP3 document or overall document subject are contained in an exact even number of pages. This makes it possible to copy pages and obtain a handy, precisely self-contained summary of a particular document or overall document subject.

SUMMARY REPORT

of the

INDUSTRIAL POLLUTION PREVENTION PROJECT (IP3)

As part of EPA's emphasis on pollution prevention, the Agency set aside 2% of its FY1991 and FY1992 contract budgets for new pollution prevention initiatives. One of the proposed initiatives selected for funding and initiated in 1991 was the Industrial Pollution Prevention Project (IP3). The IP3 was an Agency-wide, multi-media project undertaken to examine:

- O how industrial pollution prevention can be incorporated into EPA's regulatory framework, and
- O how the pollution prevention ethic can be promoted throughout industry, the public, and all levels of government.

Outputs

In addition to establishing the institutional framework for ongoing pollution prevention (P2) implementation in four geographical regions, the IP3 has produced the following 23 documents:

- P2 Barriers and Incentives Study
- Statute Analysis
- Analysis of EPA's Effluent Guidelines Process
- An Effluent Guidelines Retrospective on the Leather Tanning Industry
- Studies of P2 Technologies for Selected Effluent Guidelines Industries
- IP3 Focus Group Recommendations: The Effluent Guidelines Process
- Waivers for Technology Innovation
- Proposed Clean Water Act Legislation
- International P2 Case Studies
- New England Demonstration Project
- New England Demonstration Project: EPA Region 1 Report
- New England Demonstration Project: Building Partnerships for P2
- Nebraska Demonstration Project
- Nebraska Demonstration Project: Technical Report #1
- Nebraska Demonstration Project: Technical Report #2
- Southern California Demonstration Project
- Southern California Demonstration Project: Technical Report
- Pacific Northwest Demonstration Project
- Pacific Northwest Demonstration Project: Simpson Tacoma P2 Plan
- Pacific Northwest Demonstration Project: Model P2 Plan (Pulp and Paper Mill)
- Pacific Northwest Demonstration Project: Bibliography
- Consumer Education Handbook
- IP3 Focus Group Recommendations: P2 Information Sharing

Participants

The IP3 was funded by six EPA Offices:

- Office of Water
- Office of Air and Radiation
- Office of Solid Waste
- Office of Prevention, Pesticides, and Toxic Substances
- Office of Policy, Planning, and Evaluation
- Office of the Administrator

Some funds also were provided by the University of Nebraska (i.e., matching funds associated with an IP3 grant to the university).

EPA's Office of Water, which initially proposed the project, was designated the lead office. The Office of Water's Jim Lund, who developed the project, was designated the Director of the IP3.

Project participants included all of those mentioned above, plus:

- Office of General Counsel
- Office of Enforcement
- Office of Research and Development
- EPA Region 1
- EPA Region 7
- EPA Region 9
- EPA Region 10
- Commonwealth of Massachusetts
- State of New Hampshire
- State of California
- State of Washington
- Local Government Commission in California
- Merrimack (River) Business Environmental Network
- Northeast Business Environmental Network
- POTWs in Massachusetts and in New Hampshire
- POTWs in California
- Several industrial laundries in California
- Simpson Tacoma Kraft Company in Tacoma, Washington
- Behlen Manufacturing Company in Columbus, Nebraska

In addition, a 23-member IP3 Focus Group of stakeholders -- comprised of representatives from industry, labor, environmental groups, academia, and all levels of government (federal, state, and local) -- was established through the National Advisory Council for Environmental Policy and Technology (NACEPT) and participated in all aspects of the project.

A SUMMARY OF MAJOR IP3 FINDINGS AND CONCLUSIONS

(from each of the 23 IP3 documents)

1. P2 Barriers and Incentives Study

(Industrial Pollution Prevention: Incentives and Disincentives (EPA-820-R-94-004))

This study examines the most promising incentives to overcome existing barriers to industrial pollution prevention.

It examines the regulatory, economic, technical/informational, and management/institutional factors that affect whether an industrial facility decides to adopt or fails to adopt P2 measures and suggests to policy makers appropriate incentives to overcome each of the barriers.

It also relates its findings and conclusions specifically to the metal finishing industry.

Value

Industries can learn from the information in the numerous case studies presented. Government policy makers and regulators can learn from the case studies and from the study's detailed discussions of its findings.

Major Findings and Conclusions

The study concluded that the four most important general motivators for P2 are:

- O **Economics** -- cost savings
- O **Technical and financial assistance** -- especially for small companies.
- O **Open communication** -- between the regulator and the regulated.

And most important of all,

- O **Flexibility** -- especially regulatory. Can work best if multi-media.

The study found, however, that the key "trigger" motivator for P2 is:

- O **A stringent regulation or an enforcement action.**

The study presents an overview of the P2 incentives and disincentives and suggests appropriate incentives to overcome each of the disincentives: [see the matrices below]

Through numerous telephone interviews and site visits, the study also developed some findings and conclusions related specifically to the metal finishing industry:

- O **Mass-based standards** are motivators for P2. Regulators should be allowed the flexibility to use mass-based standards to achieve effluent goals.
- O When **enforcement and compliance** activities are tied to a strong P2 message, they can be a key motivator for facilities to adopt P2.
- O Existing **categorical standards** do not provide an incentive for P2 because they are outdated and are being increasingly superseded by non-technology based standards.
- O **Zero-discharge systems** hold much promise for metal finishers seeking to maximize water efficiency and chemical recycling/reuse. But there are both regulatory and technical/informational barriers.
- O **Economic factors** have the potential to be an important incentive for P2. But there are often significant barriers -- a fear of noncompliance, a lack of financial assistance, a general "status quo" inertia (e.g., wary of changes, preferring the security of proven profits under existing conditions) -- countering this potential. Also, for small metal finishers, total cost accounting is usually not an effective tool for promoting P2.
- O **Flexibility** in the regulatory network, **supportive assistance**/outreach, and **collaborative relationships** between industry, regulators, and the public can foster continuous, industry-wide improvement in P2.

The study concludes by presenting:

- O a detailed case example of the San Francisco Regional Water Quality Control Board in California, which illustrates the **successful integration of P2 incentives** to overcome barriers.

The Appendices to the study include:

- O 14 case studies (nine from the site visits made during the study and five more taken from the Pollution Prevention Information Clearinghouse), which describe **different companies, their situations, what specific P2 measures they chose to undertake (or chose not to undertake), what influenced the decisions they made, and the results.**

Regulatory Factors in Pollution Prevention Decisions

<u>REGULATORY INCENTIVES</u>	<u>REGULATORY DISINCENTIVES</u>
• flexible, multi-media regulatory framework	• single-media regulatory framework
• specific toxics use reduction laws or facility planning statutes that encourage firms to do P2 opportunity assessments and audits	• single-media permits that focus on end-of-pipe requirements
• compliance inspections where NOV's are tied to a pollution prevention message (e.g., referral to state technical assistance program)	• single-media inspections with no pollution prevention message (i.e., quick-fix, end-of-pipe compliance focus)
• flexibility within compliance and enforcement programs (e.g., extended compliance schedules phased to pollution prevention activities, "soft landings" for technical failure of innovative technologies)	• inflexible approach to media-specific enforcement actions that allows no time for process innovation or exploration of pollution prevention solutions
• strict local limits, with POTW ordinance authority to implement/enforce	• reliance on EPA categorical limits which may be outdated and set too low a compliance level
• regulatory pressures on POTWs such as EPA sludge regulations, or air toxics reduction requirements, motivating POTWs to push upstream sources to lower metals in wastewaters--ideally through pollution prevention measures	• specific regulatory "barriers" such as RCRA Part B permit requirements for facilities implementing reuse/recovery technologies or "zero discharge" systems
• SEPs with pollution prevention requirements; promotion of pollution prevention alternatives in enforcement case context	• guidance documents used by permit writers that may be outdated and focus on end-of-pipe solutions
• mass-based or total loadings-based standards--especially for water intensive industries--that may encourage water reclamation/recycling/re-use	• concentration-based standards that may discourage water reclamation/recycling/re-use

Economic Factors in Pollution Prevention Decisions

<u>ECONOMIC INCENTIVES</u>	<u>ECONOMIC DISINCENTIVES</u>
<ul style="list-style-type: none"> • lower facility operational costs that may include: <ul style="list-style-type: none"> -- environmental management cost savings (e.g., from eliminating RCRA sludges, or decreased wastewater treatment costs) -- production or process cost savings due to lower material or chemical use -- utility cost savings due to lower water, sewer, and energy usage -- lower liability costs 	<ul style="list-style-type: none"> • capital investment requirement difficult or impossible for many firms: <ul style="list-style-type: none"> -- firms may have limited or no capital availability due to low profit margins, competing investment priorities, or too much environmental liability (a "bad risk" for lenders) -- "sunken investments" in conventional pollution control equipment -- many small firms--especially "job shops"--cannot tolerate down-time for equipment upgrades or process change/experiments
<ul style="list-style-type: none"> • fee structures based on pollutant loadings (permit fees, POTW fees, etc.) can act as economic incentive for pollution prevention 	<ul style="list-style-type: none"> • economies of scale for some technologies may not be realistic at smaller firms (e.g., metal recovery technologies, automatic systems vs. batch)
<ul style="list-style-type: none"> • R & D challenge grants, low interest loans, tax breaks for equipment upgrades, and other funding assistance mechanisms can be powerful incentive--but only if message gets to company about availability and if application process is not onerous 	<ul style="list-style-type: none"> • R & D costs for new technologies and/or process modifications may be difficult to bear--also, firm must be concerned with potential enforcement related costs if technology fails
<ul style="list-style-type: none"> • enhanced product quality and/or corporate image may lead to higher revenues 	<ul style="list-style-type: none"> • customer dissatisfaction with changed product may mean loss of revenue
<ul style="list-style-type: none"> • full/total cost accounting methodologies can help firms identify economic savings and opportunities not readily apparent--but there is a real need for simpler, user-friendly, methods such as a quick checklist or worksheet that small firms can use 	<ul style="list-style-type: none"> • full/total cost accounting to justify pollution prevention expenditures can be complex, time-consuming, and expensive (especially for small firms)

Technical/Informational Factors in Pollution Prevention
Decisions

<u>TECH/INFO INCENTIVES</u>	<u>TECH/INFO DISINCENTIVES</u>
<ul style="list-style-type: none"> technical assistance to facility via state TAP or POTW pretreatment programs can overcome many informational barriers 	<ul style="list-style-type: none"> facility unfamiliar with pollution prevention and potential for in-process changes
<ul style="list-style-type: none"> targeted outreach to a particular industry sector via pollution prevention workshops, seminars, or training--provide forum for industry to share success stories and concerns 	<ul style="list-style-type: none"> facility uncertain of pollution prevention's ability to meet discharge limits; afraid to be first or to take risk
<ul style="list-style-type: none"> vendor lists or certification programs to assure prospective purchasers/service users that vendor is both reputable and knowledgeable about pollution prevention technologies 	<ul style="list-style-type: none"> unscrupulous vendors who misinform, misrepresent and/or install inferior equipment; so-called "pollution prevention experts" who sell a product then disappear when the system fails and the facility falls out of compliance
<ul style="list-style-type: none"> detailed knowledge of waste generation and chemical usage via facility audit/opportunity assessment 	<ul style="list-style-type: none"> lack of detailed knowledge of waste streams and extent of in-process use of toxic chemicals
<ul style="list-style-type: none"> trade and industry associations that encourage and disseminate pollution prevention information 	<ul style="list-style-type: none"> customer satisfaction concerns--potential impacts of pollution prevention on product quality, appearance, or performance that could translate into loss of customer acceptance
<ul style="list-style-type: none"> permit writer and inspector training on how pollution prevention can achieve, maintain, or even go beyond compliance 	<ul style="list-style-type: none"> chemical or product substitution concerns: will it: a) do the job; b) be consistently available; c) not become expensive; and d) not trigger some other unforeseen regulatory nightmare
	<ul style="list-style-type: none"> proprietary information concerns--disincentive to sharing information, data, and/or experiences with new processes

Management/Institutional Factors in Pollution
Prevention Decisions

<u>MGMT/INSTIT. INCENTIVES</u>	<u>MGMT/INSTIT. DISINCENTIVES</u>
• corporate policy supporting pollution prevention or incorporating it into strategic planning	• no upper management commitment to pollution prevention
• accountability within management structure for integrated (i.e., across departments, groups, or divisions) environmental responsibility	• lack of coordination and accountability among different groups in the company (e.g., process engineers/product design engineers not talking to environmental engineers)
• willingness to take risks	• low tolerance for failure; policy of risk avoidance
• willingness to engage in open dialogue with both regulators and technical assistance personnel	• closed shop mentality; afraid to ask questions-- "What I don't know won't hurt me."
• TQM programs that empower employees to seek pollution prevention opportunities	• bean-counting disincentives at regulatory agencies that tie performance reviews to number of enforcement cases, number of permits, etc. instead of rewarding quality environmental results
• potential for favorable publicity; pollution prevention helps present a "good guy" image; like to show progress (e.g., lower TRI numbers)	• do not want to call attention to themselves-- e.g., if company has been "burned" once by EPA, will be reluctant to try anything new which might draw more attention
• supportive environment within (and between) regulatory agencies; openness to pollution prevention	• inertia: "If it ain't broke, don't fix it."

2. Statute Analysis

(The Tools of Prevention (An Environmental Law Institute Report done for the IP3))

This analysis identifies and examines the industrial pollution prevention opportunities in two major environmental statutes: The Clean Water Act (CWA) and the Resource Conservation and Recovery Act (RCRA).

It seeks to discover the extent to which there is authority -- within the existing legislation -- to move beyond controlling pollution to preventing it in the first place.

Value

Government policy makers and regulators can learn, from this thorough analysis, about statutory authorities which currently exist in the provisions of the CWA and RCRA.

Major Findings and Conclusions

The analysis concludes:

- **Existing statutes provide substantial (and still largely untapped) authority to promote industrial pollution prevention using a variety of regulatory methods.**
- **The existing statutes provide more than adequate authority to promote industrial pollution prevention boldly, vigorously, and without delay.**

The CWA and RCRA each provide opportunities to use already familiar tools to promote P2. The analysis presents four strategies already provided under current law: direct regulatory action, standard setting, incentives, and information management/outreach.

With each strategy, the analysis identifies specific opportunities for pollution prevention under the existing statutory authorities. Some examples of the opportunities identified by the analysis are the following:

(NOTE: Statutory opportunities are not always easily translatable into implementation.)

1. Direct Regulatory Action

- **Banning the discharge of highly toxic pollutants. (CWA)**

Section 307(a)(2), though seldom invoked, nonetheless remains a viable option for banning the discharge of toxic pollutants.

- **Putting conditions on NPDES permits that would directly promote pollution prevention. (CWA)**

Requiring, for example, pollution prevention BMPs or a facility plan identifying P2 opportunities can be a condition of a permit. This could be done on a permit-by-permit basis or generically.

- **Requiring waste reduction plans as a condition of receiving a treatment, storage, and disposal permit. (RCRA)**

A limitation is that this could apply only to generators required to obtain permits for on-site treatment, storage, and disposal -- a subpopulation of all RCRA-regulated generators.

- **Enhancing the Waste Minimization Program by doing more with generator certification and biennial reporting. (RCRA)**

Despite a tentative legislative history, the language of the statute provides the authority to require: (1) under generator certification, a description of the waste reduction program in place and why a more aggressive program is not economically practicable; and (2) under biennial reporting, development of a waste reduction plan and reports on results achieved.

Imposing specific P2 measures as part of agency enforcement settlements with violators.

This can include not only P2 measures which correct the violation but also ones to be implemented additionally.

2. Setting Standards

- **Developing effluent guidelines that move industries toward preventing pollution. (CWA)**

Although the effluent guidelines are neutral with respect to whether an industry uses a particular technology or preventive method, EPA has the authority to promote P2 by using preventive methods as the basis for the guidelines.

- **Using water quality standards to promote prevention. (CWA)**

The wasteload allocation process under Section 303 can be employed to leverage the use of P2 measures in chosen sectors. Also, under Section 304, toxicity reduction evaluations (TREs) can be used to identify P2 opportunities for reducing discharges.

Using P2 technologies in setting BDAT standards. (RCRA)

Despite debate over the term "treatment" in Section 3004(m), the statute provides authority to develop prevention-based BDAT standards under the land disposal restrictions program.

3. Incentives

- **Charging a fee for pollution. (CWA)**

Some states already have fee systems -- but primarily to raise revenue, not induce P2. Section 402 arguably provides the authority to institute an incentive-based fee system. But absence of clear congressional authorization might be a problem.

- **Allowing pollution trading. (CWA)**

Unlike incentive-based discharge fees, pollution trading has already been implemented by environmental regulators in the United States. For several reasons, trading under the CWA may be appropriate only for conventional water pollutants.

Extending compliance deadlines for innovative processes or technologies. (CWA)

Section 301(k), intended to encourage innovation through compliance extensions, failed (see page 17 below). A revised provision (see page 19 below) can be effective and promote P2.

- **Extending compliance deadlines for newly-listed wastes. (RCRA)**

Statutory authority exists to give generators of newly-listed wastes a lengthened period of time to implement source reduction measures before the effective date of required waste management obligations. Enforcement penalties could possibly be assessed against generators who use the extension improperly.

- **Creating a P2 EPA procurement policy.**

A precedent for using procurement incentives already exists under RCRA, although it is designed to promote recycling rather than prevention. EPA could promote P2 more directly by revising its own current procurement policy and establishing a P2 procurement policy as an "additional" socioeconomic program under Part 26 of the FAR. Such a procurement policy could promote P2 by the choice of products purchased. The FAR anticipates that agencies will use their procurement policies to advance socioeconomic programs of this nature.

4. Information Management and Outreach

- **Measuring progress in pollution prevention. (RCRA)**

There are several ways (detailed in the analysis) that RCRA's biennial reporting system can be used to measure P2 progress, (including integration with the Toxics Release Inventory (TRI)).

- **Publicizing P2 performance. (CWA)**

EPA has authority to identify firms that have risen above their peers in implementing P2, and it can throw the spotlight on those who continue to lag behind. A P2 awards program could be established, for example, under Section 501(e)(1) of the CWA.

- **Providing P2 technical assistance. (CWA+RCRA)**

EPA can use its information-gathering authorities to gather P2 information and then share it (except that which is proprietary).

- **Establishing P2 as a top priority for grant-making. (CWA+RCRA)**

Section 104(a) of the CWA specifically authorizes P2 research. Similarly, so does RCRA under subchapter VII. Under its general authority, EPA can establish research priorities.

The analysis ends with these two sentences:

"...There is a [statutory] basis to begin building a pollution prevention program based on solid regulatory action. The tools are clearly there."

3. Analysis of EPA's Effluent Guidelines Process

(Consideration of P2 in EPA's Effluent Guideline Development Process (EPA-820-R-95-008))

This analysis describes in detail the steps of the effluent guideline development process and identifies where in the process pollution prevention can be considered.

Value

Government policy makers and regulators can learn and understand how the effluent guideline development process can and does incorporate P2 considerations.

Major Findings and Conclusions

The flowchart (next page) lays out the 18 steps of the effluent guideline development process and **identifies those steps** (the shaded boxes in the flowchart) **where pollution prevention considerations and decisions can most appropriately be made.**

Also, a "snapshot" of effluent guideline P2 considerations, taken in 1995, is included in the analysis to show **how EPA's effluent guidelines program is now promoting P2** in the specific effluent guidelines (Metal Products and Machinery, Pesticide Formulating and Packaging, Pharmaceuticals, and Pulp and Paper) currently under development.

The analysis ends with a listing of challenges and issues that remain to be resolved before P2 can be fully realized within the effluent guidelines process, such as:

- enabling the Effluent Guidelines Program to become more multi-media oriented
 - e.g., To what degree should EPA set effluent standards which result in the most beneficial overall impact on the environment, accounting for all media? Should budgets for rule development be administered by cross-media teams rather than by single-media program offices? Should resources for rule development be allocated specifically for multi-media analysis as a condition for program funding? Should EPA have the authority in an effluent guideline to prohibit use of technologies that have a significant adverse effect on the environment through other media?

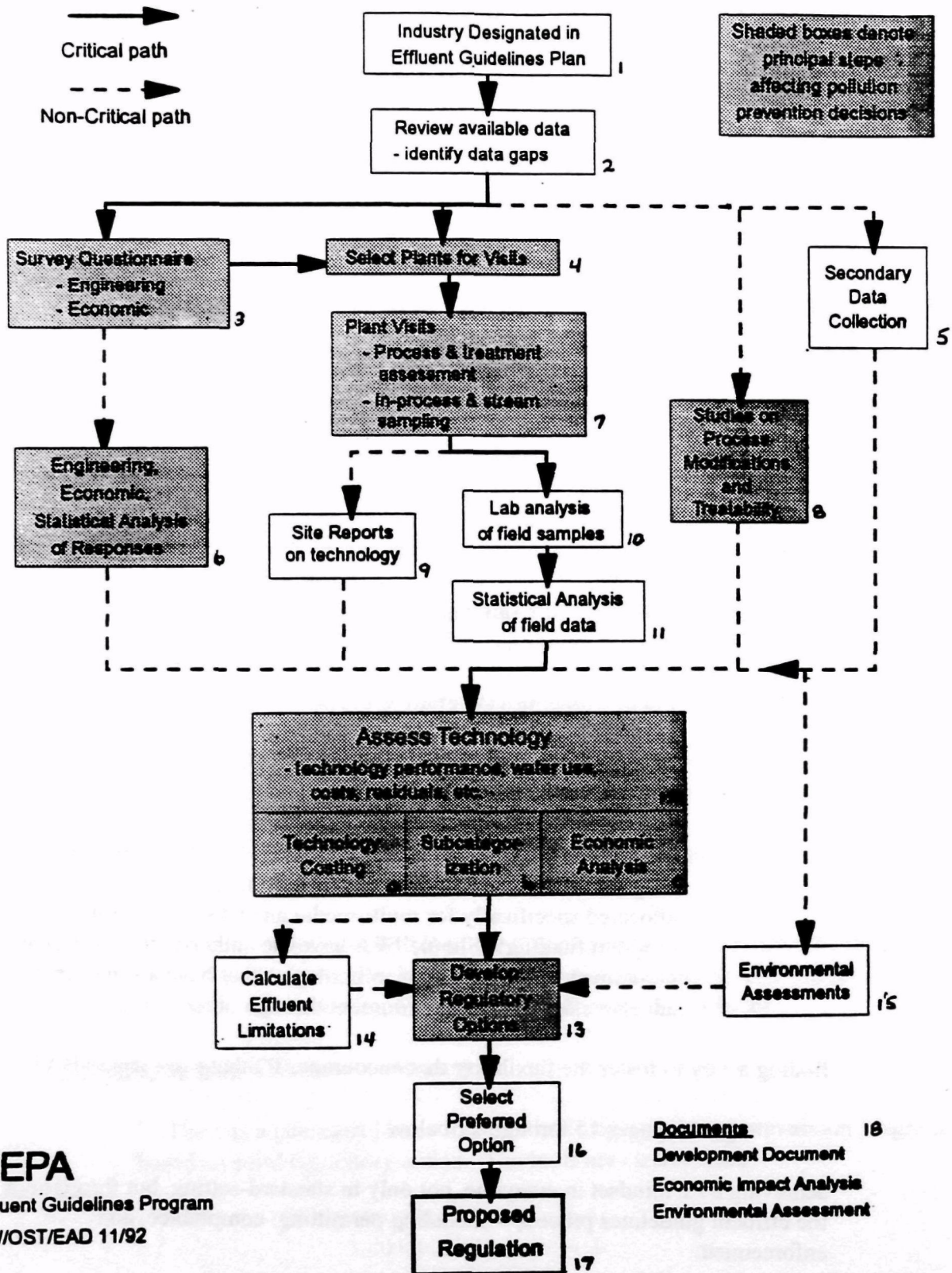
finding a way to foster the flexibility that encourages P2 that can surpass BAT

e.g., see pages 15 through 22 below.

- achieving a P2 mindset in everyone, not only in standard-setting, but throughout the effluent guidelines process -- including permitting, compliance, and enforcement.

Effluent Guidelines Flowchart

REGULATION DEVELOPMENT PROCESS



Effluent Guidelines Program
OW/OST/EAD 11/92

4. **An Effluent Guidelines Retrospective on the Leather Tanning Industry**

(Effluent Guidelines, Leather Tanning, and Pollution Prevention (EPA-820-R-95-006))

This study was undertaken to learn:

- O in what ways and for what reasons a specific industry in the past already was implementing P2 in order to comply with existing effluent guidelines; and
- O to what degree the effluent guidelines development document for that industry had already previously projected that outcome.

Value

Government policy makers and regulators can learn from the past.

Major Findings and Conclusions

(NOTE: This study was intended to serve as a case study within the leather tanning industry and may not necessarily represent the leather tanning industry as a whole.)

The study found that:

- O **The industry was already implementing pollution prevention in the past** to meet the effluent guideline requirements.
 - Process changes and material substitutions were as important in meeting the effluent guideline requirements as end-of-pipe treatment.
- O **The effluent guideline requirements were the driving force behind the implementation of pollution prevention -- even if not the only reason.**
 - Adopted primarily to meet the guideline requirements, P2 also brought improved product quality, process efficiency, and reduced water supply and treatment/disposal costs.
- O **The effluent guideline development document projections, while quite accurate generally in the areas of end-of-pipe technologies, did not forecast all the aspects of the pollution prevention creativity** that was exercised by the industry.
 - Two major pollution prevention measures that were implemented by the industry were not referenced in the development document.

5. Studies of P2 Technologies for Selected Effluent Guidelines Industries

(These were studies that were funded by the IP3 and were an integral part of the current effluent guidelines' development.)

Some technical studies examined specific P2 technologies for effluent guidelines currently under development.

Value

Government regulators and industry are able to learn about the technical characteristics and effectiveness of specific P2 technologies.

Major Findings and Conclusions

Major results of these particular studies included the following:

- O For pesticide formulating/packaging facilities' operations, membrane filtration technology was examined through extensive on-site testing, as well as pilot bench-scale testing. It performed well; it provided a high recovery rate for certain active ingredients in the waste stream, thereby eliminating discharge of the pollutants and allowing for recirculation of process water. However, it proved not to be as flexible a technology as other alternatives. Also, in some applications the membrane has a tendency to become fouled, needing replacement -- making it a relatively costly technology. Therefore, it was decided not to cost it out as a basis for BAT in the proposed Pesticides Formulating, Packaging, and Repackaging Effluent Guideline.
- O For electroplating and metal processing industries, a new process for recovering individual metals from plating baths and rinses was examined at a couple of facilities. This particular process uses oxalic acid as a precipitant. The process was found to work well. However, it was found that, while some facilities can use it, others cannot. Therefore, lacking industry-wide application, it was not used as a basis for effluent limitations in the proposed Metals Products and Machinery Effluent Guideline. However, recovery methods are discussed in the guideline's Development Document.

6. IP3 Focus Group Recommendations: The Effluent Guidelines Process

(How Best to Promote P2 Through the Effluent Guidelines Process (EPA-820-R-94-002))

The 23-member IP3 Focus Group was a stakeholders group -- comprised of representatives from industry, labor, environmental groups, academia, and all levels of government (federal, state, and local).

The Group, for 18 months, provided -- for the IP3 -- a forum for constructive dialogue among all groups affected by adoption of industrial pollution prevention. The Group developed specific recommendations to EPA on "How Best to Promote Industrial Pollution Prevention Through the Effluent Guidelines Process."

Value

Government policy makers, regulators, and the Congress can learn what the stakeholders themselves recommend, regarding P2 and the effluent guidelines process.

Major Findings and Conclusions

(NOTE: The Group considered the "effluent guidelines process" to include not only effluent guideline development (i.e., standard-setting) but also permitting, compliance, and enforcement.)

To promote more industrial pollution prevention, the effluent guidelines process must (1) be more flexible, (2) address all media, and (3) impart a pollution prevention mindset to everyone throughout the effluent guidelines process.

To accomplish this, EPA should adopt a specific new approach to the development and achievement of Best Available Technology (BAT) limits.

- 1, EPA should provide industry with an alternative approach that is more flexible than the strict requirement to attain a single Best Available Technology (BAT) effluent limit.

Industry should be permitted to achieve a level of effluent reduction different from the single BAT limit -- provided the facility will implement pollution prevention measures that will substantially reduce total emissions (all media considered) below an EPA-established emissions reduction threshold.

The alternative approach must -- in EPA's (and the State's or POTW's) opinion -- be clearly a better environmental choice than simply meeting the single BAT limit. Otherwise, the alternative approach must not be granted.

To encourage an industrial facility to choose the alternative approach and implement multi-media pollution prevention measures reducing total emissions (all media considered), EPA should offer -- along with the alternative approach -- incentives on a case-by-case basis depending on the situation. However, no incentive should be offered that would increase harm to human health or the environment.

2. **EPA should offer incentives to industry to implement pollution prevention measures that reduce pollution beyond the traditional single BAT limit.** (The Group's report suggests some possible incentives, including technical assistance (for implementing P2), extended permit length, extended compliance schedules, "soft landings," forgiveness of "brief" excursions, awards, etc.)
3. **To further the incorporation of P2 into the existing effluent guidelines development process, EPA should:**

- Encourage P2 actively in all parts of all the Agency's programs.
- Make the development of every effluent guideline multi-media.
- Conduct more dialogue with industry during the process modification/treatability studies and site reports.
- Continue to explore P2 technology used overseas.
- Use the P2 Information Clearinghouse (PPIC) in conjunction with the effluent guideline Development Document.
- ETC. (There are six more recommendations like these.)

In addition, to get industries to do more P2, EPA should:

- Look for and find ways to develop and promulgate effluent guidelines more quickly in order to cover more industries.
- Make sure that enforcement personnel and policies promote P2.

7. Waivers for Technology Innovation

(Providing Waivers From NPDES Permit Compliance Schedules For Industrial Pollution Prevention Technology (EPA-820-R-94-003))

This study examines the innovative technology waiver provision of the Clean Water Act. (The provision is Section 301(k) and Section 307(e) for direct and indirect dischargers, respectively.) Section 301(k)/307(e) -- hereinafter referred to simply as 301(k) -- provided an opportunity for permittees to request that the date for compliance be extended for up to three years (later changed to two years) if they use innovative technology to meet or exceed permit limits.

P2 often is, or can be considered, innovative technology. So studying past experiences with technology innovation provisions like 301(k) can be important to understanding the potential role of such a provision and how to change it to enable it to be effective in promoting P2.

The study examines why the past 301(k) program did not work. It presents a detailed and thorough legislative and regulatory history of the program.

It also includes a comparison to the variance program under the Clean Air Act and highlights several successful programs at the national and state levels that have promoted innovative technology.

The study concludes with some suggestions for a redesigned 301(k)-type program to promote innovative technology and P2. (See the following section 8. on Proposed Clean Water Act Legislation for a proposed revision of Section 301(k) for a reauthorized CWA.)

Value

Government policy makers and the Congress can learn why 301(k) did not work and how it can be changed to be successful. This understanding is especially important in the context of the current CWA reauthorization process.

Major Findings and Conclusions

The study found:

- O In the fourteen years from the creation of 301(k) in 1977 until its expiration in 1991, it was hardly ever used. On the basis of available EPA records, there may have been as few as five 301(k) variance applications, and only one variance approval (which had mixed results).
- O Some of the reasons 301(k) was not attractive and did not work were:
 - **Regulatory uncertainty and conflict** (e.g., 14 years of suits, argument, and delay over regulations that never became final.)

- **The 3-year (initially) extension offered was not enough time.**

Uncertainty and high cost of the application process (e.g., EPA's lack of enthusiasm for the process and the unwanted (and usually adverse) attention an exceptions process always brings.)

Lack of a "soft landing" (even for good-faith efforts)

- O Overall, the risks of the process seemed to most companies to exceed the benefits of the waiver.
- O For EPA, the perceived problems were resources, the likelihood of ingenuine applications, and the intensive nature of the exceptions process.
- O Even though partial remedies for some of the past problems of a 301(k) process might include increased resources for permit writers, defined progress steps for recipients of waivers, and some form of "soft landing" mechanism, **extension of the 301(k) process in its current form is unlikely to be more successful in the future than it has been in the past.** Its fundamental flaw is that it requires relatively large resources to make individual case decisions within an exceptions process that makes each such decision highly visible, making all parties feel at risk.
- O An alternative might be to establish criteria within the effluent guidelines process for additional environmental goals which would need to be included in any permit providing alternative compliance deadlines for implementation of innovative technology. Such criteria could include additional reductions in pollutant levels beyond the requirements in the guideline, or defined additional multi-media reductions.
- O While decisions on parameters for such tradeoffs might be difficult to make, they would occur up front in a context of overall decisions affecting all facilities covered by a guideline. The application process could then become a more standardized process, with less risk and requiring fewer resources. Furthermore, placing priority on environmental success rather than individual technical judgments would remove many of the troublesome issues that plagued 301(k).
- O The result would be a standardized process combining greater regulatory flexibility with pre-established parameters for compliance extension tradeoffs. By placing priority on environmental success rather than technological judgments, such an up-front approach to the parameters could provide a more predictable and congenial atmosphere for the implementation of technology innovation and prove to be a more workable approach than the 301(k) program of the past.

8. Proposed Clean Water Act Legislation

Aware of the IP3 study on waivers for technology innovation (presented above in the preceding section), Congressional staff requested technical assistance from EPA on revising Section 301(k)/307(e) in the CWA reauthorization process. This proposed legislation -- rewriting Sections 301(k) and 307(e) -- was written by the IP3, approved by EPA, and provided in 1994 to Congressional staff in both the House and the Senate upon their request.

It is based upon the Waivers for Technology Innovation study (presented immediately above), the IP3 Focus Group Recommendations (see page 15 above), and work done by the Effluent Guidelines Task Force which further developed the IP3 Focus Group Recommendations.

Value

It can serve as an improved Section 301(k)/307(e), resulting in a more effective CWA and increased implementation of innovative technology and P2. With the CWA undergoing reauthorization, this proposed legislation has been especially timely.

The Rationale Underlying the Proposed Legislation

- O **Pollution prevention and technology innovation should be promoted in the reauthorized Clean Water Act.**
- O **A simple way to do this is through a technology innovation provision -- but not one like the old 301(k) provision. The old 301(k) provision did not work, and another one like it will still not work (see discussion on preceding page).**
- O **Three basic changes need to be made to the old 301(k) provision to make it work and successfully promote pollution prevention and technology innovation.**
 - 1) Industry must be given **sufficient time** to enable the innovation to succeed (e.g., up to three years from the date for compliance (which would be up to six years from effluent standards promulgation)).
 - 2) If industry gets that much time, the provision must require **enhanced environmental results** (i.e., either better results in water or the same results in water with better results in other media).
 - 3) The **tradeoff parameters need to be predefined up front** (e.g., in some regulatory document) but still provide for regulatory flexibility (e.g., options for industry, such as the option referred to in the parentheses in 2) above).

- The provision will work, only if it has the support of all the stakeholders. With the above three basic changes, **all of the stakeholders get what they need** to make the provision work.
 - 1) **Industry** gets time and flexibility.
 - 2) **Environmental groups** get enhanced environmental results.
 - 3) **Regulators** get a more normal, standardized process putting less strain on resources.
- Although not as basic as the above three changes, **two additional concerns should also be addressed** in the new technology innovation provision.
 - 1) There should be requirements that will ensure that industry will do its very best to **assure permanent attainment of the enhanced environmental results.**
 - 2) There should be provided certainty of **reduced noncompliance penalties if a good-faith effort unexpectedly fails.**

Some of the Important Finer Points Within the Proposed Legislation

- **The provision provides for a permit modification rather than a "waiver"** for a couple of reasons. First, procedures already exist for permit modifications, whereas new procedures would have to be established for waivers. Second, in reality the limits are not actually being waived but modified. So "modification" is a more accurate term to use in this context.
- While the provision includes control technology and recycling as well as pollution prevention, the Industrial Pollution Prevention Project (IP3) study of this subject area found that industry is more likely to use a provision like this for pollution prevention measures than for control technologies. Therefore, **the primary effect of the provision will probably be to promote innovative pollution prevention.**
- Although the term "innovative" is not defined (that should be left to the regulations), **the sense of the provision implies a relatively broad definition of "innovative."** For example, there is no requirement that the innovative process or technology has to be previously undemonstrated. Further, there is no requirement that the process or technology has to have industry-wide application. Criteria like these are problematical in interpretation and therefore do not fit a provision that seeks to be simple and effective. If the objective is truly to foster pollution prevention, the provision has to be conducive -- not problematical or restrictive.

- **The provision applies to both new sources and existing sources and to industries both with and without effluent guidelines.**
- **Only for enhanced environmental results is a modification granted.** For example, the modification is not granted for simply lower-cost technology. The technology must produce enhanced environmental results.
- **Only an industry that is within the time period not exceeding three years beyond its compliance date can use this provision.**
- **The maximum period of the modification (i.e., three years from the date for compliance) is actually six years from promulgation of the standards.**
- **EPA is given the authority to establish predefined reduction parameters, as conditions to the modifications, but is not required to do so.** Therefore, EPA has flexibility to decide how many of the reduction conditions to establish and even has the flexibility not to establish any of them, if it so chooses.
- **Establishing the predefined reduction parameters should not be a resource-intensive task. If done, it will probably be done in a regulatory document other than the effluent guidelines.**
- **All water quality standards of receiving waters are always met -- no matter what.** Industry is never allowed to violate them. (Similarly, conditions in a POTW's permit are never allowed to be violated by indirect dischargers under this provision.)
- **The interim limitations are not burdensome ones** that would require an industry to do something extra. They are either the water quality-based limitations which the source must meet in any case or previously effective technology-based limits which -- if there were such limits for that industry -- the source is already meeting.
- **The period of the modification can vary by facility, depending on the situation; the predefined reduction parameters can vary by industry.**

- Because enforcing against the enhanced environmental results at the end of the period of the modification could be a strong disincentive for this provision, only **the originally applicable standards will be enforceable at the end of the period of the modification. But** the provision requires strict monitoring of progress during the period of the modification with the intent that **permanent attainment of the enhanced environmental results**, going beyond the enforceable standards, **will be assured**. Regulations for this provision could require (as part of the permit) a timeline of steps to be taken to demonstrate adequate progress. A deviation from that schedule of progress would result in termination of the modification.
- **The source will always eventually meet or do better than all applicable standards, while still preserving the other gains.**
- **The good-faith effort reduction in penalties can vary** with the capital cost loss sustained by the facility, or other factors.

The "Bottom-Line" Benefits of the Proposed Legislation

- **The use of pollution prevention and innovative technologies will increase significantly.**
- **There will be greater protection of the environment over time.**
- **The normal rulemaking process for effluent limitations may be shortened** because, with the regulatory flexibility offered by this provision, there may well be less litigation from industry and environmental groups over the issued limitations. This would enable more effluent guidelines to be promulgated quicker, resulting in cost savings to all the litigants and greater environmental protection.

NOTE: While it would be desirable to have a reauthorized Clean Water Act containing this proposed provision, the key concepts embodied in this proposed provision are probably still implementable even if there is no reauthorized Act or no statutory change.

9. **International P2 Case Studies**

(International (Non-U.S.) Industrial Pollution Prevention (EPA-820-R-94-005))

This compendium of over 200 case studies describes various pollution prevention technologies that have been developed and used by industries in different countries around the world. The case studies come from over 20 countries outside the United States.

The IP3 task which produced this compendium had four parts:

- gather all available information on P2 measures implemented by industries in other countries, which had not been previously gathered;
- put all this information into the form of case studies;
- compile all the case studies into a hard-copy compendium; and
- put all the case studies into electronic files so that they are accessible to all interested parties.

This is the hard-copy compendium. It was prepared by the IP3 to provide interested parties with easy access to non-U.S. pollution prevention case studies.

Value

EPA, U.S. industries, and industries around the world can learn from what industries in other countries are doing. This compendium can be helpful to plant designers, managers, and regulators around the world who are searching for creative ways to accomplish further pollution prevention.

Major Findings and Conclusions

The compendium includes many countries' experiences related to a variety of pollution prevention concepts and technologies.

Before being included, all of the international case studies were reviewed to ensure conformity with U.S. EPA's concept of pollution prevention, i.e., the multi-media approach to protecting the environment that involves the use of processes, practices, or products that reduce or eliminate the generation of pollutants -- before recycling, treatment, or disposal. (For this compendium, only source reduction or "closed-loop" recycling was considered to be pollution prevention.) Over 200 passed that test and were included in this compendium.

The information for the case studies came from a variety of sources: United Nations Environment Programme (UNEP), Organization for Economic Cooperation and

Development (OECD), embassies and government environmental offices, proceedings from various international conferences, trade journals, and assorted contacts abroad.

All information obtained was reviewed to ensure that case studies included in this compendium (and added to electronic files) would be of interest and would provide sufficient detail to be useful to intended audiences. In some cases, materials had to be translated into English before being included.

Typically, each case study summarizes:

- **the technology used**
- **its application**
- **the status of the technology's development**
- **commercial availability**
- **investment and operating costs**
- **cost savings**
- **payback periods**
- **feedstocks utilized**
- **wastes produced**
- **pollution reductions achieved**
- **regulatory issues**
- **any startup or implementation problems encountered**
- **contact name, address, and telephone number**

The over 200 case studies are organized by industrial category in the compendium. There are 20 industrial categories, such as electroplating, chemical manufacturing, pulp and paper, petroleum refining, textiles, etc.

While most of the case studies demonstrate success stories, examples of failed efforts (and the reasons for their failure) have also been included, because there is something to be learned from failure as well as successes.

As indicated above, the case studies compiled for this hard-copy compendium were also put into the electronic files of the Pollution Prevention Information Clearinghouse (PPIC) and into the International Cleaner Production Information Clearinghouse (ICPIC) so that they will be available electronically to all interested parties. Appendix A of the compendium provides a reference guide to both the PPIC and the ICPIC.

Finally, the compendium includes a very helpful keyword index. The index lists the keywords included in the case study abstracts with citations indicating the pages on which each keyword appears.

[NOTE: Subsequent to EPA publication in 1994 of this hard-copy compendium, the United Nations Environment Programme (UNEP) in 1995 put this IP3 compendium on computer diskette for distribution around the world!]

10. New England Demonstration Project

(The Merrimack Project (EPA-820-R-95-004)) [a joint report written by MA and NH]

The IP3 conducted Demonstration Projects in four different geographical regions across the nation. The purpose of these regional pilot projects was to:

- demonstrate different specific aspects of the pollution prevention approach;
- gain new insights from the demonstrations that will be useful to both industry and EPA in furthering pollution prevention;
- actually prevent pollution at real-world locations; and
- initiate and establish ongoing pollution prevention activity and institutions that will continue on their own long after the IP3 demonstration is over.

One of the four IP3 Demonstration Projects was in New England. Named the "Merrimack Project," it sought to demonstrate how two states (Massachusetts and New Hampshire) can work together to bring about pollution prevention in the industries along a commonly-shared river (the Merrimack River).

Value

Federal and state policy makers can learn from the experiences of these two states as they conducted this joint venture. The experiences are especially full of insights because the two states were so different institutionally.

Industry can learn from the industry case study examples developed in this demonstration and from seeing how a regional "self-help" network of businesses became established to promote P2 within its sphere of influence.

Major Findings and Conclusions

The Merrimack Project demonstrated:

- O **Two states, even when very different institutionally, can successfully work together to bring about P2 in the industries along a commonly-shared river.**
 - The two states jointly exchanged frequent visits to one another's state offices to share ideas/information, learn from one another's experiences, plan together, and build personal relationships among the staff.
 - The two states jointly conducted a series of industry-specific P2 workshops for Merrimack River industries.

The two states jointly held two major P2 conferences: an outdoor (under a tent) conference on a bluff overlooking the Merrimack River and another conference in Lowell, a city on the Merrimack River.

- The two states jointly performed P2 technical assistance during a number of industrial site visits.
- The following is quoted from the conclusions (page 64) of the joint report that the two states wrote on the Merrimack Project:

" This project has been essential in helping the New Hampshire Department of Environmental Services jumpstart the process of institutionalizing pollution prevention. Through this project the department has been able to experiment with different approaches and frame the questions which need to be addressed. The project has also provided a forum to identify opportunities and barriers in implementing pollution prevention in a regulatory agency.

Working collaboratively with staff from the MA Office of Technical Assistance has been a very satisfying and rewarding experience. This project has proven that agencies from two states can work together to accomplish common goals and objectives, even though their program structures and regulatory status may be different. Likewise, working with EPA staff on the Merrimack Project has been very beneficial. EPA staff provided flexibility as well as guidance, both of which were greatly appreciated. **Establishing new relationships and forming innovative partnerships is what this project was all about. It seems almost certain that the relationships that have been established will continue well beyond the life of the Merrimack Project....."**

The Merrimack Project achieved:

O Greatly increased P2 implementation in the Merrimack River watershed.

- As many as 91% of the companies that were provided P2 information during the Merrimack Project actually implemented P2.

O Measurement of actual P2 results brought by the Project.

- Sixty-two companies in the Merrimack watershed were visited with P2 technical assistance by Merrimack Project staff during the project. (Almost 40 pages of the states' joint report on the project are devoted to

describing in detail these site visits and what was accomplished.) Data on actual P2 results were gathered concerning 49 of the companies. (These data are detailed in the states' joint report.)

O **Environmental improvement to the Merrimack River and cost savings to Merrimack River industries.**

As a result of the Merrimack Project, already **over 1.7 million pounds** of toxic substances have been eliminated -- with a savings of **over \$1.9 million** to industry. (NOTE: As detailed in the states' joint report on the Merrimack Project, these figures are based on reported data that were tabulated very conservatively, e.g., "thousands" = 1,000.)

- Some companies achieved P2 but did not produce data on money saved or pounds eliminated. These companies included:

A machine shop that ceased wastewater discharges with vacuum distillation.

A manufacturer that reduced water use 87% and drummed waste 40%.

A semiconductor company with a closed-loop process.

Four electronic components manufacturers that eliminated TCA.

Two facilities that eliminated nuisance odors.

In addition, several companies, while not reporting pounds eliminated or dollars saved, did improve compliance, e.g., by establishing proper hazardous waste storage practices.

O **Widespread interstate promotion of P2.**

- The project conducted over 20 major workshops and over 100 public events promoting P2.

(This was in addition to the over 200 on-site assessments of P2 opportunities conducted by the project at over 60 industrial facilities throughout the Merrimack River watershed.)

○ **Establishment of new and lasting institutional commitments to P2.**

- **New Hampshire**

As a result of the Merrimack Project, the State of New Hampshire established a technical assistance program known as New Hampshire's Pollution Prevention Program (NHPPP). Prior to the Merrimack Project, the State of New Hampshire did not have any formal technical assistance program providing or promoting toxics use reduction or pollution prevention.

The following is quoted from the states' joint report on the Merrimack Project:

" It must be recognized that at the beginning of the project NH staff had a difficult time convincing companies that it was safe to consult with them.....The fact that NH's technical assistance personnel convinced 14 companies to let them come on site was therefore a substantial accomplishment. NH's follow up resulted in a vast majority of companies that worked with NHPPP stating that they were very pleased with the service given to them and that they would not hesitate to call on the program again or recommend the program to other businesses."

The following is quoted from EPA Region 1 (New England)'s report (see 11. on page 32 below) on the Merrimack Project:

" As the Merrimack Project gained popularity, the NHPPP was increasingly being asked to perform on-site assessments, organize workshops, train staff, and respond to informational requests....Within two years, NHPPP had become recognized throughout New England as an organization possessing the ability to identify and characterize pollution prevention opportunities."

The following also exemplifies the extent of NH's commitment:

- NH held a Solvents Bazaar, at which 55 companies had the opportunity to bring parts needing to be cleaned to be cleaned by alternative products.
- NH held a P2 conference in 1993, attended by 45 Merrimack Valley companies.

- NH held a P2 conference in 1994, attended by 58 Merrimack Valley companies.
- NH successfully established a P2 clearinghouse of information on new and innovative technologies, products and vendors, fact sheets, and case studies and made it available to businesses and industries. It has also successfully developed and instituted procedures for setting request priorities and disseminating information.

The Merrimack Business Environmental Network (MBEN)

As part of the Merrimack Project, MBEN was formed. **It is an ongoing forum of businesses committed to P2**, to environmental compliance, to interacting with government agencies, and to mutual self-help. MBEN conducted monthly meetings for its members, at most of which there have been presentations or discussions of environmental requirements and P2. (One of the purposes of the organization was to change the focus of the delivery of P2 information and the P2 message, so that it would come from business, not just government.)

MBEN, with MA and NH, sponsored two major regional conferences, each of which garnered attendance of about 100. There were about 30 committed, active members of MBEN from the business community who came regularly to all MBEN meetings, with more than 80 registered as members, who came principally to MBEN conferences. All members pay dues and sign the MBEN mission statement, which reads as follows:

"The Merrimack Business Environmental Network is a coalition of businesses, agencies and associations which is committed to a shared concern for the Merrimack Valley, its rivers, and the Valley's quality of life. This Association has made a long-term commitment to seek and implement solutions to promote pollution prevention through improved management and technology, while enhancing the economic viability of the business community."

MBEN generated a good deal of interest in other regions, who sent in requests for information on how to create similar organizations. **To enable the network to reach a larger audience, MBEN became incorporated as the Northeast Business Environmental Network (NBEN) in September 1994.**

A focus of NBEN in 1995 has been on providing opportunities for business and government to work together on regulatory improvement. Bylaws for NBEN stress the nonpartisan nature of the group and prohibit it from engaging in political lobbying. The most recent NBEN conference was in May 1995, and engaged the attentions of the highest government officials in New England. (Details of the May conference are included in the Appendices to the states' joint report on the Merrimack Project.)

The enthusiastic participation of businesses in MBEN, now NBEN, accomplishes one of the Merrimack Project's basic purposes: to form a continuing, collaborative, working commitment to P2 by all the stakeholders.

All the publicity that MBEN received from the media resulted in numerous newspaper and magazine articles including one in Pollution Prevention Review (a copy of which is included in the Appendices to The Merrimack Project report.)

Based on insights gained from the Merrimack Project, the two states' joint report on the Merrimack Project concludes with 21 policy recommendations, such as:

- **U.S. EPA should re-evaluate regulatory program measures of success.** Focus should be placed on actual pollution reductions and increases in compliance rather than number of inspections performed or enforcement actions taken.
- **More use should be made of the established POTW-industry relationship to promote P2.** Often a POTW Pretreatment Coordinator already has an established working relationship with the industries he/she regulates. This relationship provides an excellent opportunity to further the goals of P2.
- **U.S. EPA should encourage and support new and innovative partnerships.** Through the Merrimack Project some new and unique partnerships were formed between state and private entities: The Merrimack Business Environmental Network (MBEN) and the NHDES Merrimack River biomonitoring project are two examples. Partnerships like these are a very effective way to maximize resources while promoting pollution prevention.
- **Geographic initiatives especially should be encouraged and supported.** Pollution and natural resources do not respect political boundaries. Watershed-based projects such as the Merrimack Project and the Merrimack River Initiative provide an ideal opportunity to transcend political boundaries and rally around a common environmental cause.

- **U.S EPA should review categorical discharge limits...and reset them according to what known P2 technologies and practices can economically achieve. Ratchet limits down when technologically and economically feasible, according to frequent reviews....** The pressure of regulation drives companies toward P2. A certain sector does P2 because they are well informed and understand its value. A larger sector does P2 because they have to.
- **Enforcement activities should require or encourage P2 and P2 reporting.** Compliance orders should never simply order control technologies, but should do one of two things instead: either require P2 investigations or provide optional methods for coming into compliance.
- **Regulatory agencies should reorganize to the extent that functional activities can be coordinated with the goal of avoiding cross-media transfers -- in permitting, inspections, enforcement, and in all policy formation and statements.**
- **Water quality and discharge data should be made as accessible as TRI data are.**
- **The formation of self-help groups of POTW personnel should be encouraged.** Merrimack Project staff were impressed by the formation of the Massachusetts Pretreatment Forum, a discussion forum of and for POTWs in Massachusetts. It served a very useful function in keeping POTW officials up to date on P2 in the Merrimack Project. This group should be regarded as a model for encouraging the establishment of similar groups in other parts of the nation.

11. New England Demonstration Project: EPA Region 1 Report

(The Merrimack Project: A Report By EPA Region 1 (New England) (EPA-820-R-95-005))

[See the introduction under 10. on page 25.]

This EPA Region 1 (New England) report presents Merrimack Project results, implications, and follow-on next steps -- as seen from EPA Region 1 (New England)'s perspective.

Value

Government policy makers can learn from knowing how EPA's regional office views the results, implications, and follow-on next steps of the Merrimack Project.

Major Findings and Conclusions

The report presents the following results of the Merrimack Project:

- O As an interstate effort, the project tested and demonstrated that two states, even with technical assistance programs that are very different institutionally, can successfully work together to provide technical assistance to industries along a commonly shared river.
- O The Merrimack Project also demonstrated that a technical assistance program can be successfully structured and implemented under either a regulatory or non-regulatory organization.
- O The Merrimack Project demonstrated the value of publicizing the potential for pollution prevention opportunities.
- O The Merrimack Project achieved both cost savings to industry and environmental improvement to the Merrimack River.
- O Positive experiences with the project's workshops, technical assistance, kept-confidences -- combined with a desire to continue an intensified ongoing level of communication on an industry-wide basis -- led involved Merrimack industries to work with the two states to form a Merrimack Business Environmental Network (MBEN). In turn, MBEN has mushroomed into a Northeast Business Environmental Network.
- O The Merrimack Project also showed how Total Quality Management (TQM) techniques can be used by a state agency as a tool in creating a pollution prevention program and in implementing pollution prevention technical assistance to industry.

(The New Hampshire Department of Environmental Services used TQM while constructing the New Hampshire Pollution Prevention Program (NHPPP). Program commitments were evaluated against existing resources. The procedure involved an investment and disinvestment process using TQM. As a result, resources and job functions were shifted within certain programs in order to create the NHPPP.)

The report presents the following implications of the Merrimack Project:

- O Because the project has demonstrated that environmental compliance can be obtained in conjunction with traditional enforcement related activities as well as by using technical assistance independently of enforcement, **the project has highlighted that technical assistance should never necessitate the suspension of enforcement, or disinvestment in enforcement.**
- O **The project has also verified that P2 technical assistance is an effective tool for encouraging and achieving environmental compliance.**
- O The following is quoted from Region 1 (New England)'s report on the Merrimack Project:

"The Merrimack Project experience has overcome the deep-seated mindset that EPA, as well as state environmental agencies, must serve solely as a regulatory agency, taking a "hands off" approach to offering technical assistance....The Merrimack Project resolved many myths on whether or not a regulatory organization could successfully implement pollution prevention."
- O The Merrimack Project produced numerous examples of "how to methods" of integrating pollution prevention and technical assistance programs into enforcement related activities, while taking into consideration management's concerns.

The following is quoted from Region 1 (New England)'s report:
"The project has produced a network of valuable technical assistance resources that can assist management and staff. As a result, the project has increased the ability of each and every person at EPA Region 1 (New England) to access this information more readily than ever....The project also provides us in EPA Region 1 (New England) with additional insight on various techniques that we might consider when promoting or implementing pollution prevention."

The report concludes by presenting next steps for EPA Region 1 (New England) -- hereinafter referred to as EPA - New England -- to take in building upon the Merrimack Project:

- O Support P2 technical assistance -- both separate from and in conjunction with water quality evaluations, permit writing/negotiations, and compliance.
- O Strengthen the performance measures for compliance and enforcement activities to include not only the numbers of permits, inspections, and enforcement actions but also measures of environmental results.
- O Undertake three proposed EPA - New England FY95 P2 initiatives. (Each initiative is specified in the report on the Merrimack Project.)
- O Support the development of local discharge limits that are based on best available technology which recognizes and credits P2 technology.
- O Support and involve POTWs in P2 technical assistance by assisting them in negotiating implementation schedules with their respective industrial users.
- O Provide incentives to stimulate development and application of new technology to achieve P2 and more cost-effective measures to meet limits.
- O Support provisions in CWA reauthorization to incorporate more P2 in permitting. In the meantime, take advantage of every opportunity to integrate P2 into permitting, e.g., implementation measures, compliance schedules, outreach, and reporting.
- O Develop integrated data management systems to...make it possible to target P2 technical assistance to the most critical industrial facilities. (The Merrimack Project revealed that such a system was lacking and would be helpful if it existed.)

The report then describes the newly-formed New England Environmental Assistance Team (NEEAT) and what it will be doing.

The report ends with the following sentence:

" In sum, the Merrimack Project has provided important experience with assistance tools, partnerships, and geographic focus that now forms EPA - New England's own assistance efforts."

12. New England Demonstration Project: Building Partnerships for P2

(The Merrimack Project: Building Partnerships to Prevent Pollution in a Watershed (a summary report published by the Commonwealth of Massachusetts's Office of Technical Assistance))

[See the introduction under 10. on page 25.]

This Building Partnerships report is a summary report of the IP3's New England Demonstration Project, i.e., the "Merrimack Project," from the Commonwealth of Massachusetts's perspective.

Value

Federal and state policy makers can learn from the experiences and insights that Massachusetts gained from the IP3's "Merrimack Project."

Major Findings and Conclusions

The objectives of the Merrimack Project were met. Those objectives were:

- to promote pollution prevention as an ethic by working directly with businesses in the Merrimack watershed;
- to identify opportunities to incorporate pollution prevention into regulatory practices and policy, and to coordinate P2 efforts with regulatory agencies;
- to encourage industry, regulators, and others to view pollution prevention as a means of achieving both environmental protection in the watershed and economic health for local companies.

Among the project's results:

- Pollution prevention outreach and education efforts, including workshops for businesses (several tailored for specific industries) and training sessions for POTW and regulatory staff, resulted in increased requests by industry for P2 technical assistance. Massachusetts's Office of Technical Assistance staff worked with more than 55 companies in the Merrimack watershed during the project.
- Ten Massachusetts companies together eliminated nearly 1.7 million pounds of toxic pollutants, and 18 companies saved \$1.85 million by implementing P2 strategies. Several other companies also reported reduced pollution and cost savings, but did not have specific numbers. The total amount of pollution prevented and money saved is believed to be much greater than the numbers reported.

- O A group of regional businesses that began meeting informally through this project with government officials and environmental advocates to exchange information about P2 has incorporated as a nonprofit organization called the Northeast Business Environmental Network (NBEN). A nonpartisan network dedicated solely to helping its members improve their environmental performance in manufacturing operations, NBEN has been recognized as a model business-government partnership.
- O Training and informational exchanges between Massachusetts's Office of Technical Assistance (OTA) and Massachusetts's Department of Environmental Protection (DEP) that began with this project have evolved into an ongoing exchange between the agencies, including company referrals by DEP to OTA's technical assistance services.
- O Information exchange between Massachusetts and New Hampshire environmental agencies resulted in the conduct of joint public events, cooperation in the formation of NBEN, and a unified message promoting pollution prevention in the watershed.

In accord with the theme contained in its title, "Building Partnerships," this report by Massachusetts describes in detail three aspects of the IP3's Merrimack Project:

working with POTWs

- The project conducted P2 training for POTW personnel.
- Working with POTWs, industry-specific workshops and conferences on P2 were organized. Invitations were mailed out by POTWs to dischargers in their area. Approximately 200 attendees learned about specific P2 strategies and technologies, and heard businesses with P2 success stories tell how they saved money or improved quality while avoiding pollution. Target industries for the workshops were selected by analyzing POTW permit lists and consulting with POTW operators. POTWs reported positive outcomes from their involvement in the workshops. (Those outcomes are presented in the report.) The Lowell, Greater Lawrence, Newburyport, and Haverhill POTWs, for example, have continued the practice of holding public events to educate their dischargers, and requests have come in from other POTWs in the state to conduct similar events.
- POTWs gained a better understanding of and appreciation for pollution prevention as a means of helping businesses remain in compliance with discharge limits, or eliminate the use of certain chemicals altogether.
- The Merrimack Project gave POTW officials a chance to help dischargers, as opposed to simply enforcing against them.

- POTWs shared strategies with each other. For example, the Newburyport POTW told other POTW officials how they have incorporated into some permits a requirement that dischargers report chemical purchases to the POTW; the Greater Lawrence POTW shared how it has added P2 questions to its full inspection forms.
- The Merrimack Project increased POTWs' interaction with each other, with industry, and with the state, leading to improved and effective communications and relations.

working with businesses

- The report addresses working in partnership with 58 companies during the Merrimack Project, including electronics manufacturers, machine shops, web coaters, metal platers/finishers, printers, printed circuit board manufacturers, spray paint contractors, the plastics industry, adhesive manufacturers, textiles, paper, furniture, leather products, wood stain, pharmaceuticals, and other specialty products.
- The report also describes the Merrimack Project's establishing the Merrimack Business Environmental Network (MBEN) -- which has expanded to become the Northeast Business Environmental Network (NBEN) -- and its growing influence.

- coordination with regulatory agencies and programs

- An objective of the Merrimack Project was to coordinate with regulatory programs, both to increase regulators' awareness and understanding of P2 opportunities and to better define and enhance the relationship between regulation/enforcement and technical assistance. In addition, the project sought to identify opportunities and barriers to incorporating P2 in the work of regulatory agencies and to test new initiatives.
- MA OTA adopted the strategy of establishing training exchanges and referrals with the MA DEP (the state's environmental regulatory agency). At the same time, MA DEP made pollution prevention a top priority and has reorganized accordingly.
- As part of the Merrimack Project there was P2 training for EPA inspectors and managers, MA DEP inspectors and managers, POTW pretreatment coordinators, board of health agents, and audiences made up of regulatory officials of various agencies and authorities.
- The concept of P2 technical assistance initially raised several concerns among regulatory officials. These concerns included:

- that resources would be diverted from enforcement or that enforcement would somehow be diminished;
- that the touting of P2 could seem to mean a denigration of pollution control;
- that if inspectors made suggestions concerning P2 activities, companies would interpret these suggestions as commands.

During the Merrimack Project, MA OTA addressed these concerns with the following points:

- Technical assistance can be provided with a minimal devotion of resources, or with the incorporation of the function into existing programs, or with the use of new resources (e.g., based on fees). Assistance should not replace enforcement but should complement it, because strong enforcement is of paramount importance -- it is the major reason why companies implement P2 or seek technical assistance. Complementing enforcement with assistance improves the relationship between government and the regulated community. Assistance is the appropriate tool for interacting with those members of the regulated community who want to do the right thing and simply need a better understanding of the requirements and options.
- Although the hierarchy means prevention should be exercised first and foremost, it must be recognized that when it is not implemented, recycling, treatment, or other appropriate management of wastes already generated is still preferable to certain other alternatives. It has been necessary to affirm on many occasions that pollution reduction is a desirable activity, even if it is not prevention.
 - Inspectors could and should refer companies to a technical assistance agency for specific help, while talking about P2 in general to indicate the priority the agency places on the approach. Inspectors can also adopt the strategy of asking questions in lieu of making commands, because asking questions is a nondirective method of illuminating P2 opportunities and pointing a company in the right direction and denotes respect for the regulated company and can enhance the relationship between the company and the regulator. (In addition, dialogue concerning the process educates the inspector, which can improve regulatory practices.)

- The Merrimack Project also confirmed the importance of seeking to tailor enforcement strategies to encourage P2, through measures such as: waivers, extra time, penalty mitigation, and elimination of roadblocks to process changes. MA OTA staff frequently worked with companies facing short timeframes to address violations. Conventional end-of-pipe control equipment is readily available. To supplant the control technology with a preventive technique may only be possible if the company has the time for investigation and trial.
- Coordination between MA OTA and MA DEP has now evolved to mutual exchange. For example, DEP now sends copies of all Notices of Noncompliance to OTA, and included in these notices is language encouraging the recipient to contact OTA for help. Inspectors often recommend OTA's services to companies.

Among the report's stated conclusions are the following:

The results of the Merrimack Project demonstrate that --

- O industry and regulatory agencies are very receptive to education and information programs about P2, and can work together effectively to educate others about specific P2 strategies and the possible benefits;
- O businesses that implement P2 can reduce the amount of toxic byproducts reaching the environment and at the same time realize significant cost savings;
- O many businesses are very concerned about environmental protection as well as the bottom line and are willing to share successful P2 strategies with other companies.

The lasting results of the Merrimack Project include --

- O many companies in the Merrimack watershed adopting P2 strategies, and changing forever the way they approach the environmental issues relating to their operations;
- O the establishment of the Northeast Business Environmental Network (NBEN), a model nonpartisan business-government network dedicated to promoting P2 as a means of achieving environmental protection and maintaining economic competitiveness, and providing increased sharing of information among businesses and between businesses and government and environmental organizations;

- O an improved understanding of P2 opportunities by regional POTWs and MA DEP inspectors, and collaboration among POTWs, MA DEP, and MA OTA in promoting P2 as the preferred approach to industrial environmental problems;
- O the identification of opportunities to incorporate P2 into environmental regulations and policy;
- O increased understanding that environmental improvements need not be at the expense of economic progress;
- O increased awareness by businesses in the Merrimack region of the importance of local natural resources; and
- O increased awareness by governmental officials of the point of view of businesspeople who wish to be environmentally friendly.

The Appendices to the report contain a published article on MBEN (later to become NBEN) and 15 "true tales" of technical assistance conducted during the Merrimack Project. The "True Tales of Technical Assistance" are presented to assist anyone wishing to understand in detail how a P2 technical assistance program actually works.

13. Nebraska Demonstration Project

(Pollution Prevention at an Aging Midwestern Manufacturing Facility (EPA-820-R-95-009))

[See the introduction under 10. on page 25.]

One of the IP3's four demonstration projects was in Nebraska. The goal of the Nebraska project was to demonstrate the adoption of pollution prevention measures at a rural and aging metal products manufacturing facility.

Value

Industry can learn from the thorough -- and very detailed -- P2 opportunity assessment and the P2 implementation experiences of this metal products manufacturing case study.

Major Findings and Conclusions

- O Waste disposal at this facility had resulted in potential problems, especially to surface and ground water resources in the area. The economic viability of the company depended on addressing the pollution problem and reducing pollution control expenses.
- O In conducting the thorough and very detailed P2 opportunity assessment, emphasis became focused on those areas where the impact on reducing the total pollutant load would be the greatest. Those areas were the **electroplating**, hot-dip **galvanizing**, and the **painting** lines as well as the **tube mill production process**.
- O For each of those four areas, specific P2 process and/or materials changes were recommended and are described in detail in the project report. **Besides the technical details, the project report also presents the pollution load reductions, financial costs, and payback periods.**
- O One of the major considerations in making P2 recommendations to this company was that the facility was old and not very profitable. Therefore, recommendations for process and operational modifications resulting from the P2 opportunity assessment had to meet critical payback periods. The good news from this project is that the **P2 recommendations that have been implemented thus far have provided quick payback and have truly revitalized the company!**
- O The company is very pleased with their adoption of P2. **The P2 process and materials changes have not only increased company profitability but have significantly improved product quality as well!** For example, the level of rust protection in the facility's products increased up to 1000%, which delighted the company because numerous claims had been made against the company in the past because of corrosion of some of its products.

- O **The environment has also greatly benefited** from the company's adoption of P2.
- O The project also developed longer-term recommendations for the facility in addition to the shorter-term recommendations that have already been implemented. Those longer-term recommendations are also described in the project report. The company is currently well on its way in implementing the longer-term recommendations. **Implementing P2 and thereby improving facility performance and profitability will continue on into the future at this manufacturing site in Nebraska.**
- O Finally, while the primary goal of this project was to demonstrate the adoption of P2 at a rural, aging, not-very-profitable metal products manufacturing facility, **a secondary goal of the project was to demonstrate** how to involve a nearby university -- in this case, the University of Nebraska at Lincoln -- in a **cooperative and collaborative approach to promoting P2 implementation.** The approach involved **industry, the university, and EPA.** (EPA (i.e., the IP3) provided "seed money" in the form of a small grant to the university, the university provided matching funds, and the industry agreed up-front to work closely with the university during the P2 opportunity assessment and fund the recommended P2 implementation.) The project demonstrated it to be an excellent approach. **It proved to be a very effective way to bring about P2 implementation and each party gained something from the collaboration.**
- O Articles on this demonstration project have been published in Environmental Solutions, as well as in Water Science and Technology and the proceedings from several different conferences where this project has been presented.

14. and 15. Nebraska Demonstration Project: Technical Reports #1 and #2

- (#1: Pollution Prevention in the Commercial Sector: Waste Stream Assessment in the Metal Finishing Industry (available from the University of Nebraska-Lincoln libraries))
- (#2: Waste Minimization Opportunities for the Electroplating Industry (available as above))

Technical Report #1 is a lengthy, highly detailed, very technical report on the P2 opportunities for the metal finishing industry -- specifically the **galvanizing, painting, and tubing fabrication** processes. Technical Report #2 is a lengthy, highly detailed, very technical report on the P2 opportunities specifically for the **electroplating** process.

Value

Those who need to know all the technical details and all the technical rationale behind the P2 measures for those four metal finishing processes can learn them in these two reports.

16. Southern California Demonstration Project

(Pollution Prevention at Industrial Laundries: A Collaborative Approach in Southern California
(EPA-820-R-95-012))

[See the introduction under 10. on page 25.]

One of the IP3's four demonstration projects took place in Southern California. Its purpose was to demonstrate a collaborative approach to promoting pollution prevention, i.e., how enhanced communication and coordination among federal, state, and local regulatory agencies in a region of a state can be conducted to promote P2 within a selected industrial sector. The industrial sector chosen for this demonstration was industrial laundries.

Value

Federal, state, and local policy makers and regulators can learn from this interagency, multi-media demonstration of enhanced communication and coordination among the regulators and with the regulated. Industry can learn from the P2 opportunity assessments and P2 options developed in this demonstration.

Major Findings and Conclusions

- O The large number of federal, state, and local laws, regulations, agencies, policies, and enforcement practices regarding toxic pollutants is often overwhelming and sometimes conflicting, confusing, and frustrating to businesses. To be most effective, P2 must be promoted through the **unified efforts of all the regulators**.
- O All of the laws and regulations currently in place in California that create an incentive for industry to engage in P2 were collected, analyzed, and summarized. **A report was produced, A Summary of the Regulatory Incentives for Pollution Prevention.**
- O All agencies (federal, state, and local) with requirements affecting multi-media P2 in Southern California were formally invited to participate in this demonstration project. **Twenty-four different agencies** attended and participated in the project meetings and **formed the interagency multi-media team** to demonstrate a collaborative approach to promoting P2 implementation at industrial laundries.
- O **The project produced a Report on Areas in Need of Coordination** which identifies and discusses specific air quality, water quality, solid/hazardous waste, and other regulatory programs that need coordination in order to have a unified approach to pollution prevention in Southern California.
- O To industrial laundries, **the area most in need of coordination is resolution of the "shop towels as hazardous waste" issue.**

- **Detailed facility assessments were conducted at industrial laundries throughout Southern California** (see 17. Southern California Demonstration Project: Technical Report below), and the findings and results of these assessments were presented at a big workshop held in June 1993.
- **The June 1993 workshop was developed by the interagency multi-media team as a blueprint for future workshops.** The workshop took a multi-media approach and was conducted in partnership with the industrial laundries. Presenters at the workshop were from regulating agencies and industrial laundries.
- Discussions with industrial laundry operators and management during facility site visits and during the project meetings revealed several key points, including:
 - Industrial laundries have coped with the problem of non-compliance with local toxic organics and oil and grease limits by discontinuing the laundering of shop towels and shop uniforms at the facilities subject to stringent limits. Instead, the **materials are taken to facilities not subject to stringent limits.**
 - The usual discharges to the environment from industrial laundries are washwater draining to sewers, solvents from fabrics evaporating to the air, filter cakes taken to landfills, and oil from water/oil separators taken to recyclers. The facility assessments confirmed that, while there are sources of pollutants internal to the laundry (e.g., detergent residues, truck cleaning, etc.), the bulk of pollutants found in laundries' discharges originate in the material received from customers. **Toxic organic compounds and oil and grease** were the two pollutants most causing the industrial laundries to be in non-compliance with environmental regulations. **The greatest contributor of those two pollutants were shop towels** (and rags and uniforms) impregnated with solvents and oil.

Industrial laundries are subject to **conflicting, single-media regulations and inconsistent requirements** which result in overall reluctance to take the "risk" of pollution prevention innovations.
- **The project identified 16 specific pollutants of concern** for industrial laundries and probable sources of those pollutants.
- **The project showed that there are P2 opportunities available for both laundries and their customers.** For both, the establishment of and adherence to a set of best management practices (BMPs), followed by continuous improvement in searching for ways to minimize the generation of pollutants, is the key. The project produced a listing of BMPs for industrial laundries and their customers.

- O The Multi-Agency Work Group, recognizing that one of the biggest problems for laundries and the area of most concern for regulatory agencies is dealing with shop towels, suggested that **P2 options for laundries that process shop towels could include:**
 - education of their customers on P2 opportunities to prevent shop towel contamination;
 - use of BMPs at the customer's site prior to transportation to minimize the amount of solvent in the material accepted by the laundry for washing; and
 - use of BMPs for the safe handling of solvent-laden shop towels, which might include:
 - requirement of no free liquids
 - use of the paint filter test (used by some states)
 - use of a wring test (hard to standardize)
 - collection containers with mesh bag (to allow settling)
 - weighing towels and rejecting those above certain weight
 - centrifuges mounted on trucks

(A more complete and detailed list of BMPs for shop towels, both for the laundries and for the customer, was produced by the project -- along with two pages of points on why BMPs are important and how they are beneficial for the laundries. These materials, developed for the workshops, were disseminated to the laundries and their customers.)
- O The interagency multi-media team discussed how two states (Minnesota and Washington) have resolved the "shop towels as hazardous waste" regulatory issue.
- O Besides the importance to Southern California industrial laundries of resolving the "shop towels as hazardous waste" issue, there also needs to be **ongoing interaction between the local POTWs and the laundries**. Laundries want to know what causes problems for POTWs (e.g., What are their contaminants of concern? What's hard for them to treat?)
- O There needs to be a dialogue and a cooperative effort between POTWs and laundries to help identify whether or how the laundries' customers are contributing to POTW problems and what can be done about it. **Laundries and POTWs need to focus on ways of transferring information. It is important also that laundries and regulatory agencies work cooperatively together in providing to customers training and periodic retraining in P2 and the use of BMPs.**

- **The interagency multi-media team, in cooperation with management and personnel representatives of industrial laundries, developed a strategy which an industrial laundry could adopt for the P2 program:**
 - (1) Make everyone a part of the same P2 team -- internal team members would include laundry operating personnel, staff and management, distributors and route drivers; external team members would be the laundry's customers.
 - (2) Develop best management practices (BMPs) for internal and external handling of laundry -- at the laundry and at the customer's shop. (The project produced a listing of possible BMPs for laundries and their customers.)
 - (3) Train and periodically retrain internal staff and customers.
 - (4) Use route representatives and salesmen to disseminate BMPs and ensure that these practices are consistently applied in the customer's shop at pick-up, transfer, and delivery. (The project produced a written strategy for this dissemination of BMPs to customers.)

(The workshop held in June 1993 put forth ideas and materials industrial laundries and regulatory agencies can use to implement this strategy.)

The project concluded the following:

- **Any effective P2 program for industrial laundries needs to extend into the customer's shop.** The customer is an integral part of the industrial laundries' environmental compliance program. (This reality was a major reason industrial laundries were selected as the industry for this demonstration -- because involving the one industry (industrial laundries) in a P2 emphasis naturally leads to involving many other industries as well.)
- **The transfer of solvents, oils, and other pollutants to towels, rags, and uniforms by the customer should be considered emissions** to the environment and should be accounted for in the customer's overall emissions.
- **A P2 program for customers needs to be applied universally and consistently to retain competitiveness of individual laundering facilities.**
- **Industrial laundries' control of emissions from customers to the laundering facility needs to be done in partnership with the customer -- and with the support of regulators.**

- **The challenge for regulators and industry is to find a mechanism**, both regulatory and administrative, to extend P2 beyond the industrial laundry facility into the customer's shop and incorporate the customer (i.e., the generator of the pollutants) into the P2 program. **The basis for developing such a mechanism should be a partnership** among laundry, customer, and regulator, supported by a mix of regulatory mandates and incentives.
- **The collaboration and cooperation that was instituted by this demonstration project must continue into the future.** Especially with U.S. EPA continuing to work on developing effluent guidelines for industrial laundries, it is important to maintain the partnerships established in this project. For example, it is important to:

continue with the interagency multi-media team meetings with industrial laundries and local agencies to (1) assess progress in implementing BMPs; (2) serve as a sounding board for the U.S. EPA's effluent guidelines work group; (3) work on other existing and emerging issues; and (4) conduct any issue-specific meetings of value to participants.

- have local agencies, with the laundries, jointly coordinate P2 outreach (e.g., a joint letter from different regulatory agencies emphasizing BMPs) to the laundries' customers.

continue -- as a team -- to publicize and disseminate the findings and materials from the project.

This demonstration project brought together in Southern California all the different regulatory agencies and industry for the first time -- as a team. It provided a valuable forum to inform everyone of everyone's concerns and put everyone on the same "wave length." It instituted a new ongoing dialogue among all the regulatory players. It can serve as a model for how this collaborative, team approach can be done in other regions.

In summary, the overall message of the IP3's "collaborative approach in Southern California" is that the best way to get good things done is through partnerships. In order to be most effective in promoting the implementation of pollution prevention, we need a sense of partnership among the various regulators, among the regulators and the regulated, between POTWs and their users, and between industrial laundries and their customers. This project has demonstrated that these parties can work successfully together in a spirit of collaboration and cooperation. It is important that this spirit that has been established in Southern California continue there and be fostered in other places as well.

17. Southern California Demonstration Project: Technical Report

(Pollution Prevention at Industrial Laundries: Assessment Observations and Waste Reduction Options (EPA-820-R-95-010))

This technical report on P2 opportunities and waste reduction options is based on the detailed industrial laundry facility assessments conducted as part of the Southern California demonstration project.

Value

Laundry facility operators and government regulators can learn about P2 opportunities and waste reduction options; and corporate management of industrial laundries can learn that -- through a strong commitment to an ongoing P2 program involving improved customer partnerships -- their plants can achieve significant waste reduction.

(The Institute of Industrial Laundries in its publications has disseminated information from this report to its members.)

18. Pacific Northwest Demonstration Project

(Pollution Prevention Assessment and Implementation at a Pulp and Paper Mill in the Pacific Northwest: Summary Report (EPA-820-R-95-011))

[See the introduction under 10. on page 25.]

One of the IP3's four demonstration projects was in the Pacific Northwest. Its purpose was to (1) demonstrate pollution prevention opportunity assessment and implementation at a specific pulp and paper mill in Tacoma, Washington; (2) develop a model pollution prevention plan for use by other similar mills; and (3) provide a bibliography of publications related to pollution prevention for the pulp and paper industry. This demonstration project also showed how P2 can be incorporated in permit writing and the enforcement settlement process.

Value

Industry and government regulators can learn about P2 opportunities for pulp and paper mills and can learn from the P2 implementation experience of this Tacoma mill.

Major Findings and Conclusions

The IP3 in cooperation with the Simpson Tacoma Kraft Company and the Washington State Department of Ecology conducted in early 1992 a study of the opportunities for pollution prevention at the company's Tacoma mill.

- O **The assessment identified and evaluated nearly fifty feasible P2 alternatives, which are listed in Tables 4 and 5 of the assessment report (see 19. Pacific Northwest Demonstration Project: Simpson Tacoma P2 Plan below). The tables include a description, estimated pollution reduction benefits, approximate cost, and suggested priority of each of the P2 alternatives. Cost estimates for each alternative range from several thousand dollars to several million dollars.**
- O **Recommendations were made to Simpson Tacoma management to develop an ongoing P2 program and implement near-term and long-term process modifications to attain P2 benefits.**

Seventeen near-term options, for implementation within 1 to 5 years, were recommended. (See 19. Pacific Northwest Demonstration Project: Simpson Tacoma P2 Plan below.)

Nine long-term options, for implementation within 5 to 10 years, were also recommended. (See 19. Pacific Northwest Demonstration Project: Simpson Tacoma P2 Plan below.)

- **To date, Simpson Tacoma has already implemented many P2 measures and is in the active process of implementing many more.** These include 11 of the near-term options and 4 of the long-term options. **The investment cost for all the measures implemented to date totals over \$100 million.**
- Some of the P2 measures already being implemented include:
 - Woodyard (Chip Handling)
 - chip area fencing
 - modify chip unloading
 - Pulping and Chemical Recovery
 - reuse condensate on washers
 - black liquor spill recovery
 - No.4 brownstock washer
 - upgrade recausticizing area
 - non-condensable gas system expansion
 - expansion of mill capacity with addition of recycle fiber
 - Bleaching
 - new bleach plant
 - chlorine dioxide plant chiller
 - hydrogen peroxide extraction
 - Pulp Dryers and Paper Machines
 - partial steam condensate recovery
 - reuse No.14 paper machine white water at pulp mill
 - replace wet strength resin containing formaldehyde

General Mill Operations

- No.7 power boiler
- stormwater collection
- replacement of PCB-containing transformers
- asbestos abatement program
- bulk chemical purchases to reduce drum management
- eliminated use of chlorinated solvents
- minimization of miscellaneous hazardous wastes
- improved water conservation and reuse

- Most of the major expenditures were for process or utility system upgrades that provide **significant P2 benefits as well as product quality and resource utilization benefits**. For example:
 - Installation of the No.4 brownstock washer and associated screening and deknottling systems and the new bleach plant resulted in substantial reduction in bleach plant chemical consumption and the amounts of chlorinated compounds generated, while yielding bleached pulp of higher quality suitable for a wider range of markets than would otherwise have been possible.
 - Installation of the No.7 power boiler resulted in significant atmospheric emission reductions and improved resource utilization through enhanced combustion efficiency.
- **The generation of chloroform at Simpson Tacoma has been significantly reduced** with the operation of the new bleach plant and elimination of the use of sodium hypochlorite as a bleaching agent. **The results demonstrate that formation of chloroform can nearly be eliminated if elemental chlorine is replaced with chlorine dioxide for pulp bleaching in the first bleaching stage.** Current operating practice at Simpson Tacoma is to operate at an average 85% chlorine dioxide substitution rate for most grades and at 100% substitution for selected products. **Simpson Tacoma's P2 effort has reduced dioxin to non-detect levels and AOX and chloroform by 80% and 90% respectively.**
- In many cases, **Simpson Tacoma has also realized cost savings from the P2 efforts**. For example:
 - Water consumption savings of 2.9 mgd from reuse of evaporator condensates result in an annual savings of about \$300,000. The investment cost for that measure was only \$100,000.
- Simpson Tacoma's P2 accomplishments to date reflect what can be achieved at basic industries involved in processing large amounts of materials. Major P2 benefits will accrue as production processes and utility operations are changed.
- **Besides the several P2 measures already so successfully implemented, Simpson Tacoma will be implementing additional measures over the coming years. It is clear that Simpson Tacoma's P2 efforts will continue to be an ongoing program.**

- O **Simpson Tacoma's P2 implementation plan** (see 19. Pacific Northwest Demonstration Project: Simpson Tacoma P2 Plan below), containing a commitment to make both near-term and long-term process modifications, **will be used by Simpson Tacoma and the Washington State Department of Ecology as a partial fulfillment of the State's requirement for a pollution prevention plan under the State's hazardous waste law. U.S. EPA will use the plan as an example of a successful P2 plan for the pulp and paper industry.**
- O **This Pacific Northwest Demonstration Project also developed a model P2 plan** for pulp and paper mills, **for use at other mills.** (See 20. Pacific Northwest Demonstration Project: Model P2 Plan (Pulp and Paper Mill) below.)
- O This model P2 plan has proved **useful** throughout the Pacific Northwest, not only to pulp and paper mills but also **to permit writers.**
- O The P2 ideas and options in the model P2 plan have also been **useful to enforcement personnel in enforcement settlements.**
- O **The Pacific Northwest Demonstration Project also produced an extensive, annotated bibliography on pollution prevention** for the kraft pulp and paper industry. (See 21. Pacific Northwest Demonstration Project: Bibliography below.)

As a result of this IP3 Pacific Northwest Demonstration Project, Simpson Tacoma received very favorable local and national recognition. This recognition resulted in benefits not originally expected by the company:

First, the company gained a fresh perspective on U.S. EPA and now sees the agency as more than just a regulator. Simpson Tacoma now has increased confidence in dealing with the agency on technical or process related issues. Simpson Tacoma also believes that its experience through the IP3 demonstration project has shown to other companies as well that EPA will work with companies in a cooperative manner.

Second, the recognition has brought other state and federal voluntary programs to Simpson Tacoma that have maintained the momentum of the original IP3 effort. Subsequent to the IP3 demonstration at Simpson Tacoma and the company's implementation of the project's P2 recommendations, a State of Washington project on measuring pollution prevention has been conducted at the facility. In addition, Simpson Tacoma submitted an application to **U.S. EPA's Environmental Leadership Program and was one of only 10 private companies selected nationwide!** In light of the IP3's objective to spread the P2 ethic, it is perhaps not without significance that, under the Environmental Leadership Program, one of Simpson Tacoma's projects will be to conduct a supplier mentoring program whereby Simpson Tacoma will now work to help enhance the environmental performance of its suppliers.

19. Pacific Northwest Demonstration Project: Simpson Tacoma P2 Plan

(Pollution Prevention Opportunity Assessment and Implementation Plan (EPA 910/9-92-027))

This is a P2 opportunity assessment and implementation plan for the Simpson Tacoma Kraft Company pulp and paper mill in Tacoma, Washington. It was done by the IP3 in cooperation with Simpson Tacoma and the Washington State Department of Ecology. It describes the mill and its operations, the P2 opportunity assessment and its results, an evaluation of the P2 options, and the recommended P2 implementation plan.

Value

Industry and government regulators can learn about P2 possibilities for a kraft pulp and paper mill, as well as how to conduct a P2 opportunity assessment and develop a P2 implementation plan.

Major Findings and Conclusions

- O **The assessment identified and evaluated nearly fifty feasible P2 alternatives,** which are listed in Tables 4 and 5 of the document. The tables include a description, estimated pollution reduction benefits, approximate cost, and suggested priority of each of the P2 alternatives. Cost estimates for each alternative range from several thousand dollars to several million dollars.
- O **The recommended P2 implementation plan included 17 near-term and 9 long-term P2 suggestions.**

Near-term P2 recommendations (for implementation within 1 to 5 years):

(an asterisk (*) denotes the highest priority recommendations)

- fugitive dust control related to chip piles *
- stormwater control related to chip piles
- indirect heat exchangers on batch digesters *
- utilization of boiler ashes and slaker grits *
- exhaust smelt tank vents to No.7 power boiler
- expansion of non-condensable gas system *
- black liquor spill prevention and recovery *
- improved water conservation and reuse for the paper machines and pulp dryers *
- improved steam condensate recovery for the paper machines and pulp dryers
- ammonia discharge control
- save-alls on pulp dryers
- replacement of PCB-containing transformers *

- asbestos removal *
- increased bulk purchases to eliminate drums *
- minimization of miscellaneous hazardous wastes *
- improved steam condensate recovery throughout mill
- improved water conservation/reuse throughout mill *

Long-term P2 recommendations (for implementation within 5 to 10 years):

- expand mill capacity with addition of secondary fiber
- replace existing batch digester kraft capacity with addition of secondary fiber
- replace No.2 and No.3 brownstock washers
- upgrade or replace No.3 recovery boiler
- install new MCC (modified continuous cooking) digester for bleached stock
- expand bleach plant capacity with oxygen delignification
- operate bleach plant at sustained 100% chlorine dioxide substitution
- install chip thickness screens
- steam strip foul condensates or incineration in power boiler.

O **The P2 implementation plan also points out and discusses the importance of and how to establish:**

- **management commitment to P2**
- **having a corporate framework for P2 (e.g., a P2 Committee)**
- **incorporation of P2 within the company's planning processes (capital appropriation and budgeting) as well as operating plans**
- **an environmental auditing program**
- **a tracking system for P2 successes**
- **P2 awareness among company employees.**

O **Appendices to the document include:**

- **an outline for environmental and pollution prevention planning for a company**
- **an extensive glossary of pulp and paper industry terms and abbreviations**
- **a short technical description of the Simpson Tacoma mill's chlorine dioxide substitution results.**

20. Pacific Northwest Demonstration Project: Model P2 Plan (Pulp and Paper Mill)

(Model Pollution Prevention Plan for the Kraft Segment of the Pulp and Paper Industry
(EPA 910/9-92-030))

This is a model P2 plan for the kraft segment of the pulp and paper industry. It was developed after the thorough P2 assessment and P2 implementation plan were done for the Simpson Tacoma Kraft Company. Its purpose is to provide a model P2 implementation plan that can be used for other kraft pulp and paper mills.

Value

Industry and government regulators can use this model P2 plan to establish P2 at kraft mills throughout the Pacific Northwest and elsewhere.

Major Findings and Conclusions

- O **The model P2 plan contains P2 options in each of the following process areas:**
 - woodyard operations
 - pulp and chemical recovery
 - pulp bleaching
 - pulp drying and papermaking
 - wastewater treatment
- O For each P2 option, there are a **description of the P2 measure, its cost, its applicability, its benefits, and references for additional information about it.**
- O This model P2 plan has proved **useful** throughout the Pacific Northwest, not only to pulp and paper mills but also **to permit writers.**
- O The P2 ideas and options in the model P2 plan have also been **useful to enforcement personnel in enforcement settlements.**
- O **This model P2 plan also presents an organizational and management framework for establishing a P2 program at a mill, describing the importance of:**
 - management commitment**
 - the establishment of a P2 team**
 - **tracking the performance of P2 measures after implementation.**

21. Pacific Northwest Demonstration Project: Bibliography

(Pollution Prevention for the Kraft Pulp and Paper Industry: Bibliography (EPA 910/9-92-031))

This is an annotated bibliography of publications related to pollution prevention in the kraft segment of the pulp and paper industry.

Value

Industry (and any other interested parties) is provided with a handy and extensive reference guide to information about pollution prevention in the pulp and paper industry.

Major Findings and Conclusions

The bibliography references much information about P2 for the pulp and paper industry.

The document is organized by process area as follows:

- Chip Preparation
- Chemical Pulping
- Pulp Washing
- Bleaching
- Chemical Recovery
- Recausticizing
- Power Generation
- Wastewater Treatment
- Papermaking
- General Plant

The document contains 269 citations. Each citation contains: title, author, reference, and a brief synopsis.

(Influencing Consumer Choice and Assessing the Effectiveness of Risk Communication)

This handbook provides analysis and recommendations on how and when to communicate with the public to influence consumer choices. The underlying concept is that influencing consumer choices (i.e., market demand) away from products that are a significant cause of pollution either in their manufacture or in their disposal can be a very effective way to influence industry to adopt pollution prevention.

It may not now be the role of U.S. EPA to influence consumers. But that could change. This handbook was developed by the IP3 with the conviction that, if EPA ever does assume a consumer education role, it is vitally important that EPA do it cautiously and be able to do it without making mistakes. The very thorough and thoughtful analyses behind this handbook lay that sure foundation.

Value

U.S. EPA and other environmental agencies and interest groups can learn how and when to communicate with the public, so that it is done prudently and effectively.

Major Findings and Conclusions

Based on extensive background research and literature review, as well as the development and testing of consumer behavior models, the handbook presents the following three major results:

- O **There is an integrated framework available for examining the relationships between consumer choices, product risks, and risk communication.**

The project developed a detailed framework for evaluating the potential impact of consumer-targeted communication suitable for use in the context of EPA environmental policy. The method is based on a general model of consumer choice that has been validated in applications to a diverse range of consumer products and services.

- O **There is a tool for evaluating candidate products as potential subjects of a consumer education program.**

The project developed a "Product Screener." The Product Screener is to be used to evaluate the likely success of a consumer-targeted communication campaign for a specific product (or product category) and its associated environmental risk. The role of the Product Screener is to reject poor candidates. (The handbook illustrates the application of the Product Screener to three very different consumer products: lawn pesticides, dry cleaning, and paint strippers.)

- **There is a seven-step process for prudently developing a consumer-targeted communication strategy.**

The handbook describes, and illustrates by example, the various steps to direct the detailed design, testing, revision, and execution of a communication campaign for the targeted product area.

The handbook is filled with detailed analyses, information, examples, and worksheets to aid and guide the user.

23. IP3 Focus Group Recommendations: P2 Information Sharing

The 23-member IP3 Focus Group (comprised of representatives from industry, labor, environmental groups, academia, and all levels of government (federal, state, and local)) provided recommendations on the best ways to disseminate P2 information.

Value

Anyone interested in disseminating P2 information can learn what the stakeholders themselves recommend.

Major Findings and Conclusions

To disseminate P2 information most effectively, the IP3 Focus Group recommended doing so through:

- training of permit writers
- meetings with targeted audiences (not just sending them material)
- standardized dissemination systems (rather than informal ad hoc ones)
- university-based assistance programs
- non-regulatory agency assistance programs
- trade associations and other professional associations
- professional environmental auditing organizations
- the television medium
- the video cassette medium
- business publications (e.g., Business Week)
- state industry councils
- Chambers of Commerce

Whatever method is used, unless the audience is known to be technically oriented, be sure to translate the P2 information into "management's language."

Questions about the IP3 or requests for any of the IP3 documents can be addressed to:

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