

ENVIRONMENTAL AUDITING PROGRAMS:
BENEFITS TO THE ENVIRONMENT AND GOVERNMENT*

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EXECUTIVE SUMMARY

- ° Environmental auditing has the potential to create substantial benefits for the environment and regulatory agencies.
- ° These benefits depend chiefly on the effectiveness of programs adopted by private firms and the actions of government agencies in response to these programs.
- ° Government agencies must act carefully so as to stimulate environmental auditing without thwarting its effectiveness.
- ° An effective private auditing program may be expected to benefit the environment by strengthening a firm's ability to: identify problems that exist, control identified problems, and assure the results of control actions.
- ° The existence of effective private auditing programs may be expected to benefit government by enabling more effective compliance oversight and a reallocation of resources to focus on the most serious environmental problem areas.
- ° The effectiveness of private auditing programs depends on: management commitment; the technical competence of auditors; the nature ("what"), frequency ("when") and location ("where") of audits; and the number and types of firms adopting environmental auditing programs.
- ° Government agencies interested in stimulating auditing programs face several important issues: (1) the extent to which the government will be involved in these programs, if at all; (2) the extent to which the agency will target its monitoring, inspection and enforcement resources in a manner complementary to the adoption of environmental auditing programs; (3) whether the agency will establish minimum standards for environmental auditing programs; and (4) who should receive the information provided by environmental auditing programs.
- ° Government responses to environmental auditing may include: no action, encouragement of auditing, creation of direct incentives and mandatory auditing.

BENEFITS OF ENVIRONMENTAL AUDITING PROGRAMS:
TO THE ENVIRONMENT AND GOVERNMENT

INTRODUCTION

This report has two purposes. The first is to analyze the types of benefits that can be expected to result from adoption of environmental auditing programs. The second is to identify how public agencies can influence the magnitude of these benefits by their policies and actions.

An environmental auditing program is a program adopted by a private firm, public agency, or other organization for the purpose of overseeing and reviewing the firm's efforts to identify and respond to any detrimental impacts on the environment the firm may be causing.* Many firms adopting auditing programs do so solely for the purpose of assuring that all applicable environmental regulations are being complied with. Auditing programs can also help the firm identify and control situations that are not currently subject to regulation but may nevertheless be creating potential environmental, public health or worker health and safety risks.

Environmental auditing programs can create a number of different kinds of benefits. They can improve environmental quality and reduce adverse public health effects. They can save money and other resources for the firm adopting them. They can reduce the monitoring, inspection, and enforcement demands placed

* Although the concept of environmental auditing is applicable to any private or public organization, to simplify exposition this paper will use the term "firm" to refer to the organization adopting such a program.

on government agencies responsible for implementing environmental or public health programs.

Environmental auditing programs generate these benefits to the extent that their adoption results in firms' successfully controlling environmental problems. As indicated in Figure I, such success is the end result of a series of actions which technically lie outside the responsibility of the environmental auditing program, including: 1) identifying problems that exist; 2) undertaking a response to eliminate or sufficiently mitigate problems that are identified; and 3) ensuring that this response successfully eliminates the problems that have been identified.

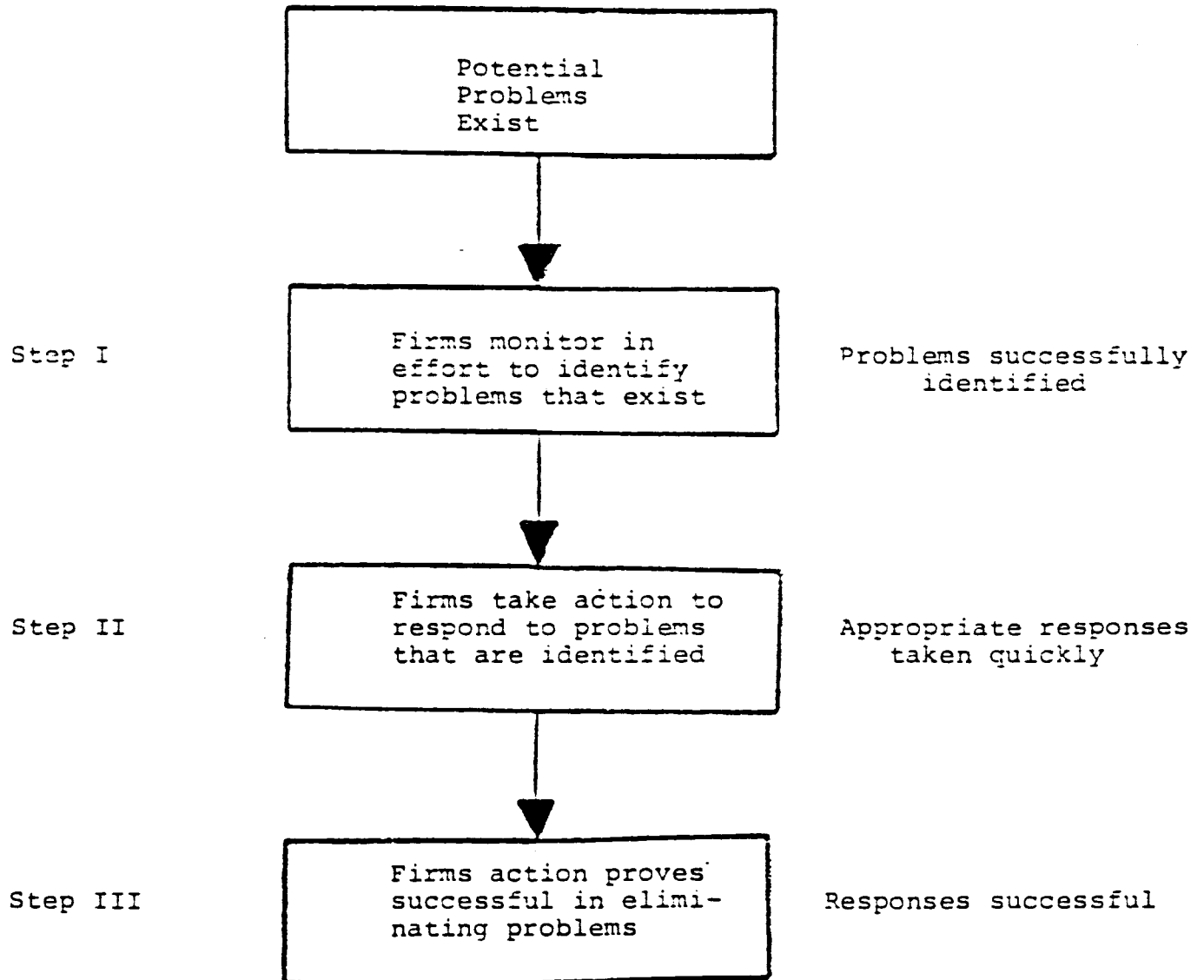
The role of an environmental auditing program is to oversee all of these activities and ensure that they are undertaken properly. Auditing generates benefits to the extent that it improves the quality of these other activities -- that is, to the extent that it increases the probability of each of the activities being successful. The likelihood of an environmental auditing program accomplishing this goal depends very much upon how the program is designed and implemented by the firm adopting it. The quality of the firm's program, in turn, can substantially be influenced by the government agency responsible for implementing environmental statutes. The primary question for such agencies, then, is what type of actions can they take that will stimulate firms to adopt the types of programs that are most likely to generate the largest amount of benefits.

FIGURE I

Problem Identification-Response Sequence

Step

Measure of Success



Thus, as shown in Figure II, there are three links that have to be hooked together. The first is the actions of the government agency. The second is how firms respond to these actions. And the third is the environmental and other benefits that result from the firms' responses.

This report addresses each of these links. It begins by identifying the types of benefits provided by environmental auditing programs and how these benefits are generated by such programs. It then analyzes the characteristics of the programs that can be expected to generate significant benefits. Finally, it analyzes how actions taken by government agencies can affect the types of auditing programs firms adopt, and, therefore, what public actions will promote the most desirable program characteristics.

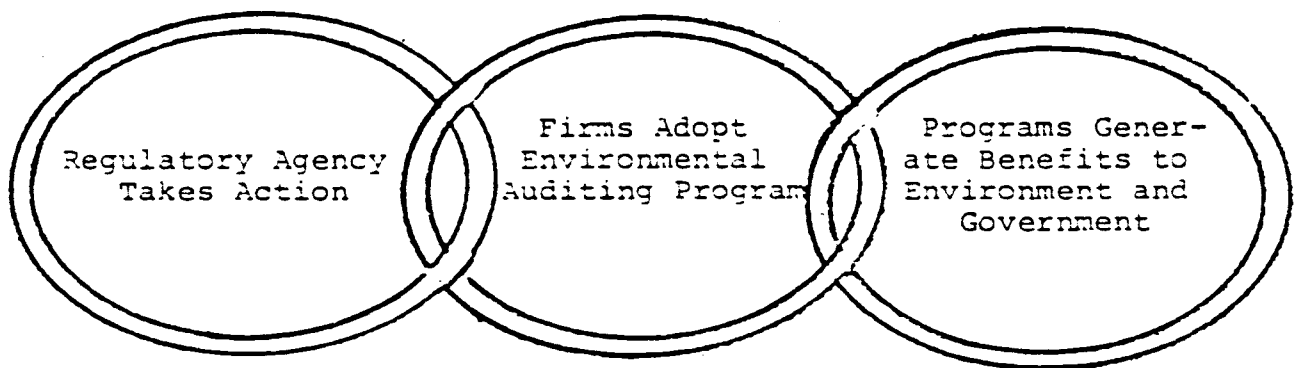
IDENTIFYING THE BENEFITS

This report is concerned primarily with two types of benefits that can result from the adoption of environmental auditing programs. The first, characterized as benefits to the environment, is a combination of the benefits resulting from improvements in environmental quality and reductions in public health risk. The second, termed benefits to government,* is comprised of the benefits resulting from the increased efficiency or

* The term "government" includes both Federal and state environmental regulatory agencies.

FIGURE II

Environmental Auditing Scheme Linkages



effectiveness that regulatory agencies may experience as a result of firms adopting environmental auditing programs.*

There are other benefits of environmental auditing programs that the report does not address. For instance, private firms adopting such programs may be able to obtain lower liability and health insurance rates, may be able to save valuable resources and thereby reduce production costs, or may be able to achieve other improvements in production efficiency which will result in reduced costs and increased profits. None of these benefits is addressed in this report. Nor is the possibility that environmental auditing programs will improve the efficiency or effectiveness of government agencies other than those involved in regulating environmental quality or public health risks. For instance, environmental auditing schemes could result in more efficient generation of information that is required by other government agencies such as the Securities and Exchange Commission or the Occupational Safety and Health Administration.

The report also does not attempt to assess the total net improvements to society resulting from environmental auditing programs. Such an assessment would require not only including benefits the report does not address, but also evaluating whether some of the identified benefits are compensated for by increased costs elsewhere. For instance, potential savings to government regulatory agencies may be offset by increased costs to

* Since the goal of the government agency is usually to achieve improvements in environmental quality or reductions in public health risk, the benefits to government can also be considered to include the benefits to the environment.

organizations implementing environmental auditing programs. No attempt has been made to identify the existence or extent of such offsets, or to estimate the magnitude of the costs (to either government or the firm) associated with establishing and implementing environmental auditing schemes.

Finally, this report attempts only to identify the types of benefits that result from auditing programs and does not attempt to estimate their magnitude. There is yet too little information available to be able to make even the crudest quantitative estimates of magnitude.

Benefits to the Environment

As stated above, environmental auditing programs will provide environmental benefits to the extent that they result in the elimination of environmental and public health problems that would otherwise have existed. Achieving these benefits is a three step process. First, the problem (or potential problem) must be identified. Second, once the problem is identified, some action must be taken to control it. And third, the action that is taken must successfully control the problem. Without all three of these steps being successful, there will be no benefits to the environment or to public health. The central question, then, is to what extent does the environmental auditing program affect the probability of success at each step?

Problem Identification. Environmental auditing programs can substantially affect the probability of success in the first of these steps -- the firm's efforts to identify problems that

exist. Some of these problems are associated with the release of regulated pollutants or with other environmentally damaging actions currently controlled by regulations. But some potential problems will be associated with actions that are not yet regulated. It is unlikely that all potential problems would ever be identified. The question is to what extent an environmental auditing program increases the probability of identifying a problem if it does exist?

The responsibility for identifying potential problems typically lies with the firm's environmental compliance assurance program.* The responsibility of the auditing program is to oversee and evaluate the compliance assurance program and ensure that this function is being carried out as well as feasible.

If the environmental auditing program has no effect on the probability of the compliance assurance efforts to identify a problem -- for instance, if the compliance assurance program with environmental auditing scheme is no better than the compliance assurance program that would exist without the scheme -- then the auditing program will produce indirect environmental benefits if it allows the government agency to shift its inspection and enforcement resources away from the particular firm adopting the auditing program to another firm which would otherwise be less closely checked.

* "Compliance assurance program" is defined here as a systematic way to determine, achieve and maintain compliance with environmental regulations and corporate environmental policies. It should be noted a firm's environmental policies may go beyond existing regulations, to cover the full range of environmental, public health and safety problems which its facilities may be causing.

If an auditing program is to generate direct environmental benefits in this first step, it must improve the likelihood that the compliance assurance program will identify a problem if it exists. The extent to which the firm's compliance assurance program is likely to identify potential problems depends upon a number of factors. One is the number of potential problems that are monitored for. A program that monitors for the wide range of air pollutants, for instance, even though they have not yet been regulated, is more likely to identify potential problems than one that monitors for only the few that are already regulated. A second factor is the depth and breadth of the compliance assurance program. The number of facilities covered by the program, as well as the kinds of activities covered (e.g., OSHA-related health and safety activities, EPA air, water and hazardous waste programs, etc.) will have a significant impact on the kinds and numbers of problems identified. A third factor affecting the likelihood of identifying a problem is the technical competence of the compliance assurance program staff. There are major technical judgments involved in identifying and measuring the seriousness of problems which may exist.

If it is to generate direct environmental benefits in this first step, then, an environmental auditing program must result in an improvement in the range of problems being monitored for, the depth and breadth of the compliance assurance program, and the quality of technical judgments.

The latter should be underscored as a potentially important benefit of an environmental auditing program. If the audit team enhances the firm's ability to make technical judgments on

compliance problems, then a potentially significant advantage of an environmental auditing program is that it can place technical judgments in the hands of individuals who have the most knowledge on which to base them -- i.e., employees of the firm. A regulatory agency usually finds it very difficult to know enough about a firm's operations to know precisely for what, when, and where monitoring should occur. An employee of, or contractor to, the firm should be able to make better judgments on such questions because that person will know more about the firm's particular production process, use of raw materials and other related factors.

Action to Control the Problem. If the compliance assurance program identifies a potential problem, the next question is what is the probability that action will be taken to control it. An environmental auditing program will generate benefits to the extent that it increases either the probability that appropriate action will be taken or increases the speed with which such action is taken. These benefits can be realized both for problems that would have been identified in the absence of an environmental auditing program as well as those that are identified because of such a program.

In this second step, technical questions, such as those associated with problem identification, are much less important than organizational or administrative issues. Is the existence of the potential problem promptly reported to someone who has the authority to take action to control it? Is the firm committed to take diligent action to control the problem? Can action be taken quickly or does it require substantial review and approval?

The environmental auditing program may have its strongest influence, and thus the easiest opportunity for generating environmental benefits, in improving such organizational and administrative responses. These influences can occur both directly and indirectly. The direct influences result from the reporting and response system established for information provided by the audit itself. If these reports are circulated narrowly or submitted only to employees who have insufficient authority to take adequate action to correct identified problems, the auditing program will generate few if any benefits in this step. However, if the establishment and operation of the program results in an improvement in the flow of information, identified problems are more likely to be responded to, resulting in the program generating environmental benefits.

The auditing program's more indirect -- but probably most important influences -- result from the demonstration effect of the audit's reporting system and from the auditing program's oversight responsibilities. The actual audit occurs only occasionally -- perhaps once a year. The largest benefits associated with this second step are likely to occur if the auditing program stimulates an improvement in the ongoing reporting and the speed of the firm's response to any problems that are identified in its ongoing compliance assurance program. These improvements can occur because responsible senior officials who want to avoid being surprised by the audit reports when the audits are undertaken, improve their own reporting and response system outside of the auditing program as a defense against such surprises. The

improvements can also occur if the audits themselves identify improvements that can be made in the firm's normal reporting and response system and the auditing program has the authority to see that the required organizational and administrative changes are made to accomplish the suggested improvements.

The first of these indirect influences -- which we call the demonstration effect -- can also generate net environmental costs if the auditing program is not implemented properly. If, for instance, the audit reports are just filed away and no action taken on them, this will demonstrate to plant managers that the whole environmental compliance assurance and response function is not considered important by the firm's top executives, and the plant managers may reduce their efforts to control environmental problems as a result. It is unlikely that establishing an environmental auditing program would have this perverse effect, but it is possible.

Successful Elimination of the Problem. The third step in generating environmental benefits is the requirement that the action taken in step 2 be successful in eliminating the problem identified in step 1. An environmental auditing program will generate environmental benefits to the extent that it increases the probability that any responses the firm makes to control identified problems will be successful. This step again involves technical questions. Does the pollution control device work? Does the clean up effort actually reduce risk? Did the production cut-back achieve its goal? But there is also at least one administrative question: is anyone checking to make sure the controls are working?

The existence of an environmental auditing program would not be expected to have much effect on the technical adequacy of efforts made to correct the problem unless adoption of the program is accompanied by an increase in the technical expertise of the firm's environmental staff. However, even without improving the firm's technical capabilities, an auditing program can deal with the administrative issue. Through oversight responsibilities it can stimulate managers to collect information about whether the action was successful or not. If so, it could lead to faster response in cases where the initial response was not effective.

Thus environmental auditing has the potential for generating environmental benefits by increasing the probability of success at each of the three steps which must be taken to correct environmental problems. There is no information available which would indicate what the probability of success is in each of these steps without an environmental auditing program, much less how much change such a program would produce in these probabilities. However, it is highly likely that the probabilities are lowest in the first of these steps -- identifying potential problems. If so, this is the step at which there is the greatest potential for improvement and, therefore, environmental benefits. However, as indicated above, it appears that environmental auditing can most easily generate benefits in the second step. We will return to these conclusions later.

Other Benefits. The analysis to this point has deferred discussing several important factors which can significantly

affect the magnitude of the benefits provided by the environmental auditing program. First, it has ignored the fact that some potential environmental problems are more serious than others. Any program which resulted in resources being focused on less serious problems could result in a reduction in environmental benefits (even though this focusing increased the probability that these less serious problems would be identified and that action would be taken to correct them). Conversely, auditing programs that focus greater resources on potentially more serious problems could generate more environmental benefits even though they had a smaller impact on improving the probability of success in any or all of the three steps. To generate the most benefits, the auditing program should be designed and implemented to focus more of the firm's resources on the more serious problems.

The fact that there is a difference in the potential seriousness of environmental problems that a firm may create provides a major potential advantage for environmental auditing over other approaches which place more responsibility for identifying problems on traditional government inspections. It is often not possible for government agencies to predict what the more serious problems may be for any specific facility. However, individuals intimately familiar with the particular materials and processes used in that facility -- knowledge that the government agency could almost never obtain -- should have a much better chance of identifying these problems if they are also knowledgeable about health and environmental effects. Under environmental auditing programs, the people who have the most pertinent knowledge, are the ones responsible for performing the task.

auditing programs, the people who have the most pertinent knowledge, are the ones responsible for performing the task.

Second, the analysis has so far been conducted only with respect to how environmental auditing would generate benefits as implemented in a single firm. The total benefits will depend not only on how it is implemented within each firm, but also how many firms adopt it. Clearly, the more firms adopting programs which generate the types of environmental benefits described above, the greater the total resulting environmental benefits will be.

The number of firms adopting adequate auditing programs is important not only in terms of such direct benefits, but in terms of indirect benefits as well. The more firms that adopt adequate auditing programs, the more regulatory agencies will be able to focus their resources on other, unaudited problem areas. As indicated below, these indirect benefits are a major potential source of environmental benefits that auditing programs can generate.

Finally, the analysis has not recognized the existence of "cross media" problems. Actions taken to avoid potential problems in air pollution, for instance, may only result in those problems being transferred to another media - for instance water or land. Again, an auditing program may be better able to identify and take account of these cross media effects than programs depending more on government inspectors. The government's statutes, regulations, inspections, and enforcement programs -- indeed the whole organization of the government

programs -- are likely to be media specific, and therefore, tend often to overlook cross media effects. An auditing program, staffed by individuals accustomed to looking at the production process as a unit without separating it into the different types of problems that it may create, may be in a better position to predict and respond to such cross media effects. Thus, one of the benefits of an environmental auditing program may be that it is more likely to avoid such problems.

In summary, it is clear that environmental auditing programs can create significant benefits for the environment. Because they place more responsibility at a decision level where the most knowledge exists, good auditing programs should increase the probability that potential problems are identified if they exist, and should increase the probability that action will be taken to correct problems once identified. They may also increase the probability that the actions taken will be adequate to control identified problems.

Effective environmental auditing programs can also focus resources on the most potentially serious problems and may avoid the generation of cross-media problems. In all these ways a well designed environmental auditing program can benefit the environment and public health.

Benefits To Government

Government agencies responsible for controlling risks to the environment or public health can also benefit from the adoption of environmental auditing programs. All such agencies operate

under budget constraints -- sometimes severely so -- which means that they do not have the resources to carry out all the desirable oversight and enforcement activities. The adoption of environmental auditing programs by firms can create substantial benefits for government agencies by increasing the total amount of effective compliance oversight which occurs with a given amount of resources.

These benefits can be realized in either of two ways. First adoption of environmental auditing programs by potential polluters can directly substitute for government funds thereby reducing the agency's budget. In this case the primary benefit would be to the taxpayer. However, the agency would still be operating more efficiently than it was before because, with fewer resources, there would be the same amount of oversight and enforcement taking place.

Alternatively, regulatory agencies could reallocate their limited resources, shifting them away from firms which adopt environmental auditing programs to other firms which have potential health and environmental problems. In this case, agencies' enforcement budgets would not be reduced; instead, agencies would be achieving increased environmental and health protection with the same level of resources. This again would improve the agencies' efficiency, as well as improve the effectiveness with which they control environmental and public health problems. In most cases some combination of these two types of benefits would be realized.

In summary, environmental auditing programs can both directly and indirectly increase the efficiency with which a government agency identifies and corrects environmental problems. They can also result in savings to taxpayers. Of course the other benefits provided by environmental auditing programs -- benefits to the environment and benefits to private firms are also benefits to society and, therefore, relevant to government as well.

Summary

The above discussion has briefly outlined the ways in which benefits to the environment and benefits to the government can result from the adoption of environmental auditing programs by private firms and other polluters. It would appear that these benefits are potentially quite large. The two types of benefits are also strongly interrelated. Taking the benefits to government solely in terms of reduced budgets will limit the benefits to the environment. If the benefits to government are taken primarily in terms of the agency making more effective use of oversight and enforcement resources, the benefits to the environment can be very significant. Thus the magnitude of the benefits to the environment are very much dependent upon the magnitude of the benefits to the government and the form which these benefits take. These interactions are important in determining appropriate policies for achieving such potential benefits as described in the last section of this paper.

The discussion has also indicated that the magnitude (or even existence) of the benefits is very much dependent upon what types of programs the firms adopt, and who is responsible for implementing them. This is the subject of the following section of the analysis.

PRIVATE PROGRAMS AND PUBLIC BENEFITS

The previous section repeatedly emphasized the potential for environmental auditing programs to generate significant benefits -- if they are implemented properly by the firm. Good programs implemented in a proper way can provide very large benefits. Poor programs may provide very small benefits, or, in extreme cases, may even result in a net reduction in environmental and health protection. Thus, the question of how the firm implements the program takes on major importance.

There are four major characteristics of an environmental auditing program which determine the extent to which auditing is likely to generate benefits to the environment. The first of these is how seriously the firm implements the program. The second is the technical quality of the program. The third is what is audited, when and where. And the fourth is how many and what types of firms adopt environmental auditing programs. Each of these characteristics is discussed below.

Commitment. A prerequisite for having a good environmental auditing program is a firm's commitment to make it a good program. A strong commitment is demonstrated in several ways. One is by having a senior officer of the firm responsible for the program.

It should be a person who has the authority to take quick action to solve any problems that are identified, and who can properly interpret the information provided. Another demonstration is given by who receives the information the program produces and the usefulness of this information. If technical reports are only made orally or, if written, are only circulated narrowly, the program is likely to have limited impact on the firm's decision making process. However, if interpretations of the data are submitted quickly to high ranking officers the impact is likely to be much greater. A third demonstration of the firm's commitment is the incentives and backing it provides to the auditors and to other personnel who respond rapidly and effectively to audit reports.

The firm's commitment in turn, depends upon how it perceives the benefits and costs associated with a good environmental auditing program. If the firm's senior officers perceive the program as producing net benefits, then the program will probably be taken seriously. However, if the program is perceived primarily as producing problems -- for instance, more rapid enforcement actions or an increased chance that successful liability suits will be filed -- the firm is unlikely to adopt the program in the first place, or, if it does, implement it in such a way that it is largely ineffective. Ultimately, perhaps, the firm's commitment to the environmental auditing program will depend upon how serious it is about complying with environmental regulations and avoiding potential health and environmental problems.

Technical Quality. The second characteristic of an effective program (at least with respect to the first and third steps described in the previous section of this paper) is its technical quality. Effectively identifying and responding to potential environmental and public health problems requires a high degree of technical skill. Properly auditing the firm's normal problem identification and response programs requires at least as much technical skill as is required for these programs themselves. For instance, auditors must be familiar with proper monitoring and analysis procedures.

A firm that assigns relatively untrained employees to the auditing program when they are not busy with their primary responsibilities, is unlikely to have an effective program. If, on the other hand, a firm creates a staff of highly qualified people dedicated solely to the auditing program, and devotes adequate resources to providing the necessary analytical capability, it is likely to have a more effective program. If adequate expertise cannot be collected in the environmental auditing staff, they should at least have ready access to people who do have the required knowledge, and mechanisms should exist for ensuring that the information they require gets to them expeditiously.

What, When and Where. A good environmental auditing program requires substantial insight into the basic technical functioning of the plant's processes by the staff conducting the program. The auditors also need to have a good knowledge of how health and environmental effects are created, and of industrial chemistry, biology, chemical engineering and industrial processes.

Questions of what, where, and when obviously involve substantial judgment on the part of this staff. If they have the competence to make technical and analytical judgments properly, then, as indicated in the previous section, the auditing program will have substantially greater potential to generate environmental benefits than other approaches which depend more on government inspectors.

But knowing what to do is one thing, and having the motivation to do it correctly is another. Thus, the staff must also have the proper incentives. They must perceive a good program as generating net benefits for them personally. Otherwise, the information that would allow them to implement a successful program can be used just as easily to ensure that the firms are auditing for the wrong problem at the wrong place at the wrong time.

Number and Types of Adopting Firms. The final factor determining the magnitude of benefits generated by environmental auditing programs is how many firms and what types of firms adopt them. Obviously, if very few firms adopt auditing programs, the total benefits will be limited. Similarly, the benefits will be limited if the only firms adopting auditing programs are those unlikely to produce serious environmental impacts or risks to public health. The greatest benefits will be achieved if high quality programs are adopted by firms most likely to create potential problems, either because of their size or the type of operations in which they are involved.

Thus, in order to create the largest amount of benefits to the environment as well as to government, regulatory agencies should consider stimulating widespread adoption of environmental auditing programs by those firms most likely to create potential risks to the environment or public health and ensure that firms that do adopt the programs 1) have a strong commitment to carrying them out properly, 2) provide their staff with the proper incentives to answer the questions of what, when and where in a manner most likely to identify potential problems, and 3) have a high quality of technical expertise involved in the program.

The dilemma facing regulatory agencies is how to achieve these goals most effectively. In many cases there may be an apparent trade off among different goals. For instance, the higher the quality demanded of individual programs, the fewer firms are likely to adopt them. Are we better off having very high quality programs adopted by a smaller number of firms or having a generally lower quality program adopted by a larger number of firms? Is there a way to avoid this dilemma? Can public agencies provide incentives that will stimulate all firms to adopt the highest quality program that is consistent with their resources and needs?

PUBLIC POLICIES AND PRIVATE PROGRAMS

The first link in the chain generating benefits to the environment and government consists of the actions taken by the regulatory agency. This section explores potential responses that government agencies might make to private sector environmen-

tal auditing programs. The goal of any response should be to stimulate the adoption of good environmental auditing programs by as many firms creating potential risks as possible. It may not be possible to stimulate all firms to adopt programs having all the desirable characteristics. But the more closely this goal is achieved, the greater the benefits will be to the environment and to the agency itself.

In addition, the agency can take some actions that may directly generate benefits. For instance, a decision to focus the agency's own monitoring, inspection and enforcement resources on high risk firms that have not adopted high quality environmental auditing programs should result in increased benefits to the environment.

There are four basic policy issues that the regulatory agency faces with respect to environmental auditing programs. The first is the extent to which the government will be involved in these programs, if at all. The second is the extent to which the agency will target its monitoring, inspection, and enforcement resources in a manner complementary to the adoption of environmental auditing programs. The third is whether the agency will establish minimum standards for environmental auditing programs. And the fourth, is who should receive the information provided by environmental auditing programs.

Mode of Government Involvement

The most basic issue relates to the mode of government involvement in the environmental auditing programs. This can run

anywhere from no involvement, to requiring all firms to adopt an auditing program meeting minimum standards. A policy of no involvement would mean that the government would not be involved in any way with the adoption of environmental auditing programs by private firms and would not modify its behavior in response to these programs. This is essentially the situation that existed before the government became interested in environmental auditing. Some firms had adopted environmental auditing programs, but the existence of these programs was often unknown to the regulatory agency, and that agency, even if it knew about the programs, did not formally modify its behavior in response to them.

A second mode of government involvement would be for the agency to encourage private firms to adopt environmental auditing programs without formally offering any incentives for them to do so. Government encouragement could take the form of 1) favorable publicity (conferences, publications, references and speeches); 2) technical assistance (advising firms on how they can establish programs, providing advice and techniques for dealing with specific environmental problems, etc.); or 3) research and analysis on environmental auditing programs, how they operate most effectively, and what benefits they can achieve for firms. Such government support may well stimulate those firms which are likely to adopt environmental auditing programs to do so and to improve the quality of the programs adopted. However, a firm's decision to adopt an environmental auditing program under this mode of government involvement would depend solely on how it perceived the benefits of such a program to it.

A somewhat more aggressive mode of government involvement would be for the agency to provide some direct incentives for firms to adopt environmental auditing programs. Such incentives might include policies 1) reducing inspection and enforcement activities directed at firms adopting such programs; 2) using the agency's enforcement discretion to suspend action against self-reported instances of non-compliance for firms adopting environmental auditing programs (if the firm is demonstrating good faith efforts to correct the problems); 3) giving such firms first priority in applications for discharge permits and other licenses, and permits that the agency must issue; 4) reducing other reporting burdens for the firm; and 5) reducing the amount involved in financial settlements associated with consent decrees or subsequent civil or criminal actions. Individual regulatory agencies may be able to think of other incentives they could offer to stimulate firms to adopt such programs. Under this mode of involvement the firm's decision to adopt an environmental auditing program would still be voluntary, but the benefits to it of such adoption would be increased. Thus, more firms would be expected to adopt auditing programs than if there were more limited government involvement.

The fourth mode of government involvement would be for the regulatory agency to require some or all firms to adopt environmental auditing programs. A decision about which firms would be required to adopt such programs might be based upon their production activity, size, or location.

The agency may also have the option of adopting several modes of involvement simultaneously. For instance, it could require auditing programs by some firms while providing incentives or technical assistance for other firms. Thus, there are a wide range of alternative modes of involvement. The question is which of these modes is most likely to result in the greatest benefits to the environment and to the government agency.

In informal interviews with firms conducted in association with this report, a very strong preference was indicated for very limited government involvement. These interviews only included larger firms that had already adopted environmental auditing programs. They were very concerned about the possibility of regulatory agencies becoming more involved in these programs because they felt 1) the programs were, for the most part, operating very well already, and 2) government involvement could do little to improve them. The second mode of involvement -- providing technical information about such programs -- was usually considered acceptable and possibly even useful, but the only possibly useful incentives that some firms identified were a reduction or elimination of government inspections.

However, this response does not take into account what should be done about the firms that have not adopted environmental auditing programs. If these programs have the potential to generate large environmental benefits (as argued above), then there is presumably a public interest in having them adopted as widely as possible. The question for regulatory agencies thus becomes whether and how can they stimulate more extensive adop-

tion of auditing programs without diminishing the benefits being generated by those programs that are already in place.

Complementary Targeting

Regulatory agencies are unlikely ever to have sufficient enforcement resources to ensure that all regulated firms are in compliance all the time. These agencies, therefore, have to allocate or "target" their monitoring, inspection, and enforcement resources in some manner. The policy question is whether this targeting scheme should be modified to take into account the existence of environmental auditing programs. There are several different ways in which these modifications may take place, and the type of modification will partially determine the magnitude of the benefits resulting from the adoption of environmental auditing programs.

If the environmental auditing programs adopted by private firms are at least as good as the monitoring and enforcement efforts that the regulatory agency is able to implement, the greatest increase in environmental benefits would result from the agency shifting its inspection and enforcement resources away from firms that have adopted auditing programs. With this approach, there should, at the least, be no reduction in environmental benefits from the firms adopting the programs and an increase in benefits from non-auditing firms that would have more of the government's resources focused on them.

However, alternative forms of complementary targeting are possible. One alternative would have the regulatory agency

analyze the results of environmental auditing programs (assuming that they were to receive selected data generated by these programs) to determine whether there is an identifiable group of firms -- for instance, firms in a particular industry, of a particular size, using a particular process, or of a particular age -- that seem to have a higher rate of non-compliance than others. The regulatory agency could then focus its enforcement resources on those particular types of firms that have the highest probability of non-compliance or are most likely to create serious health or environmental risks. In this form of targeting, the high risk firms might all be treated equally regardless of whether or not they have environmental auditing programs. Or enforcement resources might be focused on those firms in the high risk category that have not adopted environmental auditing programs.

One form of targeting that would appear to produce very limited environmental benefits (and perhaps even net environmental costs) would be to focus the agency's inspection and enforcement resources on those firms that have adopted environmental auditing programs. An agency might adopt such a targeting scheme to ensure that those firms are not cheating in their programs, because those firms are producing more data that can be used to determine whether they are in compliance, or under the assumption that the firms would not adopt an environmental auditing program unless they have problems. Although one can hypothesize cases in which such targeting could generate benefits, this is unlikely to occur under normal circumstances.

Complementary targeting is probably the easiest of the four policy decisions to implement. The agency has almost complete discretion on how it uses its inspection and enforcement resources as long as the scheme is objective. Moreover, complementary targeting is also the means by which the agency can most directly generate benefits.

There is, of course, some risk in complementary targeting. If the agency employed an efficient targeting scheme before the adoption of the programs, and if the programs do not achieve at least the same probability of success at all three steps of the problem identification-response process as existed prior to their adoption, then targeting inspection and enforcement resources away from the adopting firms could result in increased costs to the environment. Such a situation may be unlikely, but it indicates that net benefits resulting from complementary targeting will, of course, depend upon the quality of the environmental auditing programs firms adopt as well as on the type of targeting the agency adopts.

The firms contacted in association with this study strongly preferred the targeting scheme that shifted inspection and enforcement resources away from those firms adopting environmental auditing schemes. This is not surprising because all of the firms interviewed have already adopted auditing schemes. The respondents also suggested that any targeting scheme that shifted more attention to firms adopting auditing programs would be counter productive. At best, such targeting would generate no environmental benefits. At worst, it could generate significant

environmental costs by discouraging firms from adopting auditing programs at all. Even if firms did not abolish their programs altogether with such a targeting scheme they would probably limit them to only the specific requirements of their discharge permits, eliminating one of the major opportunities for such auditing programs to generate significant environmental benefits.

However, the firms and the regulatory agencies face a dilemma with respect to complementary targeting. In order for the regulatory agency to be certain that the preferred form of complementary targeting will produce net environmental benefits, it must be assured that the adopted auditing programs are at least as likely to identify and successfully respond to environmental problems as would be the case in the absence of the programs. This could imply that the government agency would need to know something about the quality of the programs. But the firms prefer that the agency not get involved at all. The question is whether there is some way of responding to this dilemma which will satisfy both the needs of the government and the desires of the firms, and which will not result in a reduction in the number of programs adopted or their quality.

Minimum Standards

The third policy variable involves the question of whether the federal government would attempt to impose any minimum standards for acceptable environmental auditing programs. There are three basic types of standards that the agency could impose. One relates to the technical aspects of the program. The second

relates to the qualifications of the individuals who are responsible for the program. The third relates to the procedures and processes followed in carrying out the program.

Minimum technical standards would relate primarily to the methods used in the firm's compliance assurance program, not to the auditing program per se. They might also relate to the questions of when, where and what auditing will be done. Regulatory agencies frequently issue rules or guidelines defining the technical aspects of monitoring and analytical programs. They may also, though often with less effectiveness, issue rules or guidelines specifying how, what, where and when monitoring and oversight should occur.

The second type of minimum standard relates to the question of who does both the compliance assurance and the auditing. This type of standard could take the form of minimum qualifications for the responsible individuals. For instance, most states require any construction drawings to be approved by a licensed engineer or architect. Such a professional, in order to be licensed, has to satisfy minimal education requirements as well as pass a qualifying examination. A regulatory agency or outside organization could license environmental auditors in a similar manner. In the previous section it was indicated that, in order to generate the greatest amount of benefits, the environmental auditing staff would have to have a substantial diversity of technical background and access to large amounts of information. It was also suggested that many firms may not be able to afford to allocate so much expertise to such a program. However, any

gaps could be filled by consultants and other personnel assigned to the program on a part time basis. Thus, the qualifications would not necessarily apply exclusively to the individuals in the program, but would include the expertise available to the program as well.

not employed by the firm conduct, or alternatively, certify the results of the auditing program. This is the concept of the "third party" auditor, and could be adopted either in association with or independently of the minimum qualifications requirement. The approach of a third party auditor is used in financial auditing to protect the interests of those who depend upon the audit to know the true financial condition of a firm. If the third party is not required to actually carry out the monitoring program, it could be required to at least certify that the auditing was conducted properly and that the resulting data have been interpreted and presented accurately. The third party auditor could also be required to interpret the information, for instance, to specify whether the firm is or is not in compliance with the conditions of its permit.

A third type of minimum standard relates to the procedures and processes followed in carrying out the auditing program. These might be requirements regarding to whom the auditors report, who has to see and sign off on the audit report, whether the report has to be formally responded to, and other such process issues. Such process requirements are often adopted in regulations to ensure that responsible officials are informed of and accept responsibility for specified activities or assertions

that the firm is making. They are most often adopted when it is not feasible to specify minimum technical standards, when the issue is a matter of judgment rather than fact, as an effort to reinforce other standards, to ensure that any problems are dealt with quickly, or just to ensure that the issue is not shunted into meaningless information collection and reporting processes outside the firm's decision making hierarchy.

In general, the concept of setting minimum standards would only apply in the more active modes of government involvement -- that is, when the regulatory agency requires that auditing programs be adopted or provides incentives for the adoption of such programs. The problem of establishing minimum standards is that they often discourage firms from doing better than the minimum. The minimum may become the maximum standard. Such standards must be implemented very sensitively to ensure that all firms are at least as good as the minimum but do not discourage firms from attempting to do better than the minimum.

The firms interviewed in association with this study indicated some acceptance of the idea of the regulatory agency imposing minimum standards. They indicated that they almost always adopt technical standards issued by such agencies. They also indicated a requirement that a senior executive of the firm be required to sign off on audit reports would probably be acceptable. However, they were more resistant to personnel standards and more detailed process standards. Most of the personnel involved in both the monitoring and auditing programs have not had any special training, rather being trained "on the

job". The respondents indicated that this type of training was, in their judgment, certainly adequate and perhaps preferable to formal training.

The respondents also indicated that detailed process requirements would be quite inappropriate because there is no one organization that will work best for every firm because the firms themselves are organized differently. However, at least one of the respondents did indicate that his firm's current program was quite informal and might benefit from being more formally organized. •

The message from these responses could be that the government should impose no requirements on how the programs are organized, but could impose requirements that: 1) there be some formal organization, and 2) that an executive of the firm be part of this organization and be required to sign off on the audit reports. These standards might provide the compromise solution to the question raised at the conclusion of the section on complementary targeting.

Information Provided

The last policy variable a government agency can affect is the question of whether, what and when information collected in the environmental auditing process will be reported to the regulatory agency or be made available to the public.

The first question is whether the firm should release any of the information collected. If so, what information? The general choices here are (1) all data collected will be reported, (2) no

data collected will be reported, (3) summaries or interpretations of data collected will be provided, (4) only information on processes and activities will be reported, or (5) only instances of noncompliance and correction schedules will be reported.

It may be more efficient to reduce the reporting burden and to improve the government's ability to use data, by requiring only summary reports. Perhaps it would be even more efficient to require that interpretations of the data rather than the data themselves or even summaries of the data be provided. When dealing with such "factual" questions as whether or not a firm is in compliance with its permit, such interpretative information can be as terse and simple as a "yes" or "no". However, the greater the amount of interpretation that takes place in preparing the report and the terser the report, the more difficult it will be for the government agency to verify its accuracy.

The second policy question on information reporting is when should the information be reported. The normal requirement is that it be reported periodically -- from once a week to once a year. The agency here is faced with a trade-off between infrequent reporting resulting in any problems not being identified early, and not having the resources to be able to interpret and benefit from reports that are made too frequently. Thus the agency will often compromise by reducing the frequency of reports to a level where the information can be adequately assimilated, realizing that there may be a delay in identifying non-compliance problems.

An alternative is the "fire alarm" -- only requiring reports when a problem has been identified or some other criterion has been met. For instance, the requirement could be that there would only be reports to the regulatory agency when a situation of non-compliance has been discovered. However, this requires the agency to somehow be assured that the absence of reports does not reflect a failure to collect the information or a failure to report cases of non-compliance that have been discovered. It could be very difficult for the agency to obtain the assurance without reviewing all of the data itself.

There are other policies a regulatory agency can adopt with respect to information reporting. It could, for instance, only require that records of the information be retained by the firm, available for inspection by the agency, and not that the information be reported to anyone. Or, it could require that only certain firms provide information, for instance, those firms that are most likely to create environmental or public health problems or those firms best able to afford a reporting burden, or selected firms that are for some reason considered representative.

The adoption of any of these policies is likely to have a significant impact on the type of auditing program that private firms adopt. Some reporting requirements could clearly stimulate the firm to reduce the quality of the environmental auditing program. For instance, a requirement that all information gathered be reported to newspapers or environmental groups would seriously inhibit such programs.

The firms that were interviewed for this study indicated substantial sensitivity about the release of auditing information outside the firm. This concern seemed to apply both to the costs of any such reporting and to what would be done with the information if it were reported. There was less concern about the problem of summarizing and interpreting the data, for this already takes place when the audit reports are submitted to senior firm officials. (This, of course, would not necessarily be the case for smaller firms.) It is probably fair to summarize the responses as saying that the less information provided to the regulatory agency the better, and the most desirable type of report would be none. In some cases the respondent actually indicated that continued government inspections would be preferable to requiring that audit reports be submitted to government.

However, the government agency probably requires some form of reporting if there is to be any complementary targeting or incentives offered to induce the adoption of environmental auditing programs. It appears reasonable that any reporting requirements be limited to items specified by regulation and contained in discharge permits. It also seems to be in both the government's and the firm's interests to keep these reports short and infrequent -- an annual statement that the firm is in full compliance might be the most desirable for both, if the government could be assured that these were accurate and based upon adequate information. The annual report could be supplemented by a fire alarm report if discharges exceed permit requirements by perhaps more than fifty percent.

However, there is still the problem of how the government obtains the assurances it needs. Two possible solutions are 1) the type of third party audit that is required for financial reports, and 2) the regulatory agency periodically auditing the auditors.

SUMMARY AND CONCLUSIONS

Environmental programs have the potential to create substantial benefits for the environment and for regulatory agencies. The extent to which such benefits are actually realized depends primarily upon the types of programs adopted by private firms, and what actions the agency itself takes in response to the existence of these programs. The types of programs the firms adopt are in turn likely to be strongly influenced by government policy decisions. There is a limited number of policy choices that regulatory agencies can make to stimulate the adoption of good programs by private firms. These policy choices have to be made very carefully, for the wrong choice could not only eliminate many of the benefits, but in some cases could result in the situation being worse than if the government had adopted no policy at all.

The first policy relates to the mode of government involvement. Even with no government involvement, some firms have adopted environmental auditing programs and these may be generating important environmental benefits. However, there are no benefits to government, and the benefits to the environment are clearly limited by the number of firms adopting adequate

programs. It is likely that government encouragement of auditing programs would result in more firms adopting them and, therefore, an increase in the total environmental benefits they provide. However, the regulatory agency needs to be very cautious about increasing the amount of involvement beyond simple encouragement.

Offering incentives for the adoption of auditing programs should further increase the number of firms adopting them as long as the incentives are not coupled with onerous regulatory and reporting requirements. Such requirements may well create larger disincentives than any incentives that the agency could offer. On the other hand, without such standards, some incentives (such as eliminating government inspections) could result in programs being established which result in less compliance than would occur in the absence of the programs.

The government could, of course, go the whole route and require all firms to adopt such programs. However, there may well be a trade off between the number of firms adopting the programs and the quality of the programs that are adopted. Mandatory auditing may result in many firms just going through the motions and others reducing the quality of their programs down to the minimum standards of the government. The extent to which this happens is likely to depend on what policy choices the regulatory agency makes with respect to the other policy options it has.

Perhaps the most important of these are 1) the policy on minimum standards and 2) the information policy. If the auditing program is going to be an integral part of the regulatory

program, as would be the case under mandatory auditing, or if the regulatory agency is to provide real incentives for the adoption of such programs, then it must establish some sort of minimum standards for these programs. The challenge is to establish standards which are not inhibiting. Technical standards can be inhibiting if they are placed too high and if the adoption of the program is voluntary. However, they have to be high enough to ensure that the program has at least as likely a chance to identify potential problems as the agency would have had in the absence of the program. Otherwise, the agency cannot target its enforcement resources in a complementary manner, thereby realizing the benefits of the environmental auditing program. Technical standards may also create problems if they are not appropriate in all cases. Frequently the best technical means of monitoring an analysis is one tailored to a specific situation being addressed. A regulatory agency is often not adequately equipped to specify such tailored technical standards.

Similarly, minimum personnel qualification standards are likely to be inhibiting if they significantly increase the firm's operating costs. The requirement of the third party auditor may also be inhibiting in some cases, particularly where the firm is concerned about the confidentiality of proprietary information. Some sort of personnel qualifications may be reasonable, but the question of whether third party auditing is appropriate is a very difficult question. Adopting the third party concept should increase the confidence of the regulatory agency that the program

is being conducted adequately, but may also create costs by discouraging firms from adopting programs. It also raises additional questions about the qualifications and competence of third party auditors.

Perhaps a policy option which has the greatest possibility for inhibiting the adoption of such programs, however, is that regarding information. The more the firm has to make public the information provided by the program, the more hesitant the firm will be to adopt such a program. On the other hand, the regulatory agency needs to have some access to the information to be sure that the program is being implemented properly and that the firm is in compliance with its environmental requirements. Perhaps the most reasonable compromise in this case is for the regulatory agency to require periodic summary reports on whether the firm is or is not in compliance with applicable requirements. Any information gathered pertaining to pollutants not covered by these requirements would not be reported to the government. Such a policy would allow the firm to monitor all potential problems without the fear that discovering new problems would result in increased enforcement efforts directed at the company.

Finally, the government agency must determine how it should target its enforcement resources in response to the adoption of environmental auditing programs. Two forms of targeting would seem to produce the greatest benefits. One is, of course, to target enforcement resources away from firms that have implemented acceptable programs. Again, to be confident that this targeting will produce benefits the public agency must be con-

fidient that the firm's auditing program is at least as good as the inspection and enforcement that would be conducted by the public agency in the absence of the program. Given the resource levels available to most regulatory agencies, this is a relatively low threshold.

The regulatory agency could also explore ways of using the information provided by environmental auditing programs to target its own inspection and enforcement resources more efficiently. Again, however, it is necessary that this information be collected in such a way as to not inhibit the firms from implementing their own programs.

Finally, the extent to which all these policies will increase the benefits of environmental auditing programs will depend on how much the regulatory agency knows about the problems it is trying to deal with. If the agency is confident that it in fact knows the answers to all the questions involved in establishing an environmental auditing program -- what firms should audit, where they should audit, when they should audit, what equipment and analytical methods they should use and how the information should be interpreted -- then a more aggressive government involvement will produce greater benefits. However, regulatory agencies rarely have such extensive and precise knowledge. In this case the agency may well create greater benefits by backing off and stimulating the firm, which probably has the best ideas about what potential problems it is causing, to adopt the best program it can afford.

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