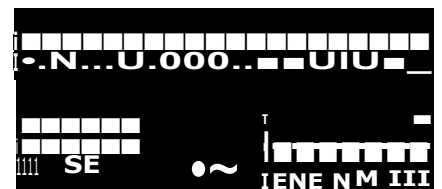
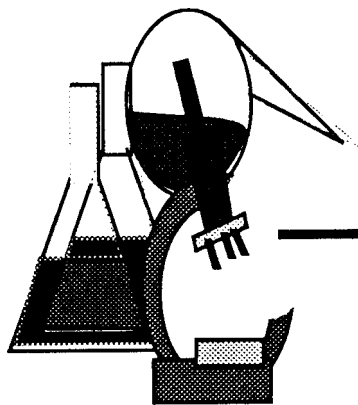


EPA

Transforming Environmental Permitting And Compliance Policies To Promote Pollution Prevention:

Removing Barriers And Providing Incentives To Foster Technology Innovation, Economic Productivity, And Environmental Protection

**Report And Recommendations
Of The Technology Innovation
And Economics Committee**



**The National Advisory Council
for Environmental Policy and Technology
NACEPT**



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CENTER FOR TECHNOLOGY POLICY AND INDUSTRIAL DEVELOPMENT

CAMBRIDGE, MASSACHUSETTS 02139

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To the Reader:

This report investigates the present and future role of the Environmental Protection Agency (EPA) in using permitting and compliance policies to foster pollution prevention in the context of industrial production and manufacturing. Both removing barriers and providing incentives to simultaneously encourage technological innovation, economic productivity, and environmental protection are major focuses of the report. This report should be seen as a complement to two prior reports of the TIE Committee entitled "Permitting and Compliance Policy: Barriers to U.S. Environmental Technology Innovation" and "Improving Technology Diffusion for Environmental Protection."

In issuing this report, the National Advisory Committee for Environmental Policy and Technology (NACEPT), through the efforts of its Technology Innovation and Economics (TIE) Committee, has adopted a series of recommendations whose implementation is necessary to bring about significant changes in federal regulatory policy. Encouraging pollution prevention must include both diffusion-focused policies and innovation-focused strategies. The report strongly recommends that EPA take actions to encourage technological changes that prevent, rather than control or treat pollution and waste, through improved innovation-driven pollution prevention initiatives.

We would like to thank EPA's Administrator William K. Reilly and Deputy Administrator F. Henry Habicht II for giving the TIE Committee the direction and encouragement to undertake this study, and all those in industry; federal, state and local government; academia; and the environmental community who provided information and perspectives in presentations at Focus Group meetings and through other mechanisms. The Focus Group that prepared this document deserves the highest commendations for its contribution of time and effort, its thoughtful deliberations, and its creative and challenging recommendations. In particular its chair, R. Darryl Banks, and EPA's committee management staff David R. Berg should be recognized for their outstanding leadership and support.

Sincerely,

(...~ *a. Ashford*

Nicholas A. Ashford
Chair, TIE Committee and
Professor of Technology and Policy

NOTICE

The following report and its recommendations have been written in conjunction with the activities of the National Advisory Council for Environmental Policy and Technology (NACEPT), a public advisory committee providing extramural policy information and advice to the Administrator and other officials of the Environmental Protection Agency (EPA). The Council is structured to provide balance, expert assessment of policy matters related to the effectiveness of the environmental programs of the United States. This report has not been reviewed for approval by the EPA. Hence, the contents of this report and recommendations do not necessarily represent the views and policies of the EPA, nor of other agencies in the Executive Branch of the federal government.

ABSTRACT

Continuous improvement of the environment in the United States requires changes in **manufacturing** processes, feedstocks and operating procedures to reduce volumes and toxicity of **pollutants** prior to treatment and control. The Technology Innovation and Economics (TIE) Committee, a standing committee of EPA's National Advisory Council for **Environmental** Policy and **Technology** (NACEPT), concluded that major changes are needed in federal **and** state permitting and compliance programs to encourage adoption of **pollution** prevention initiatives. Following extensive review and analysis of current **programs and** new initiatives, the Committee recommended seven major areas for improvement, **including:**

- 1.- **Redesigning** permit **procedures** to encourage regulated facilities to **expand** multi-media **and pollution** prevention environmental improvement efforts.
- 2.- Accelerating development of innovative pollution prevention technologies through special permitting and review procedures for their RD&D and commercialization **phases.**
- 3.- Developing and expanding pollution prevention enforcement initiatives.
4. **Supporting state initiatives in pollution prevention facility planning.**
5. **Expanding training, educational and technology diffusion efforts for all sectors for pollution prevention.**
6. **Altering personnel reward** systems to encourage EPA staff to champion pollution prevention.
- 7.- Expanding and publicizing the system of national awards honoring outstanding pollution prevention research, training and technology implementation.

TABLE OF CONTENTS

Note to the Reader

L	Executive Summary	i
IL	Members of the Technology Innovation and Economics Committee	1
ILL	Preface	3
IV.	Introduction	11
V.	Findings	19
	Overview	19
	General Findings	22
	Issue Area Findings	26
	1. Multi-Media Permitting	26
	2. Permitting of Research and Development	32
	3. Pollution Prevention-Based Compliance and Enforcement Initiatives	37
	4. Facility Planning	45
	5. Pollution Prevention Support and Training	49
	6. Agency Resources/Administrative Efficiency	54
	7. Pollution Prevention Implementation at EPA	58
VI.	Recommendations	63
	Recommendation 1	64
	Recommendation 2	70
	Recommendation 3	73
	Recommendation 4	76
	Recommendation 5	78
	Recommendation 6	82
	Recommendation 7	84

EXECUTIVE SUMMARY

BACKGROUND

Permitting and compliance requirements comprise the operational, or implementing, core of the U.S.

environmental management system. These requirements -- and the regulations and statutes that underlie them -- either determine or substantially influence environmental decision making by **regulated parties** in **the private** and public sectors.

Over the past two decades, an **end-of-pipe, pollution control culture has evolved** as the predominant U.S. environmental management strategy. An increasing number of government officials and industry leaders believe, however, that emphasis instead on the **pollution prevention alternative** can improve both environmental and economic performance. This is critical to sustainability. EPA's former Deputy Administrator F. Henry **Habicht** II stated, "EPA is seeking to integrate pollution prevention as an ethic" into its **environmental management** strategies. Similarly, industrial leaders have **begun** to use pollution prevention approaches to achieve environmental goals well beyond regulatory compliance -- in many cases achieving simultaneous productivity gains.

"Pollution prevention," as used in this report, follows the "EPA Statement of Definition" in Deputy Administrator Habicht's memo to all EPA personnel, dated May 28, 1992 (see box on page 5 of the Preface). The TIE Committee recognizes, however, that industry and some state and local government agencies use the term more broadly -- to include, for example, environmentally beneficial recycling and reuse. The TIE Committee does not intend, in following the EPA definition, to imply that such activities are not an **appropriate** focus for state programs, or for EPA, but that such programs should be in accord with the EPA hierarchy.

FOCUS GROUP

ON

ENVIRONMENTAL PERMITTING

In November of 1990, Administrator William K. Reilly of EPA requested that NACEPT focus on two principal issues: the interrelationships of international trade and the environment, and the promotion of increased use of pollution prevention alternatives to reduce adverse

environmental impacts from industrial and commercial activities. This report is one part of NACEPT's response to the Administrator's request.

Administrator Lee Thomas formed NACEPT in 1988 to provide EPA with the policy advice of a full range of outside experts. NACEPT's goal is to advise EPA on how to improve the effectiveness of the nation's environmental management system. The relationship between the environmental regulatory system and the development and use of environmentally beneficial technologies has been a primary focus of NACEPT's work. The Council assigned the Technology Innovation and Economics (TIE) Committee the responsibility of examining this relationship, and of developing recommendations for how EPA could foster innovative technologies to improve the environment.

The TIE Committee explored the overall relationship between environmental technology and the environmental management system during 1989, recommending that EPA develop policies and a strategy to foster environmentally beneficial innovation. In January 1991, the Committee issued the first evaluation and recommendations about the relationship between permitting and compliance policy and environmentally beneficial innovation, *Permitting and Compliance Policy: Barriers to U.S. **Environmental Technology Innovation***. This report, which concerned issues relevant to all types of environmentally beneficial technology (e.g., end-of-pipe control, remediation, pollution prevention, monitoring and measurement, information management), concluded **that** environmental agencies can use permitting and compliance policies to both reduce the risk and encourage the risk taking inherent in developing and implementing new technologies.

The Committee recently completed a new report and recommendations, *Improving Technology Diffusion for **Environmental Protection***, **which** assesses the role of government technology diffusion programs in the environmental management system. The Committee recommends that **EPA effectively integrate** technology diffusion programs into the environmental management system. This report describes the essential role of diffusion and incentive approaches in government pollution prevention programs.

The TIE Committee's Focus Group on Environmental Permitting was chaired by Dr. R. Darryl Banks, Deputy Commissioner of the New York State Department of Environmental Conservation, who is now director of the World Resources Institute's technology and the environment program. The fifteen members and six contributors have a wide range of interests and expertise related to the strategy, design, and **management** of permitting and compliance programs and to the development and commercial use of technologies. The members and contributors have significant experience on national committees evaluating environmental and technology programs in the public and private sectors. The Group also benefited from the experience and knowledge of twenty EPA

managers and staff representing nearly all parts of the Agency, including all but one of the major regulatory, permitting, and compliance programs in the Agency.

**COMMITTEE
APPROACH**

The TIE Committee's Focus Group on Environmental Permitting held two public meetings of two days each in November 1991 and March 1992. The Group examined whether and how EPA's permitting and compliance strategies and policies can expand environmental progress by encouraging the development and use of pollution prevention technologies and techniques. The TIE Committee developed discussion papers on key issue areas identified by TIE Committee members, EPA and outside participants, and public commenters. The Group organized its analysis around seven crucial policy topics:

- The potential of multi-media permitting systems to encourage pollution prevention.
- The need to revise permitting and compliance policies and programs related to R&D on pollution prevention technologies and techniques.
- The potential and current extent of pollution prevention-based compliance and enforcement initiatives.
- The role of facility planning by industrial and commercial facilities in encouraging pollution prevention.
- The need for specialized training and support for staff in both regulatory and regulated organizations undertaking pollution prevention initiatives.
- The need for more effective state and federal resource utilization and management practices to facilitate the adoption of pollution prevention opportunities.
- Opportunities for EPA to encourage pollution prevention through agency programs and operations.

For each of these issue areas, the TIE Committee reviewed the current status and/or standard operating procedures and the degree to which these encourage or discourage the adoption of pollution prevention alternatives. The TIE Committee then considered pollution prevention initiatives at the federal, state, and local levels. It used its findings with respect to these issue areas to develop recommendations for promoting greater development and implementation of pollution prevention technologies and practices through changes in, or additions to, environmental permitting and compliance policies and practices.

MAJOR FINDINGS

AND

RECOMMENDATIONS

The Technology Innovation and Economics (TIE)

Committee concluded that the emphasis in the

environmental management system on single-medium, pollution control strategies is rapidly reaching both technical and cost limits. The lack of a pollution prevention focus in permitting and compliance policies, for example, hinders the development, evaluation, and use of innovative pollution prevention solutions. The long term effects of continuing business as usual are likely to be:

- Reduced economic growth.
- Reduced competitiveness of American products internationally and domestically.
- Inefficient application of resources spent on environmental improvement, with a focus on compliance rather than on the simultaneous search for productivity and environmental gains.
- An overspecification of technologies for environmental improvement in regulatory policies, including in regulations, in permitting, and in compliance actions.
- Limited additional environmental improvement.

The key to maximizing environmental improvement is to modify the current environmental management system to encourage the reduction of pollution generated by industrial processes while encouraging the advance of technology. Increasing appropriately the role of pollution prevention in governmental environmental strategies can improve net (or multi-media) environmental results while increasing productivity.

While this report focuses on permitting and compliance policies, the TIE Committee believes that changes to these policies, while an obvious starting point, will comprise only part of a larger set of necessary changes in the environmental management system. This is the case because regulatory and statutory requirements often limit the potential to introduce flexibility into implementing policies. Thus, statutes and regulations may also require modification to achieve the long term environmental benefits of fuller use of pollution prevention approaches. EPA's new Source Reduction Review Project (SRRP) is piloting a regulatory process change the Committee believes would lead, over the long term, to more effective promotion of pollution prevention -- complementing and reinforcing realization of the goals of this report. In the SRRP, the development of all new regulations will be coordinated across the media for 17 industrial categories. Source reduction opportunities

will be intensely evaluated during rule development; in this way, the relative priority of problems can be addressed and cross-media shifts can be considered and avoided, where possible.

The Committee concluded that many of the recommendations in this report to reduce the implementation barriers to pollution prevention can be accomplished within the agency's current statutory authorities. In some cases, effective implementation of the Committee's recommendations could require significant experimentation with, and testing of, alternative approaches. One effective way to break out of the mold of current operating procedures, without full commitment to untested alternatives, would be to support expanded use of state (and local) pilot projects. Though strongly endorsing such an approach, the Committee emphasizes the importance of rigorous effectiveness evaluations of such experiments.

The Committee notes that the integration of pollution prevention into the environmental management system is a complex undertaking that will require a sustained commitment lasting several years. The Committee believes that there are a few top-priority, high-impact short term actions in the permitting and compliance policy area that, in particular, should be initiated to reinforce the momentum that EPA has established towards pollution prevention. This momentum will be reinforced if EPA focuses its long term attention on a few top-priority, high-impact, long-term actions in this area. Following are examples of a few action items which could be taken as a group to start the process. These are listed in context later in the Executive Summary and discussed more fully in the following sections of the report and recommendations:

- Short Term:**
1. Fully implement and expand the EPA/state demonstration program for multi-media pollution prevention permitting, and establish criteria and schedules for program evaluation (see subrecommendation 1.4).
 2. Identify opportunities to redeploy scarce regulatory agency and regulated organization resources from procedural or redundant permitting activities, and reallocate resources for the permitting of multi-media, pollution prevention, and innovative approaches (see subrecommendations 1.3 and 1.5).
 3. In evaluating state performance under delegated programs, adopt a policy giving additional credit for multi-media inspections (see subrecommendation 3.4).

- 1. Maximize the implementation of multi-media pollution prevention alternatives during permit development by emphasizing advances in environmental performance rather than (mandating) the specific means of attainment (see subrecommendation 1.1).**
- 2. Build a public/private partnership for the dissemination of pollution prevention information and the widespread adoption of pollution prevention technologies and techniques (see Recommendation 5 and subrecommendations 3.2, 3.5, 4.2, 4.3).**
- 3. Modify environmental permitting and compliance systems to accelerate the development and commercial introduction of innovative pollution prevention technologies and techniques (see Recommendation 2).**
- 4. Strengthen EPA support for environmental education and training for those involved with environmental performance in the regulated and regulatory communities to facilitate the implementation of pollution prevention (see subrecommendations 3.3, 5.1, 5.2, and 5.3 and Recommendations 6 and 7).**

The TIE Committee's overall recommendation is thus that EPA and state and local authorities more aggressively integrate pollution prevention into permitting and compliance policies. The Committee recommends strategic and tactical changes to help create the needed environmental-results orientation in federal, state, and local programs. The Committee's central findings and recommendations are outlined on the following pages:

1

FINDING: The current system of single-medium permitting has achieved significant environmental gains primarily by stimulating a pollution control response, rather than by encouraging pollution prevention.

RECOMMENDATION: Redesign permit procedures to foster and reward efforts by regulated facilities to expand their use of hi& multi-media management and pollution prevention approaches for environmental improvement.

EPA should examine its permitting policies and procedures to determine where greater flexibility would encourage the use of multi-media approaches and pollution prevention technologies and techniques, while still meeting statutory requirements. Current permitting and compliance policies and procedures respond to the exigencies of single-medium pollution control programs. Facility managers should be encouraged to look at the whole facility -- at the entire pattern of production and environmental releases. Only then will facilities be likely to reach the most economically and environmentally efficient results. The TIE Committee recommends that EPA take several critical actions:

1. Maximize the implementation of multi-media pollution prevention alternatives during permit development by emphasizing environmental results rather than the specific means of attainment.
2. Administer single-medium permit requirements flexibly to encourage environmentally beneficial multi-media pollution prevention initiatives by regulated parties.
3. Initiate, and encourage state and local agencies to initiate, fast-track permits for pollution prevention initiatives at facilities with well-documented, good compliance records.
4. Support additional state and local multi-media permit pilot projects (with well-defined objectives and timelines) and initiatives to synchronize the timing and coordinate the issuance of single-medium permits.
5. Redeploy scarce regulatory agency and regulated organization resources from procedural or redundant permitting activities, and reallocate resources for the permitting of multi-media, pollution prevention, and innovative approaches.
6. Support expanded use of permits-by-rule for permit renewals and selected new permits to encourage pollution prevention.

FINDING: Existing permitting and compliance authorities at all levels of government lack flexibility necessary to encourage technology innovation for environmental purposes.

RECOMMENDATION: Accelerate the development of innovative pollution prevention technologies and techniques and encourage their use by implementing the recommendations in the TIE Committee report on fostering technology innovation through permitting and compliance policy.

In its report on the relationship between technology innovation and permitting and compliance policy, the TIE Committee concluded that barriers to the development and use of innovative technologies are not unique to pollution control and pollution .. treatment/remediation, but are similarly germane to pollution prevention technologies and techniques. The Committee's current work confirms the findings and recommendations of its original study. The TIE Committee recommends that EPA take several critical actions:

1. Foster the development, testing, and demonstration of innovative pollution prevention technologies:
 - a. Institute a working permitting system (covering all media) for research, development, and demonstration (RD&D), testing, and evaluation. This could be accomplished through a special, multi-media "RD&D" permit or through the creation and effective coordination of single-medium RD&D permits.
 - b. Develop a system of dedicated centers for tests and demonstrations, for example with the Departments of Energy and Defense (DOE and DOD).
 - c. Develop a simple, practical system for cross-media and cross-jurisdictional coordination of reviews of such permit applications.
2. Implement permitting processes that aid the commercial introduction of innovative pollution prevention technologies and techniques. This will require increased flexibility of permitting processes involved in the commercial introduction of these technologies and techniques.
3. Recognize in compliance or enforcement policies and practices the need for flexibility during the development, testing, and early uses of innovative pollution prevention technologies and techniques.

3

FINDING: Greater flexibility is required under federal, state, and local enforcement policies to allow and encourage facilities to use pollution prevention approaches as part of compliance and other environmental improvement activities.

RECOMMENDATION: Work with the states to encourage and develop pollution prevention enforcement initiatives.

Strong, predictable, effective, and consistent enforcement is critical in fostering the use of pollution prevention technologies and techniques. It is not, however, sufficient. Enforcement flexibility is needed to allow and encourage facilities to use pollution prevention approaches to come into, or go beyond, compliance. EPA's recent pollution prevention enforcement policy statements are positive, but their implementation has been limited. Strong incentives and extensive technical support are necessary to spur EPA and state regulators toward this kind of enforcement approach. Unorthodox and innovative settlements often require more time, and create more risk, for both regulators and managers at regulated facilities. The rewards must be commensurate. The TIE Committee recommends that EPA take several critical actions:

1. Increase use of pollution prevention enforcement policy alternatives, such as those in EPA's *Interim Policy on Pollution Prevention and Recycling Conditions in Settlements* and *Policy on Supplemental Environmental Projects*.
2. Establish easily accessible mechanisms (e.g., a clearinghouse and the pollution prevention information exchange system network [PIES]) for sharing successful experiences about the use of pollution prevention in enforcement settlements.
3. Develop a multi-media compliance inspection package, including training opportunities, for use by EPA, state, and local (especially publicly owned treatment works [POTW]) inspectors. EPA should aggressively encourage adoption and use of this inspection scheme to promote pollution prevention.
4. In evaluating state performance under delegated programs, adopt a policy giving additional credit for multi-media inspections.
5. Provide technical support for multi-media inspections. Modify base grant objectives for the states to promote multi-media inspections.

4

FINDING: Facility-wide pollution prevention planning can be a valuable tool for encouraging regulated parties to comprehensively evaluate the cost and environmental implications of a range of product design and technical production alternatives, rather than simply focusing on mechanisms for environmental compliance.

RECOMMENDATION: Proactively support state initiatives in multi-media pollution prevention facility planning.

Numerous states **have adopted** pollution **prevention** facility planning requirements. These requirements mandate that facilities examine alternatives to their current materials use **and** process **design** operations to identify economically feasible **and** environmentally preferable alternatives. The objectives of facility planning are (a) to **encourage** facility **managers** to consider their facilities as a whole for environmental planning purposes, rather **than responding** only to specific, single-media compliance requirements **and** (b) to promote **industrial productivity by encouraging the simultaneous search for productivity and environmental gains**. The current diversity of state **approaches** to facility planning reflects leadership **and** commitment. These efforts **provide** a real-world laboratory in which it will be possible to observe **and** evaluate the effectiveness of alternative **approaches**. The TIE Committee recommends that EPA **take** several critical actions:

1. **Work with state officials to evaluate the effectiveness of alternative approaches to facility planning. Draw the national lessons from state experiments and facilitate the transfer of information and results of evaluations between states.**
2. **Establish industry-specific advisory groups to facilitate the transfer of pollution prevention technical information and provide support for pollution prevention facility planning for selected industries, with due regard to protecting confidential business information.**
3. **Augment industry-specific and process-specific information sharing through the national pollution prevention information exchange system network (PIES).**

5

FINDING: The positive relationship between industrial productivity and environmental protection is not yet well understood or accepted by many leaders in industry and government. Pollution prevention can help achieve both industrial productivity and environmental improvement.

RECOMMENDATION: Create a culture change by working with federal, state, and local agencies, non-profit organizations, universities, trade associations, and environmental groups to facilitate the implementation of pollution prevention technologies and techniques by expanding training, educational, and technology diffusion efforts.

While some leaders in both industry and government understand and are committed to utilizing pollution prevention approaches, most of those engaged in environmental management still do business as usual. To change this environmental management culture will require intensified efforts in training and education and in technology diffusion both for present and future officials in regulated organizations and regulators at all levels of government.

The TIE Committee's report, *Improving Technology Diffusion for Environmental Protection*, describes in detail a recommended governmental role to enhance and coordinate the diffusion of pollution prevention technologies, techniques, and culture. The Committee recommended that EPA adopt an enhanced strategic role for technology diffusion in the environmental management system by strengthening itself organizationally (e.g., create the position of an agency-wide technology advocate), redeploying diffusion and research resources, and integrating the diffusion role in policies and programs. Further, the Committee proposed that EPA establish a stronger partnership with the developers of technology information and with technology diffusion providers and users in the public and private sectors, and increase its emphasis on incentives for technology diffusion.

5 (continued)

The TIE Committee recommends that EPA take several critical actions:

1. **Provide or support intensive, regular multi-media inspection training to federal, state, and local inspectors and encourage rotating these personnel across different medium-specific assignments.**
2. **Provide or support training to increase the technical proficiency of inspectors and technical assistance personnel, both with respect to rules and regulations and with respect to production and compliance technologies and techniques.**
3. **Support development at one or more major business schools of training programs for senior and middle corporate managers on the economic benefits of implementing pollution prevention technologies and techniques.**
4. **Adopt the specific measures recommended in *Improving Technology Diffusion for Environmental Protection* for promoting a partnership for the dissemination of pollution prevention information and the adoption of pollution prevention technologies and techniques.**

FINDING: Reward systems for EPA personnel place high value on the development, implementation, and enforcement of single-media, pollution-control regulations without creating strong incentives for activities that encourage and support pollution prevention.

RECOMMENDATION: Alter personnel reward systems to encourage EPA staff to champion pollution prevention.

EPA's environmental mission has been implemented primarily through permitting and compliance requirements. In an effort to develop measurable performance criteria for federal and state agency staff, EPA has instituted a system which often evaluates performance on such bases as the number of permits or enforcement actions carried out by regional and state staffs. The TIE Committee recognizes the vital role all of these activities have played, and will continue to play, in improving the nation's environment. But while standard enforcement and permitting actions are easy to count, innovative pollution prevention approaches, because they are non-standardized and potentially more complex, may reduce the number of actions. In addition, other pollution prevention successes (e.g., dissemination of information on pollution prevention technologies, re-education of both environmental and industrial management personnel) are likely to require a new standard of evaluation. Modifying the reward system for advancement and awards towards pollution prevention should be one of EPA's first priorities. The TIE Committee recommends that EPA take the following critical actions:

1. Incorporate both pollution prevention and multi-media factors into agency personnel performance evaluation criteria and into the agency award system.
2. Make promotion of a multi-media pollution prevention culture at EPA a primary criterion for agency awards for senior staff.

7

FINDING: EPA leadership in rewarding pollution prevention efforts outside the agency provides significant encouragement for state and local regulatory personnel and for staff of regulated parties to explore the use of pollution prevention innovations.

RECOMMENDATION: Expand and publicize the system of national recognition and awards honoring outstanding pollution prevention research, *training*, and technology implementation.

It is crucial to reward EPA staff for accomplishments promoting pollution prevention. It is equally essential to recognize those -- whether in industry or elsewhere in government -- whose compliance actions help to shift the focus from environmental control to pollution prevention and industrial productivity, or who make significant strides in implementing pollution prevention technologies and techniques. These are the people who are breaking down old barriers, implementing new approaches, or leading research breakthroughs that simultaneously promote economic productivity and environmental protection. The TIE Committee concludes that, at least over the short term, an expanded EPA program to recognize pollution prevention achievements would provide broad incentives and encouragement for pollution prevention innovators. The TIE Committee recommends that EPA take several critical actions:

1. Expand and publicize a system of national recognition for individuals in other federal agencies making outstanding contributions to promoting pollution prevention.
2. Expand and publicize a system of national *recognition* for outstanding pollution prevention efforts by state and local agencies and officials.
3. Expand and publicize the system of national recognition for regulated parties making major strides in institutionalizing pollution prevention approaches to environmental protection.
4. Expand and publicize the system of national recognition for non-profit institutions (e.g., public interest groups, universities) making major pollution prevention contributions.

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PREFACE

BACKGROUND

The environmental regulatory system in the United States has been developed by Congress; the state legislatures, the U.S. Environmental Protection Agency (EPA) and state and local agencies in response to the substantial, and occasionally dramatic, environmental problems which emerged, and garnered increasing attention, in the decades after World War H. Its goal is protection of human health and the environment. In the years since the creation of EPA in 1970, the system has made significant progress toward improving the quality of the environment through implementation of media-specific pollution control programs. Notwithstanding past progress, economic, technological, and institutional factors limit the improvement that can be achieved by current programs. New measures and *new* approaches will be needed to meet the increasingly complex environmental challenges of the future -- particularly the challenge to combine environmental progress with sustainable economic growth.

The National Advisory Council for Environmental Policy and Technology (NACEPT) was formed in 1988 to provide the Administrator of EPA with the policy advice of a full range of outside experts on how to improve the effectiveness of the nation's environmental management system. The scope of NACEPT's reviews and recommendations includes legislative and regulatory authorities; implementation policies and programs at the federal, state, and local levels; environmental research and development; and technology transfer (diffusion). NACEPT's mission is "bridging the gap from problem identification to environmental solutions through successful program implementation, cooperation, and consensus building by business, government, educational institutions, and private organizations."

To carry out its responsibilities for providing assessments and recommendations to the Administrator, NACEPT created five standing committees. NACEPT charged each committee with evaluating specific aspects of the environmental management system. The Technology Innovation and Economics (TIE) Committee is responsible for providing advice on ways to strengthen EPA's encouragement of the development, commercialization , and use of environmentally beneficial technologies. The Committee's work is based on the premise that the potential for improving the environment is ultimately dependent on our ability to innovate, produce, and utilize increasingly efficient and cost-effective technologies

and techniques (including all forms of information management). The Committee considers means to promote all environmentally beneficial technologies, but has placed its primary emphasis on pollution prevention technologies -- in accordance with both the Agency's hierarchy and with a recent request from the Administrator.

In November of 1990, the Administrator of EPA requested that NACEPT focus its future efforts on two principal issues: the interrelationships of international trade and the environment, and the promotion of increased use of pollution prevention to reduce adverse environmental impacts from industrial and commercial activities. This report is one part of NACEPT's response to the Administrator's request.

The TIE Committee considers it vital to the success of strategies to promote pollution prevention to encourage both innovation and diffusion of relevant technologies. In its December 1992 report, *Improving Technology Diffusion for Environmental Protection*, the Committee defined "diffusion" as "the process of getting technologies that are ready for commercial use into widespread practice, within and between different industries and institutions." ¹ The report defines "innovation" as "the development of a technology concept into a commercial product and the first uses of that product." ² Much of the initial effort in pollution prevention has been to encourage the use of available technologies or materials in place of currently used, more highly polluting industrial methods. The objective is to achieve the most cost-effective level of environmental improvement possible within the constraints of regulatory requirements and current technology. In some cases this may only require the adoption of a technology or practice already in wide use in an industry to an application in a particular plant. In other cases, however, the adaptation even of available technologies to a plant's existing production processes or product specification needs is a complex process, involving a substantial degree of innovation. It may also involve a significant level of perceived or real economic or environmental compliance risk for a plant operator, even where it promises eventual substantial economic benefit. Most state pollution prevention technical assistance programs focus first on adoption of fairly straightforward technology alternatives, and secondarily on those approaches involving some limited degree of technology adaptation.

Improving Technology Diffusion for Environmental Protection, p. 7.

² Ibid., p. 7. The report identifies the first phase of the technology life cycle as "invention -- the birth of a technology concept."

Environmental improvements in processes and materials, however, require long-term, **continuous investment** in the development of new, more economically and environmentally efficient technologies which make it possible to leapfrog to a new level of **environmental** improvement and economic efficiency. Progress in pollution **prevention**, therefore, requires attention to the barriers **and incentives** in the environmental **management** system which can hinder or promote the research, development, **piloting**, and initial use of innovative **technologies**.

"Pollution **prevention**," as used in this report, follows the "EPA statement of Definition" in **Deputy Administrator** Habicht's memo to all **EPA** personnel (May 28, 1992). The TIE Committee **recognizes, however, that industry and** some state and local government agencies use the term more **broadly --** to include, for example, **environmentally** beneficial recycling **and** reuse. The TIE Committee does not intend, in following the EPA definition, to imply **that** such activities are

not **an appropriate** focus for state programs, or for **EPA**, but that such programs should be in accord with the EPA **hierarchy**.

In January 1990, the TIE Committee prepared its initial report for the Administrator concluding that the development and use of innovative technologies is essential both for economic growth and for continued environmental improvement. The Committee also concluded that the environmental regulatory system has a significant impact on the

Pollution prevention means "source reduction"; as defined under the Pollution Prevention Act, and other practices that reduce or eliminate the creation of pollutants through:

- ***increased efficiency in the use of raw materials, energy, water or other resources, or***
- ***protection of natural resources by conservation.***

The Pollution Prevention Act defines "source reduction" to mean any practice which:

- ***reduces the amount of any hazardous substance, pollutant, or contaminant entering any waste stream or otherwise released into the environment (including fugitive emissions) prior to recycling, treatment, or disposal; and***
- ***reduces the hazards to public health and the environment associated with the release of such substances, pollutants, or contaminants.***

The term includes: equipment, or technology modifications, process or procedure modifications, reformulation or re-design of products, substitution of raw materials, and improvements in housekeeping, maintenance, training and inventory control.

development and commercialization of environmentally beneficial innovative technologies, and that there is a critical need to examine the effectiveness of innovation-enhancing policies and programs in the regulatory system, separately and together. NACEPT recommended to the Administrator that EPA:

- Issue a policy statement expanding the agency's mission to encompass fostering the development and diffusion of innovative technologies and techniques, particularly those involving pollution prevention, to further environmental progress and enhance sustainable economic growth.
- Develop and implement a programmatic strategy for fostering such technology innovation.
- Work with the Office of Science and Technology Policy and federal agencies to develop and implement new policies that promote technological advances for the environment and economic productivity.
- Evaluate the degree to which the agency's innovation-related programs and regulatory programs effectively stimulate technology innovation.

To further define the activities EPA should undertake in determining necessary steps to promote technology innovation, the TIE Committee created a special Focus Group on Environmental Permitting. The Committee charged the Focus Group with examining EPA's permitting and compliance processes, and reporting on the relationships between these processes and the development and introduction of new, environmentally beneficial technologies. The Focus Group's efforts culminated in a report and recommendations by NACEPT to the Administrator in January 1991 entitled ***Permitting and Compliance Policy: Barriers to U.S. Environmental Technology Innovation***.³

While the report addresses problems related to encouraging any environmentally beneficial innovative technology (e.g., control, clean-up, pollution prevention, information management), one of the central findings of the Committee was that "the current environmental regulatory system tends to emphasize pollution abatement, rather than pollution prevention, and offers limited encouragement to simultaneous environmental and industrial productivity improvements."

To respond directly to the Administrator's subsequent request to focus on pollution prevention, the TIE Committee then charged the Focus Group with determining what

³ For a summary of the recommendations, see the Executive Summary.

changes should be made in the permitting and compliance system to specifically promote the development and adoption of pollution prevention technologies and practices. This report summarizes the results of that review.

GOALS OF THE REVIEW

The TIE Committee directed the Focus Group on Environmental Permitting to direct its efforts to achieving the following goals:

- Assist EPA in finding ways to facilitate more widespread implementation of pollution prevention measures to achieve continuous environmental improvement.
- Assist EPA in devising changes within the current permitting and compliance system designed to remove barriers to, and create incentives for, continuous technical and management innovation, particularly for pollution prevention approaches.
- Where appropriate, identify barriers and disincentives to implementing pollution prevention measures in the underlying rules and regulations which the permitting and compliance system is designed to fulfill.

While this report focuses on permitting and compliance policies, the TIE Committee believes that changes to these policies, while an obvious starting point, will comprise only part of a larger set of necessary improvements in the environmental management system. This is the case because regulatory and statutory requirements often limit the potential to introduce flexibility into implementing policies. The Committee concluded that statutes, regulations, and the regulatory development process may also require modification to achieve the long term environmental benefits of fuller use of pollution prevention approaches. This notwithstanding, the Committee concluded that many of the current recommendations to reduce the implementation barriers to pollution prevention can be accomplished within the agency's current statutory authorities. The TIE Committee has directed its Regulatory Design Focus Group to conduct an extensive review of possible strategic changes in regulations or statutes -- whether administered by EPA or other federal agencies -- that could improve environmental protection and compliance with environmental requirements, and as a means of increasing the rate of technological innovation.

EPA's new Source Reduction Review Project (SRRP) is piloting a regulatory process change the Committee believes would lead, over the long term, to more effective

promotion of pollution prevention -- complementing and reinforcing realization of the goals of this report. In the SRRP, the development of all new regulations will be coordinated across the media for 17 industrial categories. Source reduction opportunities will be intensely evaluated during rule development; in this way, the relative priority of problems can be addressed and cross-media shifts can be considered and avoided, where possible. The Committee believes that the agency should use the SRRP experiment and other pilot efforts to explore the statutory limits of regulatory reform, as well as the directions statutory reform to promote pollution prevention and technology innovation should take.

The TIE Committee believes that pollution prevention represents the most appropriate and effective complement to traditional end-of-pipe controls. One of the unique benefits of the pollution prevention approach over traditional abatement and control measures is that it provides a realistic opportunity for optimizing both environmental and economic achievement. Deputy Administrator F. Henry Habicht It's recent memorandum on pollution prevention to EPA staff expressed the benefit clearly:

"As EPA looks at the 'big picture' in setting strategic directions for the decade ahead, it is clear that prevention is key to solving the problems that all our media programs face, including the increasing cost of treatment and cleanup."

FOCUS GROUP PROCESS

The Focus Group on Environmental Permitting held two public fact finding meetings of two days each in November 1991 and March 1992. At the first meeting, the Focus Group heard presentations on state pollution prevention programs, including summaries by state members of the Focus Group, and summaries by EPA staff on agency enforcement and program initiatives in pollution prevention.

The Focus Group found that significant barriers and opportunities to promoting pollution prevention exist both with respect to the actual operation of permitting and compliance systems at the state and federal levels, and with respect to the perceived operations of that system by permittees; federal, state, and local officials; and the public. It also found that the nature of those barriers and opportunities varies depending on the perspectives and motivations of the regulated parties, and that this factor needs to be considered during any review of the permitting and compliance system. For purposes of its

analysis, the Focus Group examined the barriers and opportunities by breaking the issue down into seven different problem areas:

- The potential of multi-media permitting systems to encourage pollution prevention.
- The extent of the need to revise policies and programs related to the permitting of R&D in order to foster both the development and the diffusion of pollution prevention technologies and techniques.
- The potential and current extent of pollution prevention-based compliance and enforcement initiatives.
- The role of facility planning by industrial and commercial facilities in encouraging pollution prevention.
- Alternatives for training and support for those in both regulatory and regulated organizations undertaking pollution prevention initiatives.
- The need for more effective state and federal resource utilization and management to facilitate the assessment of opportunities for pollution prevention innovations.
- How EPA could give greater primacy to pollution prevention in agency programs and operations.

Members of the Focus Group (usually working in groups of two or three) wrote pollution prevention issue analyses for each of these problem areas. These concept papers provided the basis for the Focus Group's discussions of the seven areas during its second meeting in March 1992.

Through the Focus Group's discussions at its two meetings and the smaller group discussions and writing efforts that resulted in the concept papers, the Group:

1. Identified general and specific barriers to innovation and pollution prevention. These barriers arise in all aspects of the environmental management system, including statutes, regulations, permitting and compliance policies, and technology diffusion programs. The Focus Group focused its detailed analysis on barriers to pollution prevention in the implementation programs, specifically in permitting and compliance policies and in the technology diffusion programs that support them.
2. Identified current state and local efforts that should be encouraged to the greatest extent possible through technical support and through flexibility in federal approaches to delegating responsibility for federal programs to

state and local agencies. In many cases, the Focus Group concluded that these involve changes in current federal/state relationships well within EPA's current statutory authority.

3. Identified current EPA initiatives (e.g., pollution prevention enforcement options) which need to be more widely advertised and practiced.
4. Identified possible measures to deal with some of the major barriers that remain. The Focus Group felt that, at least in some cases, the appropriate approach for exploring alternative measures is for EPA to undertake one or more pilot programs in cooperation with individual state or local governments. This could involve, for example, a significant expansion of EPA's Model State Program (for cross-media permitting demonstrations) and the use of other mechanisms for providing support to state and local pilot projects in the permitting and compliance and technology diffusion areas.

This report represents the results of the Focus Group's review and discussions, as reviewed and adopted by the full TIE Committee and NACEPT. It is based on information presented to the Focus Group by agency representatives and external contributors, the concept papers prepared by members of the Focus Group, and Focus Group discussions and deliberations.

INTRODUCTION

ADMINISTRATOR WILLIAM K. REILLY'S REMARKS TO NACEPT

At the April 1992 meeting of the National Advisory Council for **Environmental Policy and Technology** (NACEPT), EPA Administrator William K. Reilly noted **that** the country is moving toward a new environmentalism **which advocates** growth, **encourages** progress, **and** recognizes **the** importance of leading **the** world in environmental **management and policy**. **He** stressed **the** importance of **pollution** prevention and the need for sensitivity to cross-media issues, **and** welcomed NACEPT's input on both of these factors in EPA's strategic plans.

Mr. Reilly spoke specifically about the **indispensability** of technology in solving our environmental problems. He noted that permitting needs to foster **innovation**, provide effective incentives, and avoid duplication. **He** further **emphasized the need** for a **partnership** between **public** and private organizations in realizing **environmental and** economic goals. Mr. Reilly specifically asked NACEPT to continue its review of the issue of permitting as it relates to innovation and pollution prevention.

The current report is intended to fulfill the Administrator's request by focusing on the impacts of the permitting and compliance process on efforts to implement pollution prevention. It carries further the analysis in NACEPT's previous reports and recommendations to the Administrator, which looked more generally at the (1) the need for **an EPA policy and strategy for fostering environmentally beneficial technology innovation**, (2) the potential to enhance the development and **use of all types of innovative technologies through permitting and compliance policies**, and (3) the opportunities to improve technology diffusion for environmental protection.

PREVIOUS REPORT BY THE TIE COMMITTEE

The primary emphasis of one of the TIE Committee's previous reports and recommendations, *Permitting and Compliance Policy: Barriers to U.S. Environmental Technology Innovation*, published in January 1991, was on the effects of permitting and compliance policy on all forms of environmental technology innovation, rather than specifically on pollution prevention. Elements of the previous report are directly

relevant to the current efforts of the Committee. The TIE Committee's primary recommendation in that report is that the Administrator of EPA, world% within EPA, with state and local agencies, and with the Congress, make interrelated improvements in **environmental** permitting and compliance systems **necessary to** foster technology innovation for environmental purposes, within the overriding goal of protecting human health and the **environment**. Further, permitting and compliance systems, as they function today, **discourage** all stakeholder **groups** from **taking** the risks necessary to develop innovative **technologies** -- whether for pollution prevention or for pollution control -- and to bring them into routine use to solve environmental problems. This primary recommendation is as **applicable** to the promotion of pollution prevention as it is to the promotion, generally, of **technology** innovation:

The other principal recommendations of the January 1991 report were that EPA:

- Modify permitting systems to aid the development, testing, and demonstration of innovative technologies for environmental purposes.
- Implement permitting processes to aid the commercial introduction of innovative technologies for environmental purposes.
- Use compliance programs to encourage the use of innovative technologies to solve **environmental** problems.
- **Support regulators and** other involved entities to maximize the effectiveness of improvements recommended in permitting and compliance systems.
- Identify and remove regulatory obstacles which create unnecessary inflexibility and **uncertainty** or otherwise **inhibit technology innovation for** environmental purposes.

While the specific application of these **recommendations** for pollution prevention **may be** different **than** for **general technology** innovation, **the** Committee finds **that** these general **recommendations** are still essential in meeting the objective of encouraging, and overcoming the barriers to, pollution prevention. These general concerns and **recommendations** are once again reflected in the Committee's current report.

THE STAKEHOLDERS

There are several groups of "stakeholders" concerned with permitting and compliance activities, including: (1) regulated communities (e.g., businesses, industry, POTWs); (2) regulators (federal, state, and local); (3) commercial firms and research consortia involved in the development of technologies, techniques, and management systems for pollution prevention; (4) investors; and (5) public interest groups and the public at large.

Properly defined and realistically managed, pollution prevention offers all stakeholders increased opportunities to achieve advances in both economic and environmental goals. Because the successful adoption of pollution prevention practices by regulated parties will depend on cooperation among an array of stakeholders, it is important to understand how each of these groups will be affected by, and will respond to, changes in the environmental permitting and compliance process within federal, state, and local regulatory organizations.

Regulated Parties

Among regulated parties and in particular businesses subject to environmental regulations, there is a growing recognition that the information generated for environmental compliance purposes can be used as an indicator of the health and efficiency of operations. This approach integrates economic motives and environmental goals. In Europe, and increasingly in the U.S., this new "sustainable" economic approach to industrial design is supported by three ecologically based principles: the need to conserve energy, to save materials, and to reduce waste.

Hundreds of companies in Europe and the United States have benefitted from this new approach to decision making and organization. Some companies are even making changes in management and technology (i.e., manufacturing and product) design based on pollution prevention and other environmental concerns. Information requirements and liability-creating statutes have had an important role in promoting these new market-oriented responses to environmental issues.

Until recently, however, most regulated parties based their environmental decisions on an "end-of-pipe" management strategy. This approach was in response to traditional, technology-based guidelines developed to protect the nation's air, water, soil, and groundwater quality. Today, while the majority of companies are still organized primarily to

respond to these traditional requirements, many companies are increasingly developing economics-based strategies, both through voluntary efforts and through enforcement actions, to reduce environmental risk through source reduction techniques, "best management practices" (BMPs), and recycling.

One of the greatest challenges to industry is the large diversity of products and processes that are affected by this new approach to risk management. In general, businesses will be increasingly concerned with such issues as: confidentiality with regard to proprietary techniques; a higher degree of regulatory flexibility to test and implement new pollution prevention techniques in lieu of traditional, end-of-pipe approaches to compliance; access to information concerning state-of-the-art pollution prevention techniques; a level playing field with consistent, predictable enforcement for all competitors; the possibility that public availability of pollution prevention audit information may open a company to liability; and more cost-efficient permitting and compliance programs.

In many instances, these new techniques may provide a company with a greater competitive advantage in the global marketplace. Smaller firms with less capital and technological resources have special concerns, however the need for improved technical assistance programs and the ability to finance the implementation of new pollution prevention techniques.

Not all firms, of course, are in the forefront of this change in perspective on environmental issues. Some firms still only respond to environmental concerns and requirements when forced directly to do so by command-and-control regulations. Others try to anticipate environmental requirements, but have not yet seen the advantage to integrating environmental and productivity planning as part of their overall management strategy. The impact of, and potential benefits from, additional flexibility and new requirements will vary substantially with the position of regulated parties in this spectrum.

Regulators

In order for government to successfully support pollution prevention, regulators at the federal, state, and local levels must begin to design permitting and compliance programs that are both effective incorporate market-based incentives or other techniques or encouragements for pollution prevention. By defining environmental protection in terms of technological standards (even where performance-based), instead of in terms of institutional

management, the regulations and regulatory structures have tended to stifle system innovation. But for regulators, including permit writers and compliance personnel, to effectively design and utilize increased flexibility in the permitting and compliance system, they must have adequate access to information; an understanding of and ability to communicate clearly regulatory requirements, objectives, and processes; and, the technical expertise necessary to understand the perspectives, processes, and products of the industries they regulate.

To be fully effective, regulators must become more adept at designing multi-media, facility-wide permitting and compliance approaches that rely more on performance standards and market-based incentives and less on a specific control technology. This will allow industry to respond more quickly and economically to health-based or ecologically based regulatory demands.

Firms Developing or Investing in Environmentally Beneficial Equipment

According to a report issued by the economics department of Germany's Commerzbank, Germany's extremely tough environmental laws have created investment opportunities in the areas of emission controls and waste disposal equipment that exceed those of all other nations. Much of this success is due to Germany's support to R&D. A recent study showed, for example, that Germany spends 5.0 percent of its public research budget on environmental problems -- which is greater than the United States, France, or Great Britain.

If there is a long-term market opportunity for their investments, and adequate licensing and trade secret confidentiality provisions, companies will likewise begin to invest in the products and services needed by industry to improve their economic efficiency, such as reducing their disposal costs through pollution prevention. Existing, and often shifting, technology-based environmental standards, which are capital intensive, spur only limited investment interest in new environmental technologies because they create a strong stimulus for the diffusion of technologies whose performance equals that of the technology upon which the standard is based, and on cost of performance. Because of this rigid regulatory approval process, and the lack of public trust in general, most investment has been directed towards improving the cost of performance of traditional technologies -- such as incinerators or scrubbers. Alternative technologies, often prejudiced by existing regulatory systems, face rigid and narrowly constrained permitting requirements which make market

entry extremely difficult. At present, the investment risk is high and unpredictable and tends to be unsupported by appropriate environmental regulations and adequate market information. If the flexibility necessary to increase the rate of utilization of pollution prevention technologies is introduced into the permitting and compliance systems, such a change will both create new market opportunities for vendors and investors, and lead to an improvement in environmental performance of facilities. Some of the vendors will be different than those in the traditional pollution control equipment market; firms involved in developing and selling production and manufacturing technology will have a new market opportunity for the technologies of production redesigned to minimize environmental impacts.

Public and Environmental Organizations

Citizen coalitions and their national representatives, the public interest groups, as well as labor, have become increasingly involved in the debate to find alternative solutions to environmental issues. Pollution prevention offers a unique opportunity for citizens and labor to work with industry towards solutions that are at once both more economically and environmentally sustainable.

The public is often skeptical of any new management approaches undertaken by industry, and of the regulatory efforts of government agencies. Problems have resulted from inadequate access to both decision making processes and critical information. It is thus very important for regulators to include the public in the permitting and compliance process and to improve current information-sharing mechanisms.

CHARACTERISTICS OF A SUCCESSFUL POLLUTION PREVENTION INITIATIVE

The goal of the current study and report by the TIE Committee is to better define the activities necessary for EPA to undertake in determining some of the steps necessary to enhance environmental improvement through balanced multi-media pollution prevention, utilizing a variety of approaches (e.g., reduction in use of toxic materials, raw material and product substitution, process change). The Committee seeks to facilitate wider implementation of pollution prevention measures through modified permitting, compliance, and enforcement activities that promote innovation, remove existing barriers to innovation,

incentives for pollution prevention. In pursuit of this goal, the Committee identifies the following elements as essential to successful implementation:

- **Confidence-building:** To achieve a transition to a pollution prevention orientation from the current predominantly pollution control orientation requires mutual confidence building between the public, the regulated community, and regulators. Effective pollution prevention requires the integration of environmental considerations into all aspects of planning and implementation for product development and production, rather than merely complying with environmental regulatory requirements. This, in turn, requires increased **emphasis on cooperation**, mutual understanding, and communication.
- **Diversity:** The permitting and compliance system must be **capable of dealing** with both organizational and technological diversity. Some regulated parties merit permitting flexibility to take environmental protection measures which go substantially beyond mandated standards. In other cases, specific **command-and-control** directions are appropriate.

Since pollution prevention options are often specific to the production needs, processes, and objectives of the individual facility, a **permitting and compliance** system which is to promote pollution prevention must take into account the **diversity** of situations and technologies to which specific **permitting** requirements **apply**. Such a system must be adequately stringent to ensure realization of environmental objectives, yet **allow** for flexibility where **appropriate** to **encourage alternative** approaches to meeting or exceeding those objectives.

- **Confidentiality:** Confidentiality of information and respect for intellectual property rights (e.g., patent rights) is critical both for **encouraging** early discussions between the regulated community and regulators about new technologies (**particularly** production technologies) which promise environmental benefits, and for encouraging the development of pollution **prevention plans which** propose significant environmentally beneficial **changes involving unique** or **proprietary** production processes or products.
- **Risk Sharing:** In order to ensure that, to **the extent they enhance** protection of the environment, available opportunities are utilized for incorporating pollution prevention into all facets of technological development and production decisions, it is necessary that there be some mechanism (e.g., flexible **permitting procedures and** "fail soft" strategies) for economic risk **sharing among** the public, **the regulated community, and the regulators.** (**Private-public** consortia **supporting technology** innovation are one potential mechanism for **achieving** this.)
- **Certainty:** It is important to create certainty within the **regulatory** process where obligations, baselines, timing, and goals are clearly stated **and** understood. Permit conditions must assure compliance and be enforceable; while flexibility is required to encourage innovation, it cannot be at the expense of enforceability, which creates the certainty that environmental requirements will be met. Certainty must also **apply** to enforcement of environmental requirements, where enforcement actions are swift, firm, and consistent.

Just as it is necessary that permit requirements be readily enforceable, it is necessary that the process for obtaining a permit where an innovative pollution prevention process is involved be predictable with respect both to timing and to criteria of acceptability. If the process lacks that kind of certainty, managers and investors are likely to have a high sense of risk in undertaking any non-standard changes.

- *Protection:* The permitting and compliance system must assure protection of human health and the environment. To assure this while encouraging innovation and pollution prevention, compliance efforts must be systematic and predictable. Health-based environmental standards which serve as the basis for a system of limits on releases are one major means for assuring protection.
- *Clarity:* Clarity in permitting processes and in permit conditions is important in encouraging any innovative approach. Ambiguity is more likely to push both industry personnel and permit writers toward caution and self-protection.
- *Flexibility:* There should be operational flexibility in the permitting system, allowing sufficient leeway to develop and use innovative approaches to meeting environmental objectives. Flexibility does not mean ambiguity in permit conditions or weaker enforcement; it is simply a necessary element in the cultural shift toward pollution prevention. As noted above, however, there may be, even with this understanding, some circumstances where the goals of certainty and flexibility come into conflict.

FINDINGS

OVERVIEW

An agreement about several basic concepts emerged from the Technology Innovation and Economics (TIE) Committee's review of current state and federal efforts. Many state and federal permitting and compliance programs include elements which could introduce to the environmental **management** system both greater flexibility to allow pollution prevention and greater incentives to encourage voluntary action, while providing for improvements in **environmental** protection. The TIE Committee concluded that the realization of the benefits of **pollution** prevention must be **based** on a recognition that:

- **Long Term Commitment:** Pollution prevention requires a long-term commitment by managers in both the **public** and **private** sectors to a process of continuous **environmental** improvement that goes **beyond traditional end-of-pipe** management strategies. This commitment includes **providing support** for innovative staff initiatives within both **regulatory** organizations and industry.
- **Comprehensive Environmental Accounting:** Effective pollution prevention is only possible where generators fully understand that efficient production goes hand in hand with good environmental performance and compliance. Advantages include reduced waste management costs, diminished long-term liability, and related production efficiency benefits.
- **Environmental Capability of Regulated Parties Varies Widely:** **Companies** vary widely in their level of environmental awareness and commitment, their **knowledge** of **alternative** waste **management** and pollution **prevention approaches**, resources **available** for **addressing** environmental compliance and initiating **pollution** prevention **approaches**, and the degree to which they have internalized pollution prevention as part of their **management** system. A system of environmental management requirements which does not take account of these differences may not yield the desired environmental improvement -- either short-term or long-term.
- **Government Constraints Limit Pollution Prevention:** Current resource commitments and requirements by federal, state, and local agencies; statutory and regulatory constraints; and standard permitting and compliance procedures often limit the degree to which agencies can promote or encourage pollution prevention and other innovations, or differentiate between companies which display varying levels of commitment to environmental objectives. These constraints also limit the ability of regulatory agencies to make changes that encourage pollution prevention and other innovative approaches to meeting environmental goals.
- **Regulatory Stimuli are Needed To Promote Both Innovation and Diffusion of Pollution Prevention Approaches:** Not all of the

environmental management system barriers which stand in the way of pollution prevention can be addressed through revisions to permitting and compliance procedures. Barriers which become apparent in the operations of the permitting and compliance system are inherent in the regulations. Eliminating such barriers will require changes to the underlying regulations and statutes. Improvements in the permitting and compliance system — the central operational/administrative mechanism for implementing environmental regulations -- can be accomplished by making policies and procedures as flexible, predictable, and comprehensible as possible.

The TIE Committee learned about a variety of initiatives at the state and federal levels showing promise for promoting pollution prevention. The bases for state initiatives, in particular, vary widely and may rise from somewhat conflicting perspectives as to the best means to approach the promotion of pollution prevention. For example, there are philosophical divergences as to whether pollution prevention is most likely to be promoted through regulatory or non-regulatory approaches. In instances where states require pollution prevention facility plans, questions arise as to whether those plans should be public or proprietary documents, or whether the planned implementation elements of a company's pollution prevention plan should become enforceable requirements.

Since most of these initiatives are quite recent, the TIE Committee believes there is insufficient information to adequately analyze the effectiveness of any single approach. It concludes that EPA should encourage a variety of state initiatives, evaluate them, and promote regulatory and administrative flexibility within federal programs in encouraging innovative pollution prevention. EPA should also attempt to define the basic criteria for additional flexibility.

ISSUE AREA SUMMARIES

The TIE Committee organized its analysis around seven significant issue areas. Its examination of these areas provides the basis for its recommendations; the TIE Committee does not intend, however, that the recommendations should deal specifically with each of those topics. The seven issue areas are:

- 1. *Multi-media Permitting:*** The TIE Committee explored the impacts of the single-medium permitting system on decisions by firms about whether to implement pollution prevention technologies **and** techniques. It considered pilot multi-media permitting programs initiated by some states in order to evaluate the applicability of these programs to facility-wide pollution reduction approaches.
- 2. *Permitting of Research, Development, and Demonstration (RD&D):*** The TIE Committee examined whether the same problems exist for the permitting of tests and demonstrations of pollution prevention or other innovative production processes and techniques as exist for the testing and demonstration of innovative control and remediation technologies. It considered whether the issue of permitting during RD&D is important

for all media and whether multi-media permit coordination is important for RD&D.

3. ***Pollution Prevention-Based Compliance and Enforcement Initiatives:*** Since the TIE Committee's first report on permitting and compliance policy, EPA has made **significant** progress **developing** policies that encourage the use of pollution **prevention** in enforcement actions. The TIE Committee explored the potential for more extensive implementation of such approaches, **and the relationship** between permitting and enforcement requirements.
4. ***Facility Planning:*** The TIE Committee reviewed a number of the different state approaches to pollution prevention facility planning **and** considered the role planning could play in facilitating the development of innovative environmental **technology and** pollution prevention technologies and techniques.
5. ***Pollution Prevention Support and Training:*** The TIE Committee considered a range of **alternatives** for **supporting** those who take the risks necessary during permitting and enforcement to develop, finance, encourage, or promote pollution prevention and innovative technology initiatives. It considered whether training **and** support for pollution prevention is necessary for **both regulatory agencies and** the **regulated** community.
6. ***Agency Resources:*** The TIE Committee examined how **EPA** and state and local agencies can more effectively manage resources to create opportunities for **technology innovation and** pollution prevention.
7. ***Pollution Prevention Implementation at EPA:*** The TIE Committee considered how EPA **can** modify its system for **measuring** accountability and determining allocation of **base grants, and enhance** its reward systems and other mechanisms, so **that** pollution prevention is integrated in the day-to-day business **and in** the **primary expenditures** of state **and** local agencies, **the regions, and EPA headquarters.**

GENERAL FINDINGS

The TIE Committee's investigations of the seven issue areas led to several general findings. These findings are based on all of the issue areas. Each finding is not necessarily related exclusively to only one issue area, nor does a single finding fully express the conclusions drawn from exploration and review of a particular issue. The findings reflect the most important conclusions resulting from the TIE Committee's present work.

FINDING 1:

The current system of single-medium permitting has achieved significant environmental gains primarily by stimulating a pollution control response, rather than by encouraging pollution prevention.

Two decades of permit requirements based on the control of releases to a single medium have produced expectations and analyses, both among the regulated community and the regulators, which isolate fragments of environmental problems. These patterns are now embedded in individual permits, in the expectations surrounding negotiations over new permits or permit renewals, in the organizational structure of environmental agencies and industry environmental staffs, in the training programs and career rewards available to those at all levels of federal, state, and local government agencies, and in the management and technology strategies of industries supporting environmental compliance. In the absence of specific methods to force plants and regulators to focus on the interrelationships of the processes generating pollution to all media across an entire facility has a number of important negative effects. These include some of the state pollution prevention facility planning requirements), this fragmentation encourages media-specific pollution control fixes rather than overall reductions in the pollutants generated, allowing cross-media transfers of pollutants, and discouraging companies from comparing the total costs and benefits of pollution control systems in all media with the costs and benefits of pollution prevention alternatives. Continuing this approach will become increasingly less effective environmentally and inefficient economically.

FINDING 2:

Existing permitting and compliance authorities at all levels of government lack flexibility necessary to encourage technology innovation for environmental purposes.

In its previous report, *Permitting and Compliance Policy: Barriers to U.S. Environmental Technology Innovation*, the TIE Committee analyzed the impact of the current permitting system on the **development and** use of **innovative** technologies. The Committee concluded that the system provides neither the flexibility nor the certainty required to support risk taking in the research, development, demonstration, and commercial introduction of new environmentally beneficial technologies. Uncertainty and inflexibility limit the willingness of companies to invest in development of these technologies, and limit the willingness of regulators to take risks on new, unproven technologies which might confer substantial environmental benefits. This problem is magnified for the development and implementation of pollution prevention approaches. Many of the pollution prevention options which companies could consider involve substantial efforts to adapt general technological approaches to specific conditions in which their performance is uncertain. In addition, the current system often takes little account of potential multi-media benefits.

FINDING 3:

Greater flexibility is required under federal, state, and local enforcement policies to allow and encourage facilities to use pollution prevention approaches as part of compliance and other environmental improvement activities.

Current federal, state, and local enforcement practices are predominantly based on a single-medium, pollution control outlook. The overwhelming majority of inspections are single-medium **and relatively** few inspectors are trained to inspect in more than one medium. Enforcement actions **tend to be based** on the most certain strategies for **achieving** compliance, which generally results in implementation of standard pollution control technologies. As with permitting, the system is not structured to reward those who take risks to promote pollution prevention or technology innovation, or those who take the additional time required to explore options for improvements in media other than that which is the subject of a violation. Taking on these risks and expending the time are critical for pollution prevention technologies and techniques. The TIE Committee did note some promising movement toward multi-media pollution prevention and technology innovation thinking -- both at the state and federal levels -- but implementation has been extremely limited (see further discussion of Issue 3).

FINDING 4:

Facility-wide pollution prevention planning can be a valuable tool for encouraging regulated parties to comprehensively evaluate the cost and environmental implications of a range of product design and technical production alternatives, rather than simply focusing on mechanisms for environmental compliance.

The TIE Committee found that state pollution prevention facility planning requirements have a significant potential to increase awareness of both single-medium and multi-media source reduction opportunities which could be economically beneficial to the facility. Because the development of relevant information for the plans requires input from production personnel, and not just environmental staff, the full costs of alternative process options are more likely to be considered. Where **pollution prevention** facility planning is a regulatory requirement, it also is likely to generate more awareness among regulators -- both permit writers and enforcement personnel -- of the potential benefits of multi-media pollution prevention solutions to environmental problems.

FINDING 5:

The positive relationship between industrial productivity and environmental protection is not yet well understood or accepted by many leaders in industry and government. Pollution prevention can help achieve both industrial productivity and environmental improvement.

In spite of the progress being made under EPA and some state programs in promoting pollution prevention, and in spite of the passage of the federal *Pollution Prevention Act* and a few state statutes, pollution control is still the dominant response to environmental regulations. Relatively few regulated facilities and regulators have begun to think in terms other than single-medium pollution control. Fewer yet have taken advantage of the opportunities presented by linking productivity and environmental decisions. To change the dominant culture to pollution prevention will require numerous coordinated actions, including changes in the basic signals of the tax, regulatory, and permitting and compliance systems; pollution prevention training at all levels of industry and government; the development and use of full-cost accounting systems for industrial decision makers; and redesign of curricula in business administration and engineering for those who will hold the basic jobs in facility operations and management and/or in environmental compliance, regulation- and permit-writing, and inspection and enforcement in the future.

FINDING 6:

Reward systems for EPA personnel place high value on the development, implementation, and enforcement of single-medium, pollution-control regulations without creating strong incentives for activities that encourage and support pollution prevention.

The most crucial factor in shaping any organization's activity is the system of rewards and career advancement. Since EPA's founding two decades ago, the agency's system of personnel advancement has been dominated almost exclusively by traditional single-medium regulatory objectives. While some rewards are now being provided for those advancing pollution prevention, the overall impact is still extremely limited; a more dramatic shift is likely to be necessary to bring about a general shift of perspective and culture within the agency.

FINDING 7:

EPA leadership in rewarding pollution prevention efforts outside the agency provides significant encouragement for state and local regulatory personnel and for staff of regulated parties to explore the use of pollution prevention innovations.

One important means of promoting change in the national culture from pollution control to pollution prevention is through recognition and rewards to those who are working to promote pollution prevention opportunities at all levels of government and in the regulated sector. While not a substitute for needed revisions to the traditional permitting and compliance system, such recognition does signal the agency's intention to foster and encourage change. EPA's Administrator's awards for pollution prevention thus provide some notice to both regulators and regulated facilities that the agency's long-term objective is to promote a shift from a traditional single-medium pollution control system to a more innovative multi-media pollution prevention culture.

ISSUE AREA FINDINGS

1. MULTI-MEDIA PERMITTING

Overview

The permitting system is an administrative linchpin of the environmental management system. New **approaches** to permitting and compliance are urgently needed to encourage both U.S. businesses and government agencies to take **a whole-facility, pollution prevention** perspective **that** reduces the **generation and** release of **pollutants and encourages** investment in **integrated production and environmental planning**. Because of the rising costs of compliance (**and** remediation) **and the declining** cost-effectiveness of incremental end-of-pipe pollution control and waste **management** strategies, pollution prevention is fast **becoming** the focus of **many** industrial **and of many** federal, state, and local **environmental** protection programs.

The increased use of multi-media permitting systems has the potential to facilitate the introduction and widespread use of proven and new pollution prevention technologies, **techniques**, and practices **throughout** U.S. **industry**. The TIE Committee reviewed the potential regulatory, environmental, and economic impacts of multi-media permitting from a federal and state perspective. It considered a number of possible multi-media program elements or **approaches**, including the following:

- *Facility-wide Permits:* **The development of integrated, "facility-wide"** (multi-media) permitting systems to improve compliance activities and to encourage pollution prevention.
- *Permit-By-Rule:* The increased use of flexible **"permit-by-rule"** systems **to streamline the** permitting process **and to encourage innovation**.
- *Relationship of Planning Goals to Permitting and Compliance:* The **integration into multi-media permits and compliance programs specific facility planning goals.(e.g., pollution prevention performance standards or best management practices).**
- *Incentives in Permitting:* The incorporation into multi-media permits of **pollution prevention** incentives (e.g., **waste-audits**, technical assistance) to **encourage** source reduction.
- *Compliance Waivers:* The selected use of compliance waivers in permits (**perhaps** tied to overall net reductions in emissions or releases) to give industries time to design and implement new **environmental** protection techniques.

There was some concern **among many** TIE Committee members **that unconstrained flexibility in the permitting and compliance process might compromise the capability of federal and state regulatory agencies to protect human health and environmental quality.**

The Committee agreed, however, that for industry to effectively implement pollution prevention, sufficient flexibility must exist to encourage industry to look at its environmental management operations from a multi-media, facility-wide perspective. As noted above, the Committee felt that a rigorously enforced system based on defined standards of achievement and performance could provide both the necessary protection and flexibility.

Findings With Respect to Incentives and Barriers

The TIE Committee **concluded** that more effective realization of the goals of environmental innovation and pollution prevention must be based on recognition that companies vary widely in their level of environmental awareness and commitment, their knowledge of alternative environmental management approaches, resources available for meeting environmental objectives, and the degree to which they have internalized pollution prevention as part of their internal management system. The application of a uniform system of environmental management requirements which ignores these differences can have adverse consequences for both short-term and long-term environmental progress. The TIE Committee found that multi-media permitting may provide a way to address issues of regulatory inflexibility and over-reliance on inflexible requirements that have characterized single media permit programs to date.

The TIE Committee's review suggests that multi-media permitting could prove to be an effective regulatory mechanism for encouraging businesses to look at their environmental management operations from a facility-wide, total quality management (TQM) perspective -- an effort that should promote the goals of pollution prevention. The success of such innovative approaches to pollution prevention clearly depends on federal and state efforts to increase cross-media integration and regulatory flexibility within the nation's permitting and compliance programs for air, water, and hazardous wastes. The success also depends on an increased understanding by the required parties of the potential cross-media shifts of risks.

The TIE Committee also noted, however, that some of the changes which would be desirable in the permitting system depend on more general changes in the regulations that the permitting system implements and on statutory changes.

State Initiatives Considered

Several states are currently initiating steps toward multi-media permitting. Since these efforts are new, and there are as yet no results, the TIE Committee looked at the plans and program designs. The TIE Committee looked at a number of states (New Jersey, California, Massachusetts, Kansas, New York, Illinois, Wisconsin, and Texas) that are beginning to design and implement new regulatory incentives as part of the permitting process in order to specifically encourage pollution prevention within industry.

Many of these same states are beginning to incorporate pollution prevention **planning** ("facility planning") requirements into traditional and non-traditional permitting and compliance programs. A variety of additional regulatory incentives and other support mechanisms are being used to stimulate the development of pollution prevention activities, **including**:

- ***Coordinated or Multi-Media Permitting:*** Developing coordinated or **comprehensive**, multi-media permitting systems **that contain** mandatory facility **planning** conditions (New Jersey, **Massachusetts**, Kansas).
- ***Permit Writers' Pollution Prevention Training:*** Training permit writers to incorporate pollution **prevention incentives** into single or multi-media permits (New Jersey, **Massachusetts**, Kansas, Wisconsin, California, Kentucky).
- ***Compliance Waivers:*** Using compliance waivers to encourage **innovative changes** in waste **management** and generation to promote pollution prevention (Illinois).
- ***Expedited Permit Review Process:*** Expediting the permit review process for businesses which implement source **reduction techniques** (California, Texas).
- ***Incentives in Permits:*** Direct **incentives**, such as **pretreatment** requirements and mass-based limits in permits for POTW facilities (California).

A few states (e.g., New Jersey, **Massachusetts**) are in the process of developing **comprehensive**, multi-media permitting programs that are **designed** specifically to facilitate **pollution** prevention. Other states (e.g., New York), while **not developing** multi-media permits, are **attempting** to coordinate the timing of **all single-medium** permits to encourage a more comprehensive environmental review of each **manufacturing** facility.

- ***New Jersey:*** New Jersey, with grant **support** from the **EPA's** Office of **Pollution Prevention**, has initiated a pilot project to test the "facility-wide" **permitting approach** as a means of "encouraging" the development and use of pollution prevention approaches and technologies." The project is attempting to coordinate all single-medium permit requirements (except RCRA-HSWA) for each facility. The State is **working** with three **volunteer** facilities. **The next stage** of the **four-year** project will involve 15 facilities.

New Jersey's pilot multi-media permit program will include a number of direct incentives for pollution prevention. For example, in order to improve the overall efficiency of the permitting and compliance programs, the program will consolidate permit application requirements and monitoring and reporting requirements for the air and water programs. The State is also revising its air permitting requirements to eliminate pre-construction approval for certain process changes. The **overall goal of this pilot program** is to **use both direct incentives** and flexible permitting requirements to encourage facilities to meet and go

beyond existing regulatory standards and to be economically competitive.

- *Massachusetts:* Massachusetts' Toxics Use Reduction Act (TURA) encourages multi-media inspections as a means to achieve toxics use reduction. Under a Pollution Prevention Incentive Grant from EPA, the State will conduct a pilot project in permitting for toxics use reduction; it will probably include a multi-media component. The State is building on the experience of the earlier multi-media inspection and enforcement project in the Blackstone River valley.

Several states are using expedited permitting, permit modifications with specific source reduction requirements, and regulatory compliance waivers as regulatory incentives for pollution prevention. For example,

- *Sanitation Districts in California:* In several local sanitation districts in California, permits set total mass limits for specific contaminants that are of local concern as part of the compliance requirements, including zero discharge requirements for certain industries such as automotive and radiator repair shops.

Illinois: Under the Illinois Pollution Prevention Act, companies implementing innovative pollution prevention initiatives can apply for a compliance waiver and also have their permit processed more expeditiously.

California: California has recently established a "fast-track" permitting mode for industries which generate wastes that can be incinerated **and** which pursue source reduction measures for such wastes. California is facing a capacity crunch for wastes that can be incinerated even with recycling and out-of-state disposal. With California's strict air requirements and active citizenry who oppose all attempts at siting incinerators, the capacity problem is not expected to go away easily. Instead of focusing on unpopular siting showdowns, California Department of Health Services (DHS) decided that it would be better to avoid the generation of such waste. The fast-track permitting is thus a "carrot-type" incentive to get facilities to do something which is in everyone's best interest.

Federal Initiatives Considered

A number of federal initiatives are being conducted to explore ways to either promote, or remove the barriers to, pollution prevention in federal (or federally-delegated) permitting processes. A few of these are multi-media. For example, EPA is working with three states -- New Jersey, Massachusetts, and South Carolina -- as experimental "Model States" for cross-media permitting. The objective in each case is to develop a cooperative program between the individual states, an EPA region (I, II, or VII), and EPA headquarters, in which EPA will provide policy and technical support for this national pilot program; EPA will also evaluate the three pilots to learn the nationally applicable lessons. A memorandum

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of understanding (MOU) has been signed with New Jersey, and other MOUs will follow with additional states. This initiative is major part of a broader agency effort to streamline EPA and state permit programs, and to link environmental protection and economic productivity objectives. State multi-media initiatives under this program include one-stop permitting, facility-wide pollution prevention planning, and basin-wide planning for natural resource protection. EPA will provide technical assistance and guidance, serve as a clearinghouse for information exchange, evaluate the national lessons which can be derived from successes and problems, and provide seed funding.

EPA's Air Office also is involved in a collaborative federal/state effort to promote pollution prevention. The Office is funding positions for permit writers in three states who will have the specific responsibility of developing incentives to promote the use of source reduction measures as a means of compliance with air standards.

Another initiative, involving the Amoco Corporation, EPA, and the State of Virginia, has resulted in a joint effort to identify regulatory incentives and obstacles for multi-media permitting and pollution prevention at Amoco's Yorktown Refinery. The project involves extensive monitoring, the evaluation of releases and contaminants at the plant, assessment of the potential for risk reduction, and identification and ranking of source reduction and control options.

Some of the changes required to promote pollution prevention involve interagency cooperation at the federal level. For example, EPA has reached an agreement with FDA under which FDA will provide expedited renewal for permits at pharmaceutical companies that undertake pollution prevention process changes.

EPA's Source Reduction Review Project, which involves cross-media coordination of the development of regulations to promote pollution prevention, should have some longer term impact on pollution prevention issues in permitting. Under the Project, EPA will collect detailed cost and benefit information on pollution prevention technologies as part of the information-gathering process for the technical background for new rules. The agency expects that, if this information is made widely available to permit writers, it will enable them to work with regulated parties to promote the use of alternatives to the end-of-pipe control technologies on which the standards are likely to be based.

Other Options Considered

In addition to the regulatory incentives discussed above, the TIE Committee considered the following options as requiring more study:

- *Permit-By-Rule:* The use of "permit-by-rule" systems, which have the potential to increase the overall efficiency of the permitting process. The benefit of this approach is in freeing scarce resources that can then be used to develop more comprehensive, multi-media based compliance

(i.e., monitoring **and** inspection) programs (see more detailed discussion in the Agency Resources section).

- ***Credits for Voluntary Efforts:*** The use of credits for documented, effective "voluntary" pollution prevention in **subsequent regulatory** and permitting decisions. (New Jersey is trying to incorporate this type of incentive into its new pilot "facility-wide" permitting **program.**)
- ***Required Audits:*** Requiring multi-media **pollution** prevention audits, **without tying** them to **mandatory reductions**. This is **akin** to **bringing** the horse to water.

2. PERMITTING OF RESEARCH AND DEVELOPMENT

Overview

In the TIE Committee's report, *Permitting and Compliance Policy: Barriers to U.S. Environmental Technology*

Innovation, the Committee emphasized the need for effective research and development (R&D) permitting, which would encompass the entire development process for innovative technologies -- including research, development, demonstration, testing, and evaluation. The Committee found that special permitting is necessary at times during the R&D cycle to allow the operating flexibility to determine performance parameters (i.e., range of applicable, cost-effective performance) of an innovative technology or technique -- or of an innovative application or adaptation of a technology or technique currently used in other manufacturing settings or applications. The Committee suggested that an effective R&D permitting process was critically important not only for technologies and techniques designed specifically for control and remediation of environmental pollution, but also for the development and implementation of production (manufacturing) systems involving new (or significantly altered) processes or for the use of new feedstocks with significant pollution prevention potential. To fully meet the needs for such R&D activities, a single, multi-media R&D permit or coordinated single-medium R&D permitting process should be available to address limitations on releases of all regulated pollutants.

In the federal air and water programs, technology tests can be conducted under the compliance terms of facility operating permits. This allows considerable R&D by the in-house engineering staffs of regulated parties, but affords less **opportunity** for independent technology developers. There are at present no special permits for air or water releases that may occur during R&D activities whose compliance performance is uncertain. The Committee found that arrangements to permit R&D operations involving release to those media are otherwise absent or *ad hoc*. While RCRA provides for research, development, and demonstration ("RD&D") permits for R&D on hazardous waste treatment technologies, the Committee found -- as have EPA's in-house studies -- that the RD&D permitting process does not yet effectively meet R&D needs.

It is notable that a recent EPA study evaluated the effectiveness of the RCRA RD&D program. The study gauged the opinions of four involved groups: permit writers, successful applicants for RCRA RD&D permits, unsuccessful applicants, and companies that have recently submitted applications. Among the study's findings were that RD&D permits had low priority in EPA regional offices, that **applicants perceived problems both with slow agency response and with permit writers lacking experience in innovative technology**, and that since the application process for RD&D permits was lengthy and expensive, a pre-screening mechanism should be developed to give applicants some sense of the likelihood of success. In addition, the study indicated the importance both of clear guidance about the application process and of the availability of technical assistance from

the agency for those going **through** the **application** process. While RCP A RD&D permits are for treatment technologies rather than process technologies, many of the problems **and** needs suggested by the study may require consideration in the development of R&D permits for pollution prevention technologies.

The Committee made a general recommendation that multi-media permitting processes for R&D should be designed to meet the special needs of such R&D activities, and that requirements in single-medium operating permits could be crafted so that more enforcement flexibility is built in for R&D associated with incremental engineering improvements. The new permitting approaches should include conditions providing for "soft landing" (or "fail soft") alternatives in the event that the original pollution reduction objectives can not be met. The Committee recommended that the R&D permitting issue should be explored in more detail with respect to potential impacts on pollution prevention innovation and implementation.

Findings with Respect to Incentives and Barriers

The TIE Committee considered how **pollution prevention** R&D for **innovative production** processes is **impacted by** current permitting **and compliance** systems. It noted several problems generic to R&D which it felt could affect development of **pollution prevention technologies**. The

Committee also noted that since implementation of **pollution prevention** process or input changes in specific facilities often involves extensive **technological adaptation** or use of techniques or materials previously untried in similar **applications**, the R&D difficulties for pollution prevention technologies and techniques may be more widespread and significant than those involving pollution control technologies in a plant's **day-to-day operations**.

There are several points in the R&D process where regulatory action could be triggered. For example, a research lab developing a new chemical process may, at some point, exceed 1,000 kg of hazardous waste, and encounter problems with the treatability provisions under RCRA. Authority for RD&D permitting falls under RCRA, section 3005(g), which provides for permits for the RD&D on innovative technologies. Some members of the TIE Committee felt that R&D on treatment technologies is relevant to pollution prevention, but others felt that treatment technologies under RCRA should not be considered pollution prevention. All members agreed that to the extent RCRA regulations are applicable to R&D on pollution prevention technologies and techniques, an effective RD&D permit program under RCRA is very important. Similarly, research involving use of a new chemical feedstock may generate air releases requiring a new permit or a permit modification. Experimental work may alternatively require modification of a facility's water discharge permit.

The following example may illustrate clearly the importance of an effective, predictable R&D permit process for the development and use of innovative pollution

prevention technologies and techniques. The operators of a textile dyeing plant wanted to experiment with mineral oils as a replacement for mineral spirits as a dye carrier. Continued use of mineral spirits, a major source of VOC emissions, would require installation of incinerators for emissions control. There was a risk that use of the mineral oil could lead to both substantial releases of smoke and to oil residues on the fabric which would be unacceptable to customers. Because no R&D permit was available, the flexibility necessary to experiment with this alternative had to be accomplished through an enforcement agreement pursuant to a minor violation. Initially, the change resulted in high levels of smoke that would **have** caused a violation without the enforcement agreement. After some experimentation, the smoke was eliminated and this pollution prevention approach to VOC reduction was successful.

This example illustrates the types of problems which can frequently emerge in efforts to develop, adapt, and then implement pollution prevention technologies or techniques. The initial efforts to achieve operating objectives -- both with respect to product quality and environmental releases -- may involve significant learning curves, engineering modifications, and operating adjustments. The more innovative the approach, or more complex the system and/or **the engineering effort required, the lengthier the adjustment** process may be. Without a system of R&D permits and compliance flexibility associated with R&D, it may often be far less risky for facilities to avoid the potential costs of compliance penalties or other enforcement actions by simply adopting well understood control alternatives -- even where the control alternatives are both less efficient economically and less effective environmentally than pollution prevention solutions.

The limitations in flexibility created by permit restrictions may derive from either the regulatory requirements or from the interpretation of those requirements by those who have to write permits; there may be elements of each in a specific situation. Under the effluent guidelines, for example, requirements are stated in the form of performance **standards**. In theory, performance standards allow flexibility in how to meet the regulatory objective. In practice, there could be two problems. First, control technologies are likely to have been used as the basis for standard development. Permit writers, consulting engineers, and staff of regulated parties may therefore regard implementation of the control technology as the lowest risk solution to meeting the standard -- even if alternatives could achieve better environmental results (perhaps both medium-specific and multi-media) and, potentially, lower the net cost of production. Second, the form of the performance standard may limit flexibility. Some Committee members noted that the inflexible use of concentration-based **standards rather than mass-based** standards for effluent limitations could **discourage** use of **pollution prevention technologies that greatly reduce both contaminant and water releases, resulting in substantial reductions of total pollution, but increased concentrations due to reduced water volume. Comprehensive R&D permits would allow the development of technologies and techniques** even if all the potential implications of **regulatory** requirements can not be foreseen, and if the effective implementation of a new technology or technique

requires experimentation with performance parameters before environmental objectives can be met or exceeded.

Generally, members of the TIE Committee agreed that:

- Because of permit limitations and the costs associated with regulatory oversight of R&D, a company may not be willing to investigate process changes with significant pollution prevention potential or may face **unnecessary cost penalties associated with R&D undertaken anyway.**
- Special R&D permits under each of the media programs, if coordinated, or a special multi-media permit covering all programs, would facilitate companies' investigations of alternative ways of using different feedstocks and explorations of innovative process changes.
- With the extension of predictable R&D permitting into the air and water programs and the flexibility of these permits to allow for full-range engineering tests of feedstock changes or process changes, companies may be more likely to investigate innovative process technologies and techniques that reduce pollution.

State Initiatives Considered

An innovative reward system for the implementation of new technologies **has been** explored in **both** Texas **and** Illinois.

Illinois offers permittees seeking to implement innovative technologies (includes pollution prevention **approaches**) the possibility of an innovation waiver from some of the more standard permitting conditions. Texas, on the other hand, allows for expedited review (similar to fast-track permitting, but not across all permits) in similar situations.

Federal Initiatives Considered

EPA's **federal** facilities enforcement program has begun what the TIE Committee considers to be an important effort to expedite the testing and use of innovative technologies for

pollution prevention and control by encouraging the development of testing centers at some federal facilities. This program involves EPA's Office of Federal Facilities Enforcement (OFFE), the Technology Innovation Office (110) in the Office of Solid Waste and Emergency Response, and the Office of Research and Development's Office of **Environmental Engineering** and **Technology** Demonstration (OEETD). **The** Departments of Defense and **Energy** are **full partners** in **this program** with EPA. **The initiative involves the co-sponsorship by EPA and another federal agency of technology tests**, whether they are conducted by private sector users and their federal partners, by one or more federal agencies, or by one or more private parties. The first testing center opened in late 1992 at McClellan Air Force Base, and a pollution prevention testing center is being planned. The Committee believes that federal facility-based test centers can -- through risk sharing,

speedy regulatory oversight, and technological sophistication -- supplement R&D permitting.

3. POLLUTION PREVENTION-BASED COMPLIANCE AND ENFORCEMENT INITIATIVES

Overview

Strong, effective, consistent, predictable enforcement is a critical factor in promoting pollution prevention. It is also essential for a fair, level playing field for all regulated parties. Facilities faced with the certainty that non-compliance will result in enforcement actions and **that** they must comply with environmental requirements are more likely, especially as the cost of compliance increases, to look for cost-effective alternatives for reducing generation of pollution in the first place. But beyond the general incentive enforcement creates, positive efforts to use enforcement actions and inspections to promote pollution prevention can provide a major additional opportunity to enhance environmental management.

EPA has made significant progress in developing and implementing pollution prevention-based compliance and enforcement initiatives since the TIE Committee's first report, particularly with respect to encouraging pollution prevention activities and innovative technologies as part of enforcement actions. The TIE Committee has explored the potential for more extensive implementation of this approach and the relationship between permitting and enforcement requirements.

Findings with Respect to Incentives and Barriers

The TIE Committee found that **many** of the recent state and federal efforts relating to compliance and enforcement provide elements which could lead to an environmental management system with both greater flexibility to allow pollution prevention and greater incentives to encourage documented and effective voluntary source reduction actions that go beyond compliance. The TIE Committee concluded that more effective realization of the goals of environmental innovation and pollution prevention must be based on a recognition that stringent compliance policies are a driving force behind much pollution prevention activity.

In the first place, compliance policies create a "level playing field" in which non-compliance is not a viable option. Second, these policies can cause facilities to institute pollution prevention voluntarily when the alternative necessary for compliance, such as control technology, is either inadequate or more expensive. Strict regulation of hazardous waste has resulted in higher costs for its management, treatment, and disposal. This has led firms to reduce or eliminate the generation of hazardous wastes. For example, many Publicly Owned Treatment Works (POTW) are finding that strict compliance requirements for sludge, air toxics, and National Pollutant Discharge Elimination System (NPDES) limits are encouraging them to institute pollution **prevention activities with their dischargers.**

Pollution prevention-based enforcement actions seem to offer the opportunity to achieve greater environmental improvements at industrial facilities than are required by applicable regulations. Enforcement actions by federal, state, and local governments, as well as POTWs, may require firms to undergo waste minimization audits. These audits can lead facilities to identify and implement pollution prevention options that reduce their discharge to zero. This was done by a discharger to a POTW in California in a case detailed in the following section on state initiatives.

EPA policies are beginning to encourage the inclusion of pollution prevention activities and the consideration of innovative technology solutions in settlement agreements. Such measures may be utilized either to correct the violation or, **pursuant** to agreements under the Policy on Supplemental Environmental Projects (SEPs), to go beyond requirements imposed to redress the original violation. Measures exceeding what is required to correct the violation are encouraged by lowering the **gravity** portion of the assessed fine for non-compliance. SEPs are designed to reduce risks posed to human health and the environment beyond the level which would be required by law.

The TIE Committee supports the use of effective and consistent enforcement as a way of **promoting** pollution **prevention**, but does not **believe that** strong **enforcement should** be the sole method of achieving it. Among the advantages of using enforcement actions to promote pollution prevention are that the actions are:

- **Effective.** Including pollution prevention activities in enforcement actions does promote reduction in generation and release of **pollutants**, and helps achieve compliance. It gives high priority to industries most in need of revising their practices.

Controlled. When the pollution prevention activity is used in an enforcement context, each case receives special attention **and** close scrutiny. Industry actions and results are closely monitored by the responsible environmental agency.

Educational. Working with industries under enforcement orders leads to the development of a broad knowledge of economically feasible pollution prevention techniques by- the **regulating** agency. The settlement actions document pollution prevention efforts which, under some conditions, could be used by other companies in the same **industry** or other industries. (The TIE Committee is concerned, however, **that** the **potential** disclosure and dissemination of **proprietary** information **gained** under settlement actions is a significant issue that requires careful examination.)

Drawbacks are that they are:

- **Negative.** Enforcement actions represent a negative regulatory incentive for pollution prevention. The TIE Committee would like to see more emphasis put on creating positive incentives for instituting pollution prevention.

- **Litigious.** Negotiating settlements can be very costly and can drain resources from regulatory activities as well as from the regulated entity. The enforcement process takes a long time and requires a lot of staff resources. Intermediate levels of enforcement, such as non-compliance orders with follow up and pre-enforcement conferences, avoid many of these disadvantages, and should be heavily relied upon as a means of promoting source reduction and pollution prevention in a way that is most efficient for a given regulated party.
- **inconsistent** Enforcement and compliance actions do not promote the consistent use of pollution prevention on either an industry-wide or multi-media basis.
- **Focused narrowly.** Enforcement actions only apply to one case with a single purpose.

The TIE Committee also found that multi-media inspections provide incentives to both regulators and facility managers to look at a facility as a whole. If inspections are coupled with technical assistance, they provide facility managers with information about opportunities to economically reduce pollutants to or below levels required to meet single-media compliance regulations. Inspectors may provide a useful role in identifying the potential for pollution prevention approaches they are familiar with in individual facilities; to do this effectively, however, they need to be well trained and have adequate technical expertise. With appropriate sensitivity and expertise, they can identify when the company should be encouraged to call on pollution prevention technical assistance specialists to analyze alternative approaches for the company. The issue of technical assistance support and training is discussed more fully, *infra*.

The TIE Committee found that, most commonly, inspectors can be valuable by simply, as a first **approach** for facilities out of compliance, directing companies to providers of technical assistance -- whether government or private -- who do not share the enforcement responsibilities and, indeed, may be in a completely independent organization. This avoids the potential problems of having the enforcer "recommend" a solution, or of companies fearing that a request for technical assistance is likely to lead to an enforcement action. In addition, specialized technical assistance personnel are more likely to have the necessary expertise to assist companies in identifying and evaluating the technical options which would be appropriate to their operations.

For inspectors to play such a potentially positive role, it is important for state and local agencies and the federal government to involve inspectors in a continuing system of pollution prevention training. At least eighteen states, including Massachusetts, Kentucky, and Minnesota, have begun multi-media compliance inspections or pilot projects.

Federal Initiatives Considered

EPA has adopted flexible enforcement as a key to encourage pollution prevention and innovative solutions in the Office of Enforcement (OE)'s Interim Policy on Pollution prevention and Recycling Conditions in Settlements and the Policy on Supplemental Environmental Projects (SEPs). The first policy allows federal negotiators to offer to extend the compliance schedule or to reduce the punitive portion of a penalty in a settlement agreement for a respondent's agreement to correct the violation with a pollution prevention activity and the use of an innovative technology. The second policy allows federal negotiators to reduce the gravity portion of the penalty in a settlement agreement when the facility agrees to undertake a supplemental environmental or innovation-related project. SEPs can be categorized as pollution prevention projects and pollution prevention related projects such as pollution reduction, environmental restoration, environmental auditing, and enforcement-related and environmental public awareness projects.

There is some question about how **aggressively** these flexible approaches are being applied. One factor limiting their use is that SEPs are potentially more difficult for enforcement personnel to understand and implement than standard enforcement actions. This problem is similar to the problems which have limited innovative permitting actions, and could be ameliorated by more extensive technical and pollution prevention training for enforcement personnel. In addition, some enforcement personnel have indicated concern that credit should not be given for changes a company may already have initiated or planned to undertake for economic reasons. As a result of these limitations and concerns, the TIE Committee was unable to identify many examples of the use of pollution prevention conditions or SEPs in enforcement actions for any of the media programs other than in the enforcement efforts of the Office of Prevention, Pesticides and Toxic Substances (OPPTS). In order to overcome these difficulties, the SEP Work Group of the Deputy Administrator's Pollution Prevention Senior Policy Council recommended that the Office of Research and Development (ORD) work with the programs to identify and disseminate pollution prevention opportunities specifically applicable to the facilities that each program regulates and the types of violations that these programs detect. ORD is now working with OE and the program offices **through** the SEP Work Group.

OPPTS' compliance program, however, **has** been active in **integrating** SEPs into settlement agreements. In its 1992 report, Pollution Prevention Through Compliance and Enforcement, this office has compiled summaries of a selection of the 265 cases under TSCA, EPCRA, and FIFRA with SEPs which were settled in 1990 and 1991. Among those summarized was the case of 3-V Chemical Corporation which was alleged by EPA to have violated TSCA. The final settlement included a reduced penalty of \$30,000 and 3-V's agreement to undertake a pollution prevention and a pollution reduction project. The company agreed to purchase and install a closed loop solvent recycling system which should reduce by more than 50 percent its point source emissions of an unregulated ozone depleting substance (1-1-1-trichloroethane) and dichloromethane, which is a probable

human carcinogen. 3-V has also agreed to implement a leak detection program for fugitive emissions of these two solvents and will report annually on pollution prevention efforts.

Under a cooperative agreement between EPA and the Massachusetts Institute of Technology (MIT), MIT is evaluating the pollution prevention settlements to date. The Office of Enforcement plans to use the results of this analysis in the further development of its policy for use of pollution prevention proposals and projects in settlement negotiations.

A pollution prevention compliance initiative at the federal level is in the Office of Solid Waste's (OSW) pollution prevention program. Its policy, which is based on the use of rather limited authorities, emphasizes the requirement, included in the Hazardous and Solid Waste Amendments of 1984, for generators to certify the existence of a waste minimization program on manifests and for a similar certification in TSD permits. Inspectors can check the certification because it is an enforceable admission. Once the certification is signed, the facility must be able to demonstrate that there is such a plan, and that actions at the facility are consistent with the plan. These plans give the inspector something to enforce. Inspectors can also try to persuade a plant to improve its plan by providing information on available technical assistance and inform the plant of generic pollution prevention opportunities, but they cannot force change in the plans.

EPA's Office of Federal Facilities Enforcement (OFFE) is developing a "Multi-media Enforcement Strategy for Federal Facilities" which will include discussions of goals, authorities, targeting, inspections, enforcement, technical assistance, and program coordination. OFFE has developed an automated Federal Facility Tracking System (FFTS) which provides a comprehensive overview of federal facility compliance rates across all media programs. To target multi-media inspections, regional staff will use four primary factors:

- Historic non-compliance, using the FFTS those facilities in chronic violation in one of more media.
- Regional risk ranking of threat posed by the facility to human health or aquatic systems.
- Significance to other national or regional initiatives.
- Opportunity for pollution prevention.

OFFE will also conduct multi-media inspections, in which the inspector will complete a multi-media screening checklist for other media programs. The checklists will be forwarded to the appropriate media offices, which may conduct follow-up inspections. Once violations are identified, OFFE plans to make a major effort to promote use of pollution prevention settlements to address compliance problems.

EPA's Enforcement Management Council has requested development of a national multi-media inspection screening checklist for use by EPA compliance inspectors. OE is planning to distribute this package during FY 1993. The proposed national checklist has been developed based on analysis of the inspection screening checklists being used in EPA's regional offices during FY 1991 and FY 1992. This multi-media checklist, however, is not structured primarily to identify **pollution prevention opportunities**.

EPA is now getting credit for referring multi-media civil suits to the Department of Justice. In the past, each suit was counted once, whether it involved multiple media or a single medium. (For example, a violation of both the Clean Water Act [CWA] and the Resource Conservation and Recovery Act [RCRA] was counted as one referral.) Now, each medium involved in a suit is considered in accounting for referrals. This gives EPA's Office of Enforcement more credit and more incentive for multi-media enforcement.

State Initiatives Considered

The TIE Committee looked at a number of examples of the ways states and POTWs are **integrating pollution** prevention into their enforcement **and** compliance activities. Among them were technical assistance programs of the **Orange County Sanitation** Districts (CSDOC) and the multi-media inspections and technical assistance referrals of the Blackstone Project in Massachusetts.

In the case of the Orange County **Sanitation** Districts, an **escalating program** of enforcement has been developed which includes a technical assistance (TA) program. The first step is a Notice of Violation, which is followed by a compliance meeting. At the compliance meeting, pollution prevention options are **suggested**. Chronic violators that do not achieve compliance are served with a **Probation** Order **which** requires **that** a pollution prevention audit **be conducted** and economically feasible **pollution prevention** methods be implemented. If additional time is needed to construct, acquire, or install **equipment**, CSDOC may require the discharger to enter into an Enforcement Compliance Schedule Agreement that sets out the goals and deadlines for **achieving** compliance.

One of the dischargers to the POTW, a medium-size **manufacturer** of aerosol cleaning products for the sanitary, automotive, and industrial markets located in Orange County, was violating discharge limitations for wastewater. The cause of the non-compliance was **attributed** to rinses from the chemical reaction **and blending tank washouts**, and overflow from the hot water bath, which was used for pressure **and leak** testing of all aerosol cans. To resolve the non-compliance problems on a long-term basis, the **company** was required to conduct, under the provisions of a **Probation** Order, an **industrial** waste survey and to implement an effective waste management and waste minimization plan. The company was notified **that** if compliance could not be **achieved through implementation** of waste minimization techniques, it would be required to install a toxic organic treatment facility. In response to the Probation Order, the **company evaluated** three **alternatives and**

decided the most cost-effective action was to modify its **manufacturing and** operational processes to create a closed loop system which would result in 100 percent recycling and reuse of materials and wastewater. As a result of choosing a zero discharge system, the company was able to disconnect its industrial sewer connection **and** no longer needed an industrial wastewater permit.

One state, Massachusetts, has been planning and training for multi-media compliance inspections since 1988. With grant support from EPA's Office of Pollution Prevention, the Massachusetts Department of Environmental Protection conducted a pilot project named "Blackstone" which tested various formats for multi-media inspections. The Blackstone project focused on approximately 25 metal-intensive manufacturing facilities located in the service area of the Upper Blackstone sewerage system (POTW). The project had several specific objectives: incorporating source reduction into enforcement programs, testing the efficiency of various enforcement models, and coordinating regulatory activities with technical assistance to identify source reduction opportunities. The key factors linking compliance requirements to pollution prevention were that the inspections were multi-media, and that all facilities with compliance problems were referred by the inspectors to the State's pollution prevention technical assistance office.

A main objective of the Blackstone project was to ensure **that** the facility would be viewed holistically, rather than as a series of separate releases to different media. In meeting this overall objective, inspectors from each of the media programs coordinated their efforts, conducting multi-media inspections either jointly or **individually**.

The Blackstone project has served as a model for multi-media inspections planned for other states, as well as for expanded application in Massachusetts. Almost all of the manufacturing facilities referred to **the Office of Technical Assistance (OTA) implemented at least** some of the recommendations made **by** OTA, **and many made significant changes to their processes**. It is **notable** that OTA **provided information about** a wide **range** of technical options, including pollution prevention approaches. Of the first 25 or so firms receiving compliance notifications, about 22 availed themselves of the technical assistance services that were offered to them. This extremely high success rate was **apparently** due to the combination of two factors. First, the "hammer" of a compliance requirement established the need to take action (which might normally have been met through treatment or control). Second, the source of technical **assistance was an organization independent** from the **environmental regulatory agency and not reporting to it**.

The pilot project also showed that multi-media coordination resulted in greater efficiency in inspection programs. However, significant time is required for the initial training and coordination. In the case of Blackstone, **EPA** provided significant support for the project's development. Similar support is likely to be needed for development of comparable initiatives in other states.

Other Options Considered

The TIE Committee also considered the option of third-party auditing for certain types of reporting and measurement requirements, as a supplement to local, state, or federal enforcement capabilities. Review by third-party auditors would be paid for by the facility. Some members of the TIE Committee saw the **advantages** as being:

- More efficient targeting of governmental enforcement resources on the more environmentally significant enforcement opportunities.
- Helping expedite the permit process, in cases where inspections were required for permit approvals.

Other members were concerned about the effects which reliance on independent, third-party auditors would have on the integrity of the enforcement system. Issues were raised regarding the need for certifying environmental auditors. Also, audit requirements raised questions about the confidentiality, release of attorney-client **privileged** information, and the risk of self-incrimination with respect to exposure to criminal liability.

4. FACILITY PLANNING

Overview

The TIE Committee reviewed pollution prevention facility planning as a means for **encouraging industrial and/or** commercial facilities to evaluate cost-effective opportunities to reduce **environmental** pollution on a whole-facility, multi-media basis. Several states **have initiated pollution** prevention facility planning requirements. While these state initiatives differ in a variety of ways (e.g., the extent to which planning information is public, whether **changes** are mandatory, the scope and applicability of the planning requirement), they have in common requirements that the facility evaluate the technical **and** economic feasibility of process, materials, and product alternatives, and that senior corporate **management** take ultimate responsibility for the plans. The TIE Committee also discussed the **voluntary planning** efforts undertaken by some industrial facilities.

The TIE Committee considered **the implications of the alternative approaches taken** by the states, the different levels of pollution prevention **planning activity and environmental** awareness at industrial facilities, and the potential **for differential treatment of industrial** facilities based on some measure of past performance.

The TIE Committee's review of facility **planning** identified several issues:

- *Scope:* Whether the scope of applicability of **planning should** be limited to either hazardous waste or TRI chemicals, or **should be broadened** to include all non-product materials released from a facility.
- *Effect of Track Record:* Whether companies with **proven pollution** prevention track records should be required to fulfill the facility **planning** requirement, and if so, how the requirement might be **modified** to reflect the ongoing nature of a facility's commitment, or whether the requirement **should** be limited to companies with **poor environmental** records. Specific **alternatives included** whether **or not** (or to what degree) **the public** release of plans **should depend on such** factors.
- *Measurement* The basis of measurement for **determining** whether a facility has done **enough**. This would be necessary either for **mandatory** reduction requirements (currently mandated in only **one** state), or for variations in requirements based on past performance **(above)**. It would create, however, the potential negative incentive of **minimum** targets.
- *Confidentiality of Proprietary Information:* The problem of **protecting** the confidentiality of proprietary information in the facility **plan**.

Findings With Respect to Incentives and Barriers

The TIE Committee found that pollution prevention facility planning can be a valuable tool for getting a company to look at the whole facility and at a wide range of technical and cost options, rather than simply focusing on environmental compliance. For pollution prevention facility planning to be effective, it must become a part of the overall production planning process **involving** operational and **top** management personnel. In this sense, pollution **prevention planning** is analogous to Total Quality Management (TQM); it is a process, not a finishing point.

The Committee also found that the wide diversity of state approaches provides an opportunity to learn what planning requirements are most effective. The diversity of state approaches offers the additional advantage of state leadership and commitment, and creates a **valuable opportunity** to examine and **evaluate** the differing outcomes. As a result, the TIE Committee **found** that the current federal role of **providing technical and financial support** to state **planning** efforts is **the** appropriate one; EPA **should** not **attempt** to **impose** a uniform planning requirement on all the states. It should, however, evaluate state approaches to learn nationally applicable lessons and facilitate exchange of information between the states on the individual state experiences.

The TIE Committee found that companies are at widely different points in terms of incorporating pollution prevention approaches into corporate actions **and** culture, and that this may be a factor to consider in developing facility planning requirements.

State Initiatives Considered

Nineteen states **have passed** legislation **requiring** some form of facility planning -- either for solid or **hazardous** waste reduction specifically, or for multi-media reduction in the use and/or release of toxics (based on the release of chemicals subject to reporting for the Toxics Release Inventory). Several other state legislatures or state environmental offices have considered, or are currently considering, facility **planning** legislation. Examples of the diverse **approaches** and laws reviewed by the TIE Committee include:

- ***Four laws that emphasize planning for toxics reduction***, rather than just reductions in generation or release of hazardous wastes or toxics. Others have a dual emphasis.
- ***Increased emphasis on targeting large-volume generators and users of toxics***, especially for mandatory program elements. One of the effects of facility planning requirements has been to expand the need for technical assistance programs to larger companies, as well as smaller companies.
- ***Planning processes in a few states tied to permits or to enforcement actions***. Four states are able to enforce against a facility for substantive reasons (e.g., in New York and California, failure to implement the plan), rather than being limited to enforcing "process" violations such as

the failure to submit a required facility plan. In most states, the contents of a facility plan are generally not enforceable.

- *Two programs (New York and California) in which facility plans are public documents.* In most states, progress reports and/or plan summaries are made public, but the plans themselves are not public.
- *One state, New Jersey, that not only **requires** facility planning, but is evaluating the potential for incorporating pollution **prevention options** into facility-wide multi-media permits.* This State is **participating** in an important outgrowth of a TIE Committee report, EPA's "Model States" program.
- *State plans tied to the Toxics **Release Inventory (TRI)** (e.g., **Minnesota, Massachusetts**) that are **intrinsically multi-media**.* State plans initially developed out of concern for meeting state capacity assurance **planning** (CAP) requirements tend to be single-medium hazardous waste requirements. New York, which has such a single-medium requirement, is trying to use other state authorities to require single-medium air **and** water plans, and then to persuade facilities to do a single multi-media plan.
- *A state-level facility planning requirement (California) for **generators of hazardous waste**.* The requirement to plan waste reduction there is limited to hazardous waste. In some locations in the state, however, industrial or commercial facilities **discharging** to sewers must also respond to pollution prevention planning requirements from Regional Water Quality Boards, sanitation districts, and/or POTWs. For example, because of high concentrations of heavy metals, the San Francisco **Bay** Regional Board identified target sources of metallic wastes and feasible waste minimization technologies and measures, and provided potential reduction estimates to both the sources and the POTWs in the San Francisco area. The Board found that further reductions of metals entering the sewer system were possible through a combination of expanded pretreatment restrictions and the initiation of waste minimization efforts. A companion technical assistance program aims at helping regulated parties understand their options. The Board has issued permits to the POTWs requiring that the pilot waste minimization programs:

Be tailored to address the targeted industrial sector(s).

Establish best management practices and waste minimization alternatives for the targeted industries.

Require waste minimization plans in response to industry violations and as a condition of permitting for new permit applicants.

Federal Initiatives Considered

EPA's role in facility **planning** has been one of providing support to the states. The support has consisted both of provision and exchange of technical information and financial support. Through its Pollution Prevention Incentives for States grants, EPA has funded state programs to develop and initiate facility planning requirements. Since most state facility planning statutes include mechanisms for financial support for the state's implementation of the facility **planning** requirement, long-term EPA support of these programs will not generally be necessary.

Other Options Considered

The TIE Committee considered, but did not come to any conclusions about, recommendations that pollution prevention "leaders" and "laggards" in the industrial community should be treated differentially with respect to pollution prevention facility planning.

5. POLLUTION PREVENTION SUPPORT AND TRAINING

Overview

The TIE Committee considered a range of alternatives for supporting regulatory organizations, regulated parties, and others in their efforts to undertake the risks necessary in permitting and enforcement processes to develop, finance, encourage, and promote pollution prevention objectives and initiatives. The issue of support for pollution prevention builds on one of the key recommendations of the first report of the TIE Committee, *Permitting and Compliance Policy: Barriers to U.S. Environmental Technology Innovation* (January 1991), that the agency "should support regulators and other involved communities to maximize the effectiveness of improvements recommended in permitting and compliance systems." The TIE Committee was addressing the idea that the ability and willingness of regulatory personnel to promote pollution prevention is impacted by the strength or weakness of informational and motivational support. The development and retention of skilled, motivated people is at the heart of this issue.

Findings With Respect to Incentives and Barriers

The TIE Committee found that many of the barriers discussed in its previous report on the relationship between technology innovation and permitting and compliance policy also apply to pollution prevention. Individuals in both regulatory organizations and regulated parties lack a positive system of support and incentives that would foster and reward their efforts to try to utilize pollution prevention approaches within the context of standard, media-specific, permitting and enforcement programs. Their needs are similar to those of people who try to foster the development and use of innovative technologies through permitting and compliance decisions.

In addition, the Committee found that there is a need for better informational and technical resources, such as clearinghouses of pollution prevention-based enforcement actions, or sample permits with details of pollution prevention focused permit conditions that could help regulators craft permits and/or settlements that more effectively enable pollution prevention. Regulated parties could also benefit from such technical assistance (TA) and technology transfer (TT) resources. For example, if permittees had more certainty that a particular range of source reduction approaches was potentially acceptable, more would be willing to pursue innovative technologies or pollution prevention solutions rather than opting for conventional abatement or control.

The TIE Committee found that there is little federal guidance available to states on how to incorporate pollution prevention into existing medium-specific programs. Moreover, adequate guidance is not yet available to state personnel on conducting multi-media

inspections -- an activity which the Committee agreed was one of the more promising ways to help a facility discover, and potentially act upon, pollution prevention opportunities. The agency has, however, taken an initial step towards the development of such guidance. In May 1992, EPA modified the policy Framework on State/EPA Enforcement Agreements by issuing Addendum D. Multi-Media Enforcement. This addendum lays out principles for EPA and the states to follow in working together to coordinate **and package** multi-media cases and target multi-media inspections.

The Committee was briefed on a number of **separate multi-media inspection projects at the state and local level**; the members **agreed that much can be learned** from **sharing** the lessons from such experiences. For **multi-media** activities to be successful, representatives of the single-medium programs must begin a dialogue to discover similarities and differences among their respective needs, authorities, limitations, and goals. Almost half of the states have now **established intra-agency** task forces or working groups to **begin** such a process. More support, however, is needed at the federal level to coordinate, facilitate, and disseminate the states' experiences with multi-media initiatives.

Members of the TIE *Committee* also believe it is important not only to look at improving pollution prevention support and training for **individuals** within the **regulated/regulator** relationship (e.g., permit writers, permittees, inspectors), but also to consider ways of utilizing business-to-business support and informational systems, industry training programs, and higher **educational** programs for engineers, managers, and business majors to disseminate **knowledge** of, **and industry** experience with, pollution prevention. In its report, *Permitting and Compliance Policy: Barriers to U.S. Environmental Technology Innovation*, the TIE Committee **also discussed** the need for cross-training that **builds mutual knowledge and understanding by staffs** of **regulated and regulatory organizations**. EPA has, based on this previous **recommendation**, **begun** pilot courses to explore how to do this effectively. As noted in the TIE Committee report, *Improving Technology Diffusion for Environmental Protection*, **pollution prevention** technical assistance also needs to be institutionalized as a role for both the regulated community (including trade and professional associations) and environmental service providers, not just as a service of government agencies -- whether regulatory or non-regulatory. The TIE Committee felt that while some progress has been made in incorporating pollution prevention concepts into certain engineering curricula, the development of business school courses to educate corporate managers on the economic, environmental, and **management** benefits of **pollution prevention has lagged further behind**.

State Initiatives Considered

The burden of knowing all of the rules, regulations, and compliance requirements falls on the regulated entity. One of the most important roles state agencies can play is outreach and education. Ideally, this involves providing both technical information and regulatory information (especially as rules change). Many states and local agencies have a

history of successful outreach initiatives aimed at educating, training, and guiding facilities towards pollution prevention; North Carolina, Minnesota, and New York have programs dating back a decade or more. Such activities make it more likely that industry will be aware of both technical options and their relationship to regulatory requirements.

Technical assistance and informational outreach is most crucial for small and medium-sized firms which are often frustrated and confused by rapidly changing requirements and limited in their ability to identify, test, and apply technical alternatives. Some state technical assistance programs are limited to such smaller facilities. The design of state programs that aim at encouraging regulated parties toward pollution prevention must be based on the recognition of the importance of providing in-depth technical information to support industrial innovation. In the permitting process, this support might take the form of process-oriented technical assistance on pollution prevention for permit writers or detailed instruments such as guidances and checklists to support pollution prevention focused compliance activities of inspectors. Other TA programs should be based in non-regulatory agencies, NGOs and other non-profit organizations, and the private sector (e.g., trade associations and consulting engineers).

The TIE Committee considered the experiences of a number of state initiatives (including some based outside state regulatory agencies) whose goals were to provide support and training for pollution prevention, not only for regulated parties but also within the regulatory agencies themselves. Activities generally fell under the following categories:

- Outreach on compliance information and opportunities to implement pollution prevention responses.
- Technical assistance to firms, sometimes including on-site pollution prevention audits.
- Human resource development and training.
- Rewards, recognition, and other incentive approaches.
- Informational mechanisms (clearinghouses, publications).
- Advisory committees (technical, regulatory, cross-program).

Federal Initiatives Considered

Within EPA, pollution prevention training and support is currently being provided to permit writers and inspectors in some of the media programs as well as to all new agency employees. For example, the Office of Water has conducted pollution prevention training workshops for permit writers. Permit writers are being trained to use flexibility and judgement in areas such as monitoring requirements. Permit writers are also receiving training in the application of "best management practices" as they apply to pollution prevention, and are being encouraged to consider innovative solutions in draft permits as a

means of achieving performance-based standards, rather than relying simply on off-the-shelf technologies to comply with Best Available Control Technology (BACT).

In the technical outreach arena, EPA has created a national Pollution Prevention Information Clearinghouse (PPIC). The clearinghouse includes a computerized pollution prevention information exchange system (PIES) which allows users (including permit writers, regulators, and inspectors at the federal, state, and local levels, as well as industrial users, academics, environmental professionals, and ordinary citizens) access to **databases**, information networks, document summaries, and ordering information, etc. A national hotline similar to the RCRA/Superfund hotline is envisioned in the near future.

The TIE Committee has found one of EPA's most important and **valuable** contributions to pollution prevention to be its support of state pollution prevention programs through the Pollution Prevention Incentives to States (PPIS) grants. Since **1988**, EPA has supported the initiation and development of a range of state pollution prevention activities. These have included expanded technical assistance, pollution prevention enforcement and permitting pilot projects, education and training programs, **and innovative pollution** prevention efforts in agriculture and energy. By supporting the leadership role of the states in promoting the identification and adoption of pollution prevention technologies **and** techniques to meet the needs and problems of their own industries, EPA has made a major contribution to expanding the awareness and impact of such **approaches**.

The TIE Committee applauds efforts by EPA to support pollution prevention initiatives both within the agency and outside of it (i.e., in the industrial and state **and** local government sectors). However, the Committee noted specific areas that could benefit from additional support. As discussed elsewhere in the findings, support is needed in the way of guidance and/or training on how to incorporate pollution prevention into existing media-specific programs. A clearinghouse of successful pollution prevention permitting and compliance actions (e.g., SEPs in enforcement cases) was also mentioned as a pressing need.

Other Options Considered

The range of activities the TIE Committee considered within the topic area of **support and training** for **pollution prevention** was quite broad. **Beyond** what has been mentioned **above** under state **and** federal initiatives, the Committee looked at the following as being among the more promising **avenues** for broadening the base of pollution **prevention support and** training:

- The National Pollution Prevention Center just established at the University of Michigan with a grant from EPA. The Center will develop pollution prevention curricula for **undergraduate** and **graduate students**, focusing within the schools of natural resources, engineering, **and** management.

The MIT Program on Technology, Business, and the Environment which focuses on education, research, and promoting public discourse on pollution prevention. A principal goal is to foster leadership and learning in students and in practicing professionals.

- The UCLA Center for Clean Technology (CCT), a consortium of research centers that specialize in hazardous substance control, intermedia transport research, and risk/systems analysis for toxics control. Projects have included curricula developed to integrate environmental issues and concerns (including pollution prevention) into mainstream engineering design procedures.
- The American Institute of Chemical Engineers' (AIChE) Center for Waste Reduction Technologies campaign to encourage industry sponsorship of pollution prevention research and training.
- Technical assistance models that parallel the U.S. Department of Agriculture's extension service program. Initiatives like this have **begun** in both Kentucky and Georgia.
- The development of accounting systems to allow the incorporation of environmental obligations into the day-to-day management of **companies** and facilities. While some larger companies have such systems or are developing them, most mid-sized and smaller companies have no such system. Without this, it is difficult to measure the amount of waste being generated and even more difficult to measure waste reduction possible from process changes, chemical substitutions, or improved housekeeping.
- Corporate sponsorship or support of company-wide integrated pollution prevention. One example of a well developed corporate **environmental** management system is "3M Quality Environmental Management Program."
- Short pollution prevention training programs for **CEOs and other senior** level executives at the Harvard Business School or other major business institutions. EPA could support the development of such programs.
- Support or provision by EPA of training to small and medium-sized businesses on the development and implementation of improved environmental management systems that emphasize the integration of environmental and other business decisions.

The Committee also refers the reader to the new report and recommendations of the TIE Committee's Diffusion Focus Group, *Improving **Technology Diffusion for Environmental Protection***, which discusses extensively the critical role of the diffusion of information about environmentally beneficial technologies in the **environmental management** system. This report describes a number of policy and action steps **that** can help accomplish this strategic environmental management approach.

6. AGENCY RESOURCES/ADMINISTRATIVE EFFICIENCY

Overview

The TIE Committee considered the issue of agency resources as essentially addressing the question of how EPA and state and local agencies can more effectively manage their limited resources to:

- Allow staff time for detailed assessment of opportunities for technology innovation and pollution prevention.
- Optimize the performance of permitting and compliance systems to address the most pressing environmental problems first

Today, too high a percentage of state and federal agency resources are spent in the administration of single-medium permitting actions, a high proportion of which are routine and provide little opportunity to have a significant environmental impact. It is estimated, for instance, that nearly 50 percent of a state's permitting resources are used for the routine reissuance of permits.

Findings With Respect to Incentives and Barriers

The TIE Committee found that current resource commitments and requirements by state and federal agencies, statutory and regulatory constraints, and standard operating procedures which have developed in permitting and compliance limit the degree to which those agencies can promote or encourage innovation or pollution prevention, or differentiate between companies with differing commitments and practices. The cost and time associated with the current permit application, negotiation, and renewal process is excessive, not only for permittees but also for the agencies which must process, draft, negotiate, review, conduct hearings, and finally approve or deny each, new permit, permit modification, or permit renewal.

The TIE Committee found that there are significant opportunities to save resources in the permitting and compliance process. To take advantage of these opportunities, however, EPA must provide the maximum flexibility to the states compatible with the agency's statutory responsibilities.

The TIE Committee found that modifications to current permitting and compliance systems, such as increasing the use of permits-by-rule or reducing the time taken administratively to process and review standard permit renewals, could help free up resources so that agencies could not only focus on innovative pollution prevention alternatives across the board, but also shift their scarce resources to deal with those permits

and enforcement cases which are the most environmentally pressing and that could, therefore, benefit most from pollution prevention **approaches**.

State Initiatives Considered

The TIE Committee looked at a number of ways states are beginning to streamline and improve the permitting process, such as expedited review of innovative technology and pollution prevention-focused permits (Illinois), standardized exemptions from the new source review (NSR) process (Texas), and environmental benefit permit renewal strategies (New York) which shift agency resources away from administrative or regulatory calendar-linked renewals, redirecting them toward projects of high environmental interest. The TIE Committee considered such state initiatives in light of agency resource savings they could realize, and the potential they have for achieving resource savings that could then be redirected to efforts focused on pollution prevention and on more significant environmental risks.

New York's environmental benefits permit strategy is a **unique approach** to permit renewals. Previously, renewals were **driven by calendar-linked** schedules rather than opportunities for high environmental payoffs. The new strategy makes all state pollution discharge elimination system (SPDES) permit renewals **administrative** in nature -- i.e., they will become essentially **automatic** with **administrative changes (changes in name, address, etc.)** only. All **substantive** permit **changes** would be processed as permit modifications, **and** a special environmental priority file is **being developed to guide** the processing order and degree of attention such permit modifications will receive. Factors to be considered in establishing priorities for permit modifications include:

- **Problem areas identified by either the state, permittees, or the public.**
- **Multi-media targeted facilities.**
- **Toxics reduction targets.**
- **Facilities with history of permit non-compliance.**
- **Facilities discharging to receiving waters that have been reclassified.**
- **Areas with combined sewer overflow (CSO) problems.**
- **Other special industry features (e.g., PCB dischargers).**

At least annually, the state will establish rankings for workload assignment and permit-drafting purposes; the rankings will include lists of specific permits to be acted upon. Savings in agency resources the state realizes (from the resources previously expended on reviewing permit renewals involving no changes) will be directed to addressing the most problematic facilities. The TIE Committee found that linking the **permit modification process to environmental priorities** has much potential for fostering pollution

prevention, not only because of its multi-media, toxics reduction focus, but also because problem facilities can benefit most from pollution prevention solutions.

Federal Initiatives Considered

Over the years, EPA has utilized elements of class permits, general permits, permits-by-rule, or simple notifications within a number of regulatory programs to impose standards and requirements covering a large number of facilities. Under the RCRA underground storage tank (UST) program, for example, EPA **established technical** and general performance standards, but left program development and implementation up to the states. Many states chose a combination of notification/permit-by-rule **and** class permit systems, **and** have been successful in bringing a previously **unregulated** activity, **involving** literally millions of units, into an environmental management system. **Incineration of PCBs under the Toxic Substances Control Act (TSCA) is another area where EPA has successfully used a class permit approach.**

In April of this year, EPA issued a final rule describing a **national strategy** for issuing general storm water discharge permits under the NPDES program. The general permits will be issued to groups of industries or municipalities, or to types of activities which are sufficiently similar to warrant a general approach. For a basic compliance mechanism, the storm water program will rely on site **inspections to provide an** efficient and cost-effective approach for evaluating the effectiveness of the general permit requirements. Facilities will be required to self-certify (annually) that pollution reduction measures identified in the general permit have been **adequately and properly implemented**, and to **evaluate whether** additional controls are needed. In some cases, **monitoring of storm water discharges may be required (e.g., primary metal industries, incinerators).** **The monitoring** information will help EPA determine if such facilities warrant additional permits or requirements not covered under the general framework. The program provides for a simple notice-of-intent (NOI) -- facilities that wish to participate only have to notify EPA of their intent to take part. There is no formal permit application.

The TIE Committee identified and discussed a range of **issues centering on permit-by-rule approaches and how they might help foster pollution prevention by reallocating** resources. Concerns were raised about how universal a permit-by-rule approach could be (e.g., it might not be appropriate for hazardous waste incinerators). Members of the TIE Committee felt strongly that, regardless of how streamlined or fast-tracked permitting might become, public participation in the permitting process is essential. There are opportunities for efficiencies in the public hearing or public comment process, however. New York, for example, will **batch** public notices for all SNPDES permit renewals, **and** if there are any **public challenges** to a particular permit, that permit will not be renewed **administratively --** it will be tracked into the priority file. Finally, there was some concern expressed in the TIE Committee that general permits scoped out and drafted by regulators might serve to narrow

opportunities rather than broaden them, and discourage the technology innovation and process redesign/modification that is so important to pollution prevention.

Other Options Considered

In exploring the issue of **reallocating agency** resources, the TIE Committee looked at a number of other approaches that might complement permit-by-rule or environmental benefits review-type strategies. Such approaches centered on fostering more "back-end" oversight (i.e., through enforcement/compliance systems) at the expense of "front-end" oversight (i.e., through permitting systems). **The following were considered and discussed:**

Self-Reporting: Increased use of self-reporting mechanisms (e.g., expanded use of checklists, questionnaires, self-audits). SARA 313 (TRI) reporting was cited as a model of what can be achieved **through** increased informational requirements outside of a permitting system.

- *Facility Siting Contracts:* Facility siting contracts with local governments and environmental public interest **organizations** which define the standards of environmental performance/result to be achieved during facility operations. Such contracts could be **negotiated** in conjunction with initial permitting of a facility. As long as the facility keeps faith with the terms of the contract, subsequent permit modifications or renewals might be automatic or streamlined. Standard state or federal compliance systems would be augmented, not only by the additional legal authority (i.e., the contract) but also by the **heightened** scrutiny the facility would be under from local interests.
- *Third Party Auditing:* Third party auditing, paid for by the facility, to supplement state or federal agency inspections. As defined by the TIE Committee, third party auditing would be utilized as part of the enforcement scheme and would not replace traditional enforcement activities. The TIE Committee considered both the potential benefits of reducing resource demands on government resources, **and** potential problems associated with having a private entity fulfill an essentially governmental enforcement role.

7. POLLUTION PREVENTION IMPLEMENTATION AT EPA

Overview

In considering the issue of pollution prevention implementation at EPA, the TIE Committee addressed several questions. Broadly, how does the desire to promote pollution prevention interact with the current culture and mission of EPA? Specifically, how can EPA refrain; accountable planning targets, base grants, measurement and reward systems, and other mechanisms so that pollution prevention is integrated in the day-to-day business and the primary expenditures of state and local agencies, the regions, and EPA headquarters?

Findings with Respect to Incentives and Barriers

The TIE Committee concluded that more effective realization of the goals of environmental innovation and pollution prevention must be based on a recognition that effective pollution prevention requires a long term commitment by management to a process of continuous environmental improvement. The TIE Committee had findings in three areas, including national policy and goals, resources, and culture.

The TIE Committee found that a clearly articulated national pollution prevention policy and goal would greatly support industrial pollution prevention. The National Environmental Policy Plan (NEPP) of the Dutch government provides an example of such a plan. The NEPP is a strategic plan for the medium and long term (through 2010), and defines target groups and environmental objectives for that period. While the Dutch approach is specific to that country's needs, several TIE Committee members expressed an interest in such longer term setting of targets and defining of objectives. Not only would such an approach make clear the nation's environmental needs and requirements, but it could provide a more stable horizon for industrial planning and a more predictable market for environmentally beneficial technologies. Possible types of goals discussed by the TIE Committee include improved regulatory compliance, reduction of waste generation on an annual percentage basis, achievement of zero discharge in certain circumstances, or the use of a hierarchy in formulating waste management/reduction strategies. Some key components of a longer term policy, although beyond the scope of permitting and compliance, could include capital investment incentives to reduce emissions and tax credits for achieving pollution prevention.

Because undertaking pollution prevention (or any major culture shift) can be resource intensive, resources need to be freed up (see the Agency Resources Finding, *supra*). As a key supplier of resources to states, EPA can help address this barrier by freeing up base grant funds to meet compliance goals through using pollution prevention.

The state core grant programs do not currently provide adequate flexibility for the states to pursue pollution prevention and multi-media approaches within the existing programs.

At the philosophical level, the TIE Committee recognized that incorporation of pollution prevention into industrial and government planning requires a cultural shift in perspective. One way that EPA can support this culture shift is to change its own priorities from command and control to incentives and support. EPA's budgeting and personnel advancement policies do not currently encourage the institutionalization of the pollution prevention approach in the day-to-day business of the agency.

The TIE Committee recognizes that incorporation of pollution prevention into industrial planning is a strategic issue. It affects a company's public image and environmental integrity. The environmental information developed for **analyzing** pollution prevention opportunities also can enable regulated parties to improve their business management; an understanding of the generation of waste can be used as a diagnostic tool in analyzing opportunities to increase productivity.

State Initiatives Considered

A few states have begun to address pollution prevention resource questions in their relationships with EPA headquarters and regional offices. For example, Alaska is working out a program with Region 10 to dedicate 5 percent of core grants (across all programs) to pollution prevention activities. In addition, states in Regions 1 and 2 are working with their EPA regional offices to modify current agency approaches to accountability on use of EPA's grants to the states. Their objective is to create ways to provide additional credit for multi-media inspections, permitting, or enforcement actions, and greater flexibility in implementing permit review requirements.

Federal Initiatives Considered

While the TIE Committee found that pollution prevention is still far from becoming the central focus of EPA programs, it found a number of valuable initiatives which move towards re-directing priorities. Beyond the specific agreement with Alaska, for example, EPA has recently issued guidance for incorporating pollution prevention into the agency's media grant programs to the states. The guidance document states that pollution prevention "is EPA's preferred approach to environmental management where technically and economically feasible," and that proposals from the states consistent with the pollution prevention principles in the guidance should be considered "good candidates for funding through the grant programs." The Administrator's proposed budgets for FY 1993 and FY1994 show pollution prevention activities as a percentage of core grants across the board.

EPA has used the "2 Percent Set-Aside Projects," a Pollution Prevention Awards program, and the 33/50 program to voluntarily promote pollution prevention and to attempt

to elevate the priority that pollution prevention is given by firms and by agency employees. The agency is incorporating pollution prevention in the comprehensive, four-year strategic plans developed by each program office. In addition, EPA is beginning to include pollution prevention-related activities in its operating guidance, accountability measures, and regulatory review and development processes. Examples of 2 percent set-aside projects include "Pollution Prevention By and For Small Businesses," which provided awards of \$25,000 each to small businesses to demonstrate **innovative** approaches to pollution **prevention**, and "RCRA Inspectors: Pollution Prevention Opportunities in the Field," which investigated the role of RCRA facility inspectors to determine when it is feasible and appropriate for them to provide waste reduction information.

In the **agency's regulatory** development process, a **formal pollution prevention review process** has been initiated for significant regulations. The **regulations** subject to this review are identified in a Source Reduction Review Projects (SRRP) -- which focuses, for example, on major regulatory initiatives (e.g., MACT requirements) which will establish the framework for EPA's environmental management for the next decade or more. In the SRRPs, the development of all new regulations will be coordinated across the media for 17 industrial categories and source reduction opportunities will be intensely evaluated during rule development. In this way, the relative priority of problems can be addressed and cross-media shifts can be considered and avoided, where possible.

On the "reward" side, a new initiative involves establishing cash awards for EPA facilities and individuals who create policies or activities that promote pollution prevention. The Office of Air Quality **Planning** and Standards (OAQPS) **has begun** to offer \$1,000 cash awards to staff members **who** make the **greatest contribution** to **promotion** of pollution prevention. For several years now, EPA has given annual awards to private companies and local governments for "excellence" in promoting the principles and practices of pollution prevention or in instituting them at the facility or company level. Such award programs are **a way to point out** and reward (in terms of **positive publicity**) **the** leaders in **the** effort to incorporate pollution **prevention** into **environmental management systems**.

EPA has also established an awards program to recognize those private, non-profit, or **governmental** entities making outstanding contributions in the implementation or promotion of pollution prevention technologies and techniques. During the past year, recipients of the award were selected through a process which began at the EPA regions. The agency sent out over 8,000 notices of the **availability** of the awards and requests for applications. Regional offices selected from among the original applicants, and Renew America (a non-profit organization which is involved in other environmental awards) put together a panel of judges which included representatives from state and local agencies, environmental public interest groups, and businesses. Final selections were made by EPA's Assistant Administrators.

The 33/50 program is designed to encourage large facilities to voluntarily reduce releases of some of the most toxic industrial chemicals. While the principal objective is to encourage pollution prevention, companies can achieve credit for reductions in releases achieved **through** control, treatment, or recycling, as well.

To promote more rapid internal EPA adoption of pollution prevention measures and approaches, and to provide guidance and direction for the effort to undertake the transition to pollution prevention, the agency has formed a Senior Policy Council which is comprised of top managers representing EPA's national programs and review and approve agency wide pollution prevention initiatives, and to evaluate their implementation. The group has been in existence for just over a year, and has focused on pollution prevention initiatives in the areas of rule development, enforcement, state grants, and budget. Specific accomplishments have included the state media program grants guidance, allocation of the 2 percent pollution prevention set-aside projects, and development of the Source Reduction *Review* Project which will ensure promotion of pollution prevention options and consideration of multi-media effects in 24 major media program rules during the next ten years.

RECOMMENDATIONS

The TIE Committee has concluded that there are significant permitting and compliance barriers to the implementation of pollution prevention technologies and techniques. The barriers create major impediments for innovative pollution prevention technologies, **although** these barriers are often significant even for the implementation of **readily available** and/or widely utilized process or material **changes**. The Committee has also **reached** consensus on many of the policy and **program changes** which are necessary to effectively overcome these barriers, creating **additional** incentives for **pollution prevention**. The TIE Committee **believes that** the **changes** it is **recommending** will be conducive to **greater and more rapid development, commercialization, and use of environmentally beneficial pollution prevention technologies and techniques**.

The TIE Committee wishes to re-emphasize, however, a general finding stated earlier in this report. Permitting and compliance procedures are not the only barriers to pollution prevention in the environmental management system. Indeed, some of the barriers which become apparent in the operations of the permitting and compliance system are inherent in the regulations and statutes. Eliminating such barriers will require modifying this underlying system of constraints and requirements.

These recommendations address changes which the TIE Committee believes are within the scope of EPA's permitting and compliance system. Many can be accomplished within the agency's current statutory authorities. While there is consensus on the TIE Committee about many of the changes needed to reduce barriers and increase incentives, the Committee believes that much remains to be learned about the impacts of specific combinations of approaches to these permitting and compliance issues. The integration of pollution prevention into the environmental management system is a complex undertaking that will require a sustained commitment lasting several years.

Effective implementation of the Committee's recommendations will, in some cases, require **significant** experimentation with, and the testing of, alternative approaches. EPA **should** promote and encourage a range of local, state, and federal pilot projects or "initiatives", **including** currently emerging state and local experiments. Pilot projects should have both clearly defined goals and objectives, and a clearly delineated time frame with interim milestones. It is critical that EPA support and/or **cooperatively** conduct evaluations of the effectiveness of pilot projects to learn nationally **applicable** lessons. These pilots, should be part of a focused program to make long-term changes to current procedures. Information developed through pilot projects should provide the basis for designing future agency actions.

RECOMMENDATION 1

Re-design permit procedures to foster and reward efforts by regulated facilities to expand their use of both multi-media management and pollution prevention approaches for environmental improvement.

The TIE Committee believes that EPA needs to examine its permitting procedures to determine where greater flexibility in approach would be conducive to implementation of pollution prevention technologies and techniques, while still meeting the requirements of the agency's governing statutes. EPA's current procedures have been developed to meet the exigencies of single-medium pollution control programs. The Committee believes that modification of the design of these implementing programs, consistent with statutory requirements, would in some cases lead to the increased development and use of pollution prevention technologies and techniques and improved environmental results.

1.1 Maximize the implementation of multi-media pollution prevention alternatives during permit development by emphasizing environmental results rather than the specific means of attainment.

The TIE Committee found that some regulatory standards, even though formulated as performance standards, tend to be implemented as *de facto* control technology-based standards; this can create an obstacle for firms wishing to meet the standards through implementation of innovative process technologies or use of alternative feedstocks. For both air and water regulatory requirements, for example, EPA carries out extensive technology evaluations during the process of standard development. While the performance standards are legally separate from the technologies used to derive them adoption of the model technologies sometimes is treated, by federal or state agency and industry personnel, as the best way to achieve the standard.

A similar opportunity for additional flexibility at the operational permitting level relates to the form of the performance standard. The TIE Committee discussed some cases where standards are written as concentration limits, but where significant reductions could occur if mass-based limits were used; one member reported that a publicly owned treatment works (POTW) achieved substantial water use and contaminant loading reductions in its influent by encouraging industrial users to implement pollution prevention changes under a mass-based standard. However, although the quantity (mass) of pollutants was reduced, the

reduced flows resulted in some cases in an increase in effluent concentrations. The EPA regional office decided to use concentration limits as the governing standard, which resulted in violations in spite of the reduction in the quantity of pollutants released. All EPA regional offices should adopt a consistent policy which maximizes the flexibility necessary to encourage and approve reduction measures of this kind.

The TIE Committee suggests that a specific example of an implementation consequence of this recommendation could be that EPA would provide guidance to permit writers. This guidance would prohibit the use of end-of-pipe technologies that resulted in a significant cross-media impact and did not result in a net environmental **gain**.

1.2 Administer single-medium permit requirements flexibly to encourage environmentally beneficial multi-media pollution prevention initiatives by regulated parties.

The TIE Committee notes that many permitting requirements are based on regulatory and statutory provisions with a significant degree of flexibility, but that such flexibility is often lost in standard implementation procedures. Rigid enforcement of single-medium permitting discourages regulated facilities from either **evaluating** cost-effective multi-media plantwide approaches to reducing pollution, or from proposing to implement such approaches. The Committee recommends that EPA adopt implementation policies which utilize the maximum allowable 'flexibility in single-medium permitting to encourage plants to undertake environmentally beneficial multi-media reductions. Such policies should then be clearly communicated to regulated organizations. As an initial step in this effort, EPA should examine a number of the more widespread industrial activities for which there are significant pollution prevention opportunities. The agency should determine what problems there might be in showing equivalency with the single-medium standards that are based on end-of-pipe control technologies.

1.3 Initiate, and encourage state and local agencies to initiate, fast-track permits for pollution prevention initiatives at facilities with well-documented, good compliance records.

Certainty and timing are often crucial considerations for facilities seeking permits for alterations in their production processes, particularly if the changes for which the permits are sought are innovative or involve pollution prevention solutions which differ from the treatment or control options standardly approved by the reviewing agency. One way to

minimize the risk necessarily involved in such changes is for the reviewing agency to provide its decisions (or raise questions needing resolution) quickly.

The TIE Committee believes, however, that expedited permitting should not just be a reward for a new idea; it should be a reward for good environmental performance. A facility's environmental performance includes both its past compliance record and future factors that are proposed to improve compliance. For instance, the addition of advanced monitoring capabilities would enable an agency to better track the performance of proposed innovative technologies which might otherwise raise enforceability concerns because of the uncertainty of their performance. Where both the pollution prevention initiative and environmental performance warrant, the TIE Committee believes that the reviewing agency should expedite the permit review. The Administrator could direct such a change for federally administered permits, encourage or direct the change for state or locally administered, federally mandated permits, and provide support for this change by increasing the credit in the administrative system for pollution prevention permits which are processed within a specified time period.

- 1.4 Support additional state and local multi-media permit pilot projects (with well-defined objectives and timelines) and initiatives to synchronize timing and coordinate issuance of single-medium permits.**

The TIE Committee recommends that the Administrator direct EPA staff to provide maximum support and discretion to the states in their efforts to adapt the existing system of permitting to multi-media and pollution prevention objectives. It commends EPA for the MOU, under the Model States Program, between Region 2 and New Jersey to support that state's effort to carry out a multi-media pollution prevention pilot project. EPA should support additional multi-media permit projects and initiatives to synchronize the timing and coordinate the issuance of single-medium permits. For example, without going as far as multi-media permitting, New York is trying to synchronize the scheduling of permits for a facility, so that all the permits will be renewed simultaneously, thus creating an incentive for the facility to evaluate all of its environmental releases at the same time. This, too, is an effort which EPA should encourage, support, and help to disseminate.

EPA should evaluate these pilot efforts to identify nationally applicable lessons. Evaluations are critical to determine what types of multi-media permitting ^{best} promote the use of pollution prevention technologies and techniques and what steps (federal and state) might need to be taken to promote multi-media permitting, if it is shown to be beneficial to pollution prevention.

1.5 Redeploy scarce regulatory agency and regulated organization resources from procedural or redundant permitting activities, and reallocate resources for the permitting of multi-media, pollution prevention, and innovative approaches.

Substantial federal and state resources are expended in reviewing permit renewals or minor modifications with little or no environmental impact. This reduces the resources available for reviewing either those applications which involve potentially significant environmental impacts, or which involve technically challenging pollution prevention alternatives. It also drains resources which could be used to enhance enforcement, which the TIE Committee believes to be critical in creating the atmosphere in which companies look for pollution prevention alternatives. One important use of agency resources freed by these arrangements is facilitating the development of innovative pollution prevention settlements. The TIE Committee recommends that EPA's regional offices review their current permitting and compliance administrative workloads to determine where redeployment can occur.

The TIE Committee recognizes that streamlining routine permits also potentially allows industry to focus more effort on developing and negotiating pollution prevention approaches to meeting environmental standards. Environmental management resources which would otherwise be involved in developing routine applications may be freed to focus on pollution prevention and other innovative approaches. Redeployment and reallocation can provide critical support for the permitting of multi-media, pollution prevention, and innovative technology approaches. For example, in a recent review, the State of New York found that 85 percent of its NPDES permitting resources were being used to review permit renewals involving no significant change. The State has now initiated a program under which routine renewals will be batched administratively and not subjected to individual review. Any permit applications which are challenged, or which involve facilities which any of a series of State indicators show to be potentially problematic, will still be subject to individual review (see Findings section on Agency Resources, *supra*).

1.6 Support expanded use of permits-by-rule for permit renewals and selected new permits under certain conditions to encourage pollution prevention.

Permit renewals involving no significant changes.

Renewals or new permits for facilities:

- **With good compliance records with existing requirements.**
- **Which have involved the public in the planning process for the specific permit, or more generally for pollution prevention plans at the facility.**
- **Which have provided the state agency or EPA with requested environmental or operational information beyond that legally required.**

EPA currently uses or allows streamlined permit mechanisms, such as permits-by-rule (PBR), simple notifications or general permits for PCB incineration under the Toxic Substances Control Act (TSCA), permitting under the stormwater discharge programs, and state implementation of the underground storage tank (UST) program (see Findings section on Agency Resources). The TIE Committee concludes that while there are definite limits to the types of situations to which PBRs could apply, substantial resource and time savings, could be achieved through their appropriate use. The TIE Committee believes that the

current permit system is not efficient.

The TIE Committee recognizes that there may be circumstances where PBRs would be substantively appropriate, but where their use would be constrained by statute. Several years ago, for example, EPA explored and prepared to promulgate a rule allowing PBRs for permits for hazardous waste storage facilities. But the linkage of such permits to corrective action requirements (which the agency believed to inherently require individual review) legally eliminated the utility of a PBR approach.

Where PBRs are appropriate, the TIE Committee believes that there are additional conditions, beyond those above, which the Administrator might consider attaching to their use. Use of PBRs for renewals or other permits might be limited to facilities:

Offering single-medium or multi-media pollution prevention reductions exceeding requirements.

With pollution prevention facility plans which incorporate significant continuous reductions, and direct involvement and commitment of highest corporate management in the planning for those reductions.

With facility siting contracts with local governments, state governments, and/or environmental groups which incorporate performance standards and/or pollution prevention 'education agreements.

Recommendation 2

Accelerate the development of innovative pollution prevention technologies and techniques and encourage their use by implementing the recommendations in the TIE Committee report on fostering technology innovation through permitting and compliance policy.

In its previous report on technology innovation in permitting and compliance policy, *Permitting and Compliance Policy: Barriers to U.S. Environmental Technology Innovation*, the Committee found that associated R&D problems were not **unique** to pollution control and pollution abatement technologies, but were similarly **germane** to the development, demonstration, and use of pollution prevention technologies and techniques. The TIE Committee's current work confirms its original findings. The TM Committee therefore reaffirms the original recommendations and urges the **agency** to accelerate their implementation. The Committee notes that several recommendations have been implemented, in whole or in part, and commends EPA for these actions.

2.1 Foster the development, testing, and demonstration of innovative pollution prevention technologies:

- a. Institute a working permitting system (covering all media) for research, development, and demonstration (RD&D), testing, and evaluation. This could be accomplished through a special, multi-media "RD&D" permit or through the creation and effective coordination of single-medium RD&D permits.
- b. Develop a system of dedicated centers for tests and demonstrations, for example with the Departments of Energy and Defense (DOE and DOD).
- c. Develop a simple, practical system for cross-media and cross-jurisdictional coordination of reviews of such permit applications.

Testing of pollution prevention technologies is usually necessary at various points during the research and development cycle to define their parameters of performance and cost of performance. As indicated in the previous report on permitting and compliance policy, provisions for testing under the Clean Water Act and the Clean Air Act are *ad hoc*

only, while provisions under RCRA are little used. EPA's support for the testing of innovative pollution prevention technologies and techniques could be improved by maximizing use of allowed permitting flexibility under the statutes, coordinating the review of permit applications across the media (and across the levels of government), and ensuring a systematic interpretation between regions.

The TIE Committee commends EPA for extending its plan to establish testing centers for innovative technologies at federal facilities by planning, with the Department of Defense, a center where innovative pollution prevention technologies and techniques can be tested. EPA should develop specialized permits for such centers that are located at sites not on federal property. In order to encourage testing of pollution prevention technologies and techniques that have multi-media benefits, a special effort should be made to coordinate all single-medium permitting decisions for testing or to create through legislation a single, multi-media RD&D permit.

Licensing and marketing of such technologies could be promoted through clearinghouses, publications, and other means, and facilitated through Federal Technology Transfer Act agreements, if the technologies are federally owned.

2.2 Implement permitting processes that aid the commercial introduction of innovative pollution prevention technologies and techniques. This will require increased flexibility of permitting processes involved in the commercial introduction of pollution prevention technologies and techniques.

Many of the recommendations in this report address the additional flexibility required to implement innovative technologies and techniques. This need is particularly great for pollution prevention approaches, since even plant-specific adaptations of many technologies require substantial innovation. But in addition to the general needs discussed elsewhere in this report, the first commercial introduction of a new pollution prevention technology or technique may require many of the specific remedies to the current permitting system suggested in the previous report, such as revitalized waiver authorities. "Soft landings" (i.e., policies designed to avoid punishing good faith innovative technology efforts that do not fully succeed) and other flexible enforcement approaches are needed to complement and reinforce permitting flexibility.

2.3 Recognize in compliance or enforcement policies and practices the need for flexibility during the development, testing, and early uses of innovative pollution prevention technologies and techniques.

The Committee re-emphasizes the recommendation it made in its previous report on permitting and compliance policy: while flexibility in permitting is essential to foster innovative pollution prevention technology development and use, EPA needs to make complementary changes in enforcement policy to increase flexibility, such as through "soft landing" strategies, and to increase coordination in compliance programs across the environmental media and across jurisdictional lines. The Committee believes that unless both permitting and compliance policies are flexible in a coordinated fashion, there will be unnecessary discouragement to the development and use of pollution prevention technologies and techniques. EPA should increase its use of the Interim Policy on Pollution Prevention and Recycling Conditions in Settlements and the Policy on Supplemental Environmental Projects.

Recommendation 3

Work with the states to encourage and develop pollution prevention enforcement initiatives.

Strong, predictable, effective, consistent enforcement is critical in fostering the use of pollution prevention technologies and techniques. It is not, however, sufficient. Enforcement flexibility is needed to allow and encourage facilities to use pollution prevention approaches to come into, or go beyond, compliance. EPA's recent pollution prevention enforcement policy statements are positive, but their implementation has been limited. Strong incentives and extensive technical support are necessary to spur EPA and state regulators toward this kind of enforcement approach. Unorthodox and innovative settlements often require more time, and create more risk, for both regulators and managers at regulated facilities. The rewards must be commensurate. The Committee recommends that the agency provide the necessary technical support, incentives, and guidance to encourage increased use of pollution prevention approaches in enforcement actions in accordance with its policy initiatives.

3.1 Increase use of pollution prevention enforcement policy alternatives, such as those in EPA's Interim Policy on Pollution Prevention and Recycling Conditions in Settlements and Policy on Supplemental Environmental Projects.

The TIE Committee believes that EPA's enforcement policy initiatives to incorporate pollution prevention into enforcement actions (see Finding 3) are a strong positive step towards promoting pollution prevention approaches, where applicable, as a preferred approach to standard pollution control approaches. Current information reviewed by the Committee indicates, however, that there has been little use of pollution prevention-oriented SEPs in enforcement actions for media programs other than the Office of Prevention, Pesticides and Toxic Substances (OPPTS). The TIE Committee urges EPA to pursue -- and to provide the necessary technical support, incentives, and guidance to encourage others to pursue -- active implementation of these and other similar enforcement policy initiatives for air, water, and solid waste media program enforcement actions. These policy initiatives allow federal negotiators to offer to extend the compliance schedule or to reduce the punitive portion of a penalty in a settlement agreement for a respondent's agreement to correct the violation with a pollution prevention activity, or to reduce the

gravity portion of the penalty in a settlement agreement when the facility agrees to undertake a supplemental pollution prevention-related or innovation-related project.

3.2 Establish easily accessible mechanisms (e.g., a clearinghouse and the pollution prevention information exchange system network [PIES]) for sharing successful experiences about the use of pollution prevention in enforcement settlements.

An easily accessible information exchange is critical to the effective implementation of the agency's new pollution prevention enforcement policy. The Office of Pollution Prevention and Toxic Substances (OPPTS) has taken an excellent step in this direction through its study earlier this year, pollution Prevention through Compliance and Enforcement: A Review of (OPPTS) Accomplishments. It is a review of all pollution prevention-oriented OPPTS enforcement settlement agreements during the previous three years. OPPTS plans to update the report on an annual basis. Similar reviews are needed for all of the agency's enforcement areas -- and information about them made widely available -- so that state and federal enforcement officials can learn what types of pollution prevention opportunities have been used successfully in resolving other enforcement actions.

3.3 Develop a multi-media compliance inspection package, including training opportunities, for use by EPA, state, and local (especially publicly owned treatment works [POTW]) inspectors. EPA should aggressively encourage adoption and use of this inspection scheme to promote pollution prevention.

There have been a number of state and local initiatives in multi-media inspections of industrial facilities. The original program of this kind was the Blackstone project in Massachusetts, but a number of other states have now undertaken similar efforts (see Findings section on Enforcement). Each of these programs has needed to train single-medium inspectors on how to carry out multi-media inspections. EPA should make use of the experience of the states, and work with them to develop a multi-media training and inspection package which would be available in the future for all federal, state, and local inspectors. As the experience in Massachusetts demonstrated, it is important that inspectors also be familiar with and able to direct facilities to sources of pollution prevention technical assistance, so that the facilities have ready access to the widest range

possible of credible technology information. They will then be better able to select the tools to respond to the multi-media inspection results.

3.4 In evaluating state performance under delegated programs, adopt a policy giving additional credit for multi-media inspections.

In meeting their federal evaluation criteria, state and federal inspectors are required to carry out specific minimum numbers of inspections. Because of the greater value of multi-media inspections in directing facilities toward pollution prevention alternatives, it is important that these inspections be accorded a higher value than the usual single-medium inspections. If multi-media inspections are only counted the same as single-medium inspections, then it is not likely that state or federal inspectors will undertake the additional effort required for a multi-media inspection. One way to resolve this would be to give credit separately for each individual single-medium inspection incorporated in a multi-media inspection.

3.5 Provide technical support for multi-media inspections. Modify base grant objectives for the states to promote multi-media inspections.

For several years, EPA has provided support to states for initiating pollution prevention activities through competitive Pollution Prevention Incentive for States (PPIS) grants. These grants are, however, both limited in the time allowed for execution and in dollar amount. They are not designed to sustain state pollution prevention efforts.

The basic single-media program grants to the states, by contrast, provide operational support on a continuing basis. The criteria for those grants have been linked to date to very specific program requirements. The TIE Committee commends the recent action of EPA to allow allocation of a portion of these grants to pollution prevention activities in the next two fiscal years, and believes this is an important step in the right direction. The Committee recommends that EPA maximize support for pollution prevention activities under these grants.

Recommendation 4

Proactively support state initiatives in multi-media pollution prevention facility planning.

The TIE Committee believes that pollution prevention facility planning is a critical element in long-term industrial adoption of pollution prevention alternatives and, more importantly, in the integration of pollution prevention perspectives into all of the industrial **planning** processes of a facility. The current diversity of state **approaches** to facility **planning** reflects leadership and commitment. These efforts provide a real-world laboratory in which it will be possible to observe and evaluate the effectiveness of alternative **approaches**. EPA should play a major leadership role by **supporting** and evaluating the numerous and varied state pollution prevention facility planning programs which have been initiated or are currently being considered.

4.1 Work with state officials to evaluate the effectiveness of alternative approaches to facility planning. Draw the national lessons from state experiments and facilitate transfer of information and results of evaluations between states.

The Committee emphasizes that pollution prevention facility planning has been an area in which the states have seized the initiative, and in which states are implementing a diverse array of approaches. At present there is little experience on which to base the selection of a single ideal approach to pollution prevention facility planning. Extensive analysis will be needed as these programs develop to determine which strategies and program elements are most effective. The Committee recommends that rather than **developing** a single national model for pollution prevention facility planning at this time, **EPA should develop** baseline criteria (e.g., that programs be multi-media in scope) that do not **discourage** states from developing their own facility planning programs. In addition, **EPA should** work with the states to analyze results of the current state efforts and to facilitate exchange of information between states.

4.2 Establish industry-specific advisory groups to facilitate the transfer of pollution prevention technical information and provide support for pollution prevention facility planning for selected industries, with due regard for protecting confidential business information.

One important way in which EPA can provide technical support for state efforts is through the creation of advisory panels of experts on specific industries. These panels, made up of industry experts plus a broad representation of stakeholders, could evaluate and provide information to the states on pollution prevention technology approaches for the particular industry. The selection of industry areas for such panels should be made cooperatively by EPA and the states. The panels would serve as official advisory committees under the Federal Advisory Committee Act (FACA).

4.3 Augment industry-specific and process-specific information sharing through the national pollution prevention information exchange system network (PIES).

EPA should provide technical support to state and local agencies (and to regulated parties, consulting engineers, the public, and others involved in environmental improvement) by developing a significantly augmented industry-specific and process-specific information bank in PIES. This would include both technical pollution prevention and economic information, and might include specific information on problem areas or barriers to pollution prevention. Since many of the state and local technical assistance programs have developed a significant level of expertise about specific industries, it would be important to work cooperatively with them in developing such a system. A good starting point would be to begin with the industries for which advisory groups are established. Another good place to start is with the 17 industrial categories which are the focus of the Source Reduction Review Project; source reduction opportunities will be intensely evaluated during rule development for the 17.

It is particularly important that such a system be readily and easily accessible for all potential federal, state, local, and industry users; it should include hotline support to help users obtain the information they need. The current PIES system has been perceived by many potential users as too complex and difficult to use.

Recommendation 5

Create a culture change by working with federal, state, and local agencies, non-profit organizations, universities, trade associations, and environmental groups to facilitate the implementation of pollution prevention technologies and techniques by expanding training, educational, and technology diffusion efforts.

The TIE Committee found that there is still a widespread need to educate leaders in both the private and public sectors on the positive relationship between industrial productivity and environmental protection. While some leaders in both industry and government understand and are committed to utilizing pollution prevention approaches, most of those engaged in environmental management still do business as usual. To change this environmental management culture will require intensified efforts in training and education and in technology diffusion both for present and future officials in regulated organizations and regulators at all levels of government. It is critical that EPA adopt a major role in guiding a change in the typical U.S. environmental management culture. EPA should support this culture change by making a major expansion in its support for training, educational, and technology diffusion efforts.

Some positive steps have already been taken. For example, the Committee found that EPA's support for state programs through the Pollution Prevention Incentives for States (PPIS) grants, while limited, has been a significant factor both in initiating new state pollution prevention programs and in the expansion of pollution prevention initiatives within existing state programs. The TIE Committee believes that the state grants program is a crucial and valuable role for EPA, one that should be complemented.

The TIE Committee's *report, Improving Technology Diffusion for Environmental Protection*, recommends in detail an expanded governmental role to enhance and coordinate the diffusion of pollution prevention technologies, techniques, and culture. The Committee recommended that EPA adopt an enhanced strategic role for technology diffusion in the environmental management system, strengthening itself organizationally (e.g., create the position of an agencywide technology advocate), redeploying diffusion and research resources, and integrating the diffusion role in policies and programs. Further, the Committee proposed that EPA establish a stronger partnership with the developers of technology information and with technology diffusion providers and users in the public and private sectors, and increase its emphasis on incentives for technology diffusion. These actions are important complements to the state grants program and to other initiatives

through which EPA has begun to expand its support for training, educational, and technology diffusion efforts.

5.1 Provide or support intensive, regular multi-media inspection training to federal, state, and local inspectors and encourage rotating these personnel across different medium-specific assignments.

Since the overwhelming majority of current inspections, whether state, local, or federal, are of a single environmental medium, and since many of those who carry out such inspections have experience only in a single medium, it is important to develop training materials to enable people to improve their skills in conducting multi-media inspections. (Source reduction training, though not explicitly multi-media, for state and federal permit issuance, inspection, and enforcement personnel is required under Section 66(4) of the Pollution Prevention Act of 1990.) In addition, it is important to broaden the experience of a significant proportion of state and federal inspectors by rotating them through inspection assignments in other media. Inspectors who have had such rotational assignments are likely to find it easier to adapt to the needs of multi-media inspections.

If multi-media compliance inspections are to become a strong lever to promote pollution prevention, it would also be valuable for some inspectors, both state and EPA, to take a rotational assignment in a state compliance or pollution prevention technical assistance office. This should be established as regular personnel policy for EPA's regional offices.

5.2 Provide or support training to increase the technical proficiency of inspectors and technical assistance personnel, both with respect to rules and regulations and with respect to production and compliance technologies and techniques.

Many inspectors are not highly trained with respect to the technological production alternatives available to the facilities whose compliance status they are responsible for evaluating. In some cases, inspectors may be relatively junior employees who do not fully understand all the relevant regulatory requirements with which a facility must comply. With the exception of special programs like the Blackstone project, where a specific objective of the project is to link facilities to technical assistance specialists, inspectors who

are not technically knowledgeable are unlikely to recognize that pollution prevention opportunities exist and to suggest evaluating the compliance potential of pollution prevention technologies and techniques. They are more likely to focus on checklists of standard pollution control techniques or technologies and may not know when to recommend contact with a technical assistance program.

For state and local technical assistance specialists, general knowledge of pollution prevention approaches is unlikely to be sufficient for more than the first pollution prevention steps in an industrial facility. More specialized technical knowledge of the options for a particular industry will often be required. Except for the largest state technical assistance programs, it will be difficult to hire and retain specialists (and to maintain their state-of-the-art knowledge) with experience in each of the industries and industrial unit processes of environmental concern to the state.

EPA is in the best position to guide states and to help them close these gaps in their inspection and technical assistance programs. The agency should provide and support training programs for inspectors and technical assistance personnel on industry-specific and process-specific information on pollution prevention technologies and techniques, and support them with aggressive information dissemination programs (see subrecommendation 5.4).

5.3 Support development at one or more major business schools of training programs for senior and middle corporate managers on the economic benefits of implementing pollution prevention technologies and techniques.

Members of the TIE Committee noted that a critical factor in converting American businesses to a pollution prevention mentality is educating the current top management on the benefits of pollution prevention in increasing productivity and competitiveness, as well as potentially reducing environmental management costs substantially. The Committee noted that corporate leaders will occasionally attend special short seminars at business schools to exchange views or obtain information on subjects of practical, special importance. EPA should fund, and should work with one or two major business schools to establish, such a short course in pollution prevention.

5.4 Adopt the specific measures recommended in *Improving Technology Diffusion for Environmental Protection* for promoting a partnership for the dissemination of pollution prevention information and the adoption of pollution prevention technologies and techniques.

In its recent report on technology diffusion, the TIE Committee recommended several steps EPA should take to promote diffusion of environmentally beneficial technologies. Adoption of these recommendations would serve to promote diffusion of pollution prevention technologies and techniques. The five general recommendations are:

- Make technology diffusion a major supporting mission for EPA.
- Build a stronger partnership with technology diffusion providers and users.
- Make diffusion and incentives the emphases of EPA's pollution prevention programs.
- Expand support for the international diffusion of environmental technologies to help meet U.S. environmental and competitiveness objectives.
- Increase support for the diffusion of technology provided by EPA's research programs on environmentally beneficial technologies.

Recommendation 6

Alter personnel reward systems to encourage EPA staff to champion pollution prevention.

The system of evaluation, rewards, and career advancement at all levels for individual EPA and state personnel will ultimately determine how effective EPA is in making pollution prevention the primary basis of its environmental programs. The integration of pollution prevention into the environmental management system is a complex undertaking that will require a sustained commitment lasting several years. Unless the personnel system quickly reflects the need to establish and reinforce pollution prevention, EPA will fail in its goal of promoting pollution prevention because its people will not support the change. The TIE Committee recommends that the current system of rewards and advancement be changed systematically to reflect new agency priorities relating to encouragement of pollution prevention.

6.1 Incorporate both pollution prevention and multi-media factors into agency personnel performance evaluation criteria and into the agency award system.

So long as federal or state personnel evaluation criteria are based on standard single-medium program criteria, the career rewards for both managers and staff will be determined by the degree to which they effectively implement and manage those programs. It is important to build encouragement and promotion of pollution prevention into the evaluation criteria for all permit writers, inspectors, and other enforcement personnel. Evaluating the adequacy and legitimacy of pollution prevention options is often more time consuming and risky for agency personnel than evaluating standard pollution control options.

Many agency personnel are knowledgeable about the engineering specifications of available control or treatment equipment, but know far less about the process engineering requirements or needs of the actual production operations. Without express support from the personnel management system for their efforts to understand industry-specific and process-specific factors, there will be little incentive for them to become proponents of pollution prevention alternatives and there will be reduced incentives for regulated parties to adopt them.

6.2 Make promotion of a multi-media pollution prevention culture at EPA a primary criterion for agency awards for senior staff.

Since management attitudes drive much of the action of agency staff, it is important for management personnel to be given both direction and incentive to promote pollution prevention within agency programs. The TIE Committee recognizes, however, that many of EPA's mid-level managers have spent their entire careers building and implementing the current single-medium pollution control and abatement system. To encourage them to adopt pollution prevention as a priority, it is important to provide them with special incentives and rewards to do so. The TIE Committee commends the \$1,000 pollution prevention cash awards established by OAQPS as an example of a step in the right direction. The TIE Committee commends the \$1,000 pollution prevention cash awards established by OAQPS as an example of a step in the right direction.

Senior EPA personnel are provided special incentives to meet agency objectives in the form of cash and other awards. The TIE Committee recommends that, especially during a period when the agency is trying to go through a transition from a pollution control to a pollution prevention culture, such awards be based substantially on pollution prevention-related criteria.

Recommendation 7

Expand and publicize the system of national recognition and awards honoring outstanding pollution prevention research, training, and technology implementation.

EPA should recognize annually those individuals and organizations outside of EPA taking an outstanding leadership role in pollution prevention. Pollution prevention can only be successful when individual decisions and organizational actions result in the integration of environmental objectives into overall planning. The organizations, or champions within organizations, who take the initial innovative steps towards the pollution prevention alternative often have to overcome substantial resistance. The TIE Committee believes that an expanded system of national recognition for outstanding efforts would help both to encourage and strengthen the efforts of these individuals and organizations, and to establish them as models for others to emulate. It would also serve to publicize particularly successful or innovative technologies and techniques, strategies, and approaches to pollution prevention. The agency's current Administrator's awards program for accomplishments in pollution prevention is an excellent step in the right direction. The awards program could be made a more effective vehicle for education and widespread recognition of pollution prevention approaches if it included more of a focus on technology diffusion. For example, the agency could facilitate diffusion of innovative, non-proprietary technologies or innovative pollution prevention programs by recognizing them (their creators and implementers) in the awards program.

7.1 Expand and publicize a system of national recognition for individuals in other federal agencies making outstanding contributions to promoting pollution prevention.

Some of the country's most important opportunities for promoting pollution prevention require actions by managers of federal government facilities and decisions by federal government program managers outside of EPA (e.g., Department of Energy, Department of Defense). EPA should develop, therefore, in cooperation with those other federal agencies, a system for rewarding those individuals -- possibly including a cash award.

7.2 Expand and publicize a system of national recognition for outstanding pollution prevention efforts by state and local agencies and officials.

Much of the initiative for current pollution prevention activities has come from state and local programs. Many of these programs have been **highly innovative, and/or have had to struggle with limited budgets against more entrenched approaches to environmental protection.** State and local government agencies are both on the front line **in interacting** with regulated parties, **and deeply involved in the day-to-day process of making the environmental permitting and compliance system adequately flexible, to allow for or to encourage pollution prevention.** While EPA has frequently **acknowledged** the key role of state and local governments in promoting pollution **prevention,** the **TIE Committee believes** that it is extremely important to specifically recognize both those **individuals and** those organizations whose contributions have been particularly innovative and effective. These should include both outstanding achievements in technical assistance and training, **and** innovative approaches to promote pollution prevention **through permitting and compliance.**

7.3 Expand and publicize the system of national recognition for regulated parties making major strides in institutionalizing pollution prevention approaches to environmental protection.

Rewards for private sector organizations would be similar in intent to the Malcolm Baldrige awards **made by** the Department of Commerce for **outstanding** business performance. They would both provide a means for companies to advertise their excellence and a vehicle for **educating** other companies on **the competitive advantages and technical/managerial** means for utilizing pollution prevention to achieve **exceptional** environmental results. Since the needs and situations of smaller and larger companies can differ **substantially,** the Committee recommends that there be separate recognition categories for small and large firms. EPA's rewards program for the private sector should strive for simplicity and practicality.

7.4 Expand and publicize the system of national recognition for non-profit institutions (e.g., public interest groups, universities) making major pollution prevention contributions.

In addition to the frontline efforts of companies and government agencies, significant contributions have been made to pollution prevention by universities and other non-profit organizations -- particularly in research, training, and technical assistance. The Committee recommends that EPA recognize these efforts, either through awards to the institutions or to the key individuals, or to both. Once again, a key factor to making the recognition meaningful is following through. For these organizations, this could involve either support for disseminating a new organizational approach to promoting pollution prevention technologies and techniques, or diffusion support for innovative pollution prevention research or technology concepts they develop.

14. SUBJECT TERMS (Key Words) continued: facility planning, environmentally beneficial technology, environmentally beneficial equipment, multimedia pollution prevention, pollution prevention technologies, cross-jurisdictional coordination, culture change, incentives for pollution prevention