Developing Methods for Studying Costs and Benefits of Federal Environmental Regulations for Small Community Governments

Anthony G. Bower, Lisa Meredith, Steven Garber, Sandy Geschwind, Naihua Duan

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EXECUTIVE SUMMARY

POLICY CONTEXT

A number of studies have suggested that the costs of environmental regulations, particularly the costs to small community governments (SCGs), can be quite daunting. Much of the policy debate on this issue occurs in the context of discussions about “unfunded mandates”—activities that federal and state governments require of community governments without the direct provision of the financial resources to implement them.

Per capita environmental costs can be much higher for SCGs than for governments of larger communities. A fundamental reason is that many activities involved in providing environmental services are subject to economies of scale. This means, for example, that a particular service can be provided to twice as many households or businesses with costs increasing but not nearly doubling. According to one report, per household costs for compliance with drinking water testing and treatment regulations in a community of 50 people are 87 times greater than those for a community of 750,000 people. In an era of declining grant funding, relatively high per capita costs for SCGs are believed to pose particular difficulties for many such communities.

Proponents of regulatory or financing reform have argued that the regulatory costs for some SCGs may simply exceed their ability to pay, and that in such cases the communities will not undertake certain required activities, thus undermining environmental protection. Another concern is that the costs of some regulations may exceed the perceived benefits in many small communities and that the communities will choose not to comply with the regulations and to allocate available funding to other public services. Some observers suggest that regulatory efficacy might be improved by targeting subsidies to certain communities or by allowing regulations to be more readily tailored to differing circumstances in different locations.

Currently, there is little quantitative information available to assess the validity of these concerns and identify reforms that might reduce costs without undue sacrifices in environmental protection. The purpose of this study was to take a first step in meeting this need.
STUDY OBJECTIVES AND DEFINITIONS

The study had two objectives:

- First, to assess the feasibility of collecting interpretable, quantitative information on costs and benefits of federal environmental regulations in communities with populations up to 50,000.
- Second, to develop methods for collecting such data, if our research showed that the effort is feasible.

Before attempting to assess the feasibility of objectively measuring costs of environmental regulations, we needed to define key concepts. First, we wanted to measure costs caused directly by federal environmental regulations (i.e., incremental costs), not the total costs of an activity. For example, the federal government regulates the treatment and disposal of wastewater, and responses to the regulations may increase the costs to a community of providing these services. However, the entire cost of wastewater treatment and disposal is almost surely not due to environmental regulation — in the absence of regulations, the community would still invest in some wastewater facilities.

Unfortunately, there is no direct way to measure incremental environmental costs; they must be inferred. A certain degree of precision can be obtained, however. Rather than attempting to collect incremental cost estimates directly from community respondents, whose responses might be biased or unreliable, it is more useful to collect cost information disaggregated by activities that SCGs undertake in providing services. Efforts would best focus on the three areas that reflect the majority of regulatory costs for SCGs: drinking water, wastewater, and solid waste management.* Given this information, estimates of incremental costs can be derived from cost reports for those activities that appear truly incremental.

It is also crucial to define what we mean by benefits. As with costs, we are interested in incremental benefits — those benefits that flow from activities that are undertaken in response to federal environmental regulations and thus actually result from those regulations. Another important distinction is the difference between actual and perceived benefits. Actual benefits are of interest because they are the principal motivation for environmental activities. Perceived benefits are of

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* In the case of drinking water, for example, activities would include: taking samples; testing; disinfecting; record keeping and reporting; public notification; operator training; wellhead protection; applying for waivers; and upgrading or replacing plant and equipment.
interest because people act on the basis of their perceptions. Measures of perceived benefits are important because they can help us better understand what activities SCGs would engage in even in the absence of regulation, as well as the degree to which perceived benefits lead to compliance with regulations. For example, most of the respondents in the focus groups we conducted for this study perceived that it was important to test drinking water for coliform and giardia but placed a much lower priority on testing for radon, copper, and lead.

Comparisons of actual and perceived benefits are also important because if such comparisons identify major disparities between environmental risks as perceived by community decision makers and what is suggested by the best scientific evidence, improving the communication of risks would be worthwhile.

RESEARCH APPROACH

Our study consisted of five primary tasks.

_Gather Background Information._ We reviewed literature from a variety of sources. Academic literature provided perspective on the psychology of risk perception, exposure assessment, and the budgeting choices of local governments. Industry association and city literature offered case studies of environmental costs. Government documents yielded a range of information on environmental laws and their relative success in implementation. We also reviewed a comprehensive case study of the effects of unfunded mandates on four SCGs in Idaho, interviewed EPA staff, and monitored relevant developments in Congress.

_Assess Data Availability._ We examined financial reports from communities in five states to their state governments to determine whether state governments might be able to provide the kind of cost data needed for the purposes of our project. We found that cost data reported to state governments typically combined costs of several activities, some of which are and some of which are not incremental in the sense defined above. Cost data available from state governments are, then, too aggregated to be useful for our purposes. Likewise, census data (Census of Population, Census of Governments) would not support the needed analysis, though Census data would be useful in selecting sample communities and in future analyses linking census and survey data. In the case of benefits, we explored the possibility of using an exposure assessment approach to link environmental monitoring data to community health data. Specifically, we examined the feasibility of retrieving drinking water quality data for individual SCGs from
federal agencies and agencies in two states (California and Kansas). We found that
the requisite information is not centrally located and in many cases is not even
computerized. As a result, we discontinued our efforts along these lines.

**Develop Instruments for Data Collection.** Because of the results of the
preceding task, which demonstrated that data on incremental costs and benefits are
not readily available, we developed pilot questions to collect the pertinent data
directly from SCGs and designed different formats in which to present questions to
community officials. We held three rounds of meetings to further our
understanding of the issues involved. The first meeting was with officials from
about twenty smaller communities in Kansas, all with populations of approximately
3,000 to 15,000. The meeting’s purpose was to identify activities involving major
incremental environmental costs, gauge the willingness of officials to cooperate with
a data collection effort, and clarify availability of information in existing community
accounting records. Second, we met with officials in Washington’s Department of
Ecology and Department of Health responsible for programs in drinking water,
wastewater, and solid waste management. We discussed environmental regulations
and challenges in the state, the waiver process through which communities could
petition for relief from certain regulations, and reactions of state officials to
concerns of SCG officials. Finally, we interviewed an official of the Association of
Washington Cities, discussing community attitudes toward EPA regulations and
other environmental issues.

**Develop Theoretical Framework and Estimation Strategy.** We devised a
preliminary theoretical framework for analyzing SCG issues before the project
started and presented it in our proposal to EPA. Based on the results of the
preceding tasks, the economists, statistician, and survey researchers on the project
modified and extended the theoretical framework. We used this framework to
formulate a strategy for estimating incremental costs and benefits among SCGs.
The major considerations in formulation were availability and reliability of data,
cost of data collection, and potential policy impact. The econometric strategy
involves assessment of determinants of degrees of regulatory compliance—which we
assume cannot be measured directly—and estimation of relationships between
expenditures on incremental activities and demographic variables (such as
community per capita income and population). The benefits assessment strategy is
focused on perceived benefits, and addresses community priorities among
environmental activities and other activities, attitudes about benefits, perception and evaluation of environmental risks, and behavioral intentions.

**Pilot Test Instruments.** We discussed pilot questionnaires in a four-hour meeting with the Directors of Public Works in two small California communities that operate their own drinking water and wastewater systems. Based on these discussions and guided by our theoretical framework, we revised the questionnaires and then conducted four focus groups consisting of 22 mayors and city administrators from SCGs in Washington State. Each focus group session lasted two to three hours and included a general discussion of the issues as well as the participants completing the cost and benefit questionnaires. Our objective was to learn whether the questions we developed made sense, whether respondents could answer them with ease and accuracy, and whether the participants could suggest better ways to ask them.

**CONCLUSIONS AND RECOMMENDATIONS**

Regarding the first study objective (feasibility assessment), we have concluded based on our findings that it is feasible to collect interpretable, quantitative cost and perceived benefit information pertaining to federal environmental regulations in small communities. We have learned from our focus group participants that the activity-specific cost data can be obtained either retrospectively from historical information kept on file for several years, or prospectively with survey participants recording expenditures as they are incurred in a project-specific format. For benefits data, we concluded that it is not feasible (given realistic projections of future project budgets) to estimate actual benefits using an exposure assessment approach, nor is it feasible to elicit perceived benefits from community residents. However, we were successful in eliciting perceived benefits from community officials, such as mayors, council members, directors of public works, and facilities operators, who participated in our focus groups. Since their perceptions are likely to play a crucial role in how SCGs respond to environmental regulations, we believe it is worthwhile to collect such information.

For the second study objective (methods development), we have developed methods, recommendations, and pilot survey instruments for carrying out such an effort. The pilot survey instruments (one for drinking water, one for wastewater) have been attached as Appendices D and E. Earlier versions of those instruments
have been tested on a preliminary basis in our Washington State focus groups. Our recommendations on the methods for data collection are as follows.

Methods for Collecting Cost Data
- Collect cost data for drinking water, wastewater, and solid waste management.
- Use an activity-based data collection scheme, rather than a department-based scheme or subjective individual judgments.
- Administer the pilot mail survey to mayors and city administrators in SCGs, with a follow-up telephone interview in cases where clarification is needed.
- Based on the results of the pilot survey, revise and administer a full-scale, national mail survey with telephone follow-up.

Methods for Collecting Benefits Data
- Administer—jointly with the cost survey—a pilot mail survey that is now ready for further field testing.
- Use the perceived benefits data and other secondary data sources, such as the Census of Governments, to better understand environmental compliance of SCGs.

Information from full-scale, national surveys and data from secondary sources would enable investigators to:
- Estimate incremental costs and perceived benefits of various federal environmental regulations
- Compare costs with perceived benefits for selected regulations or activities
- Analyze issues related to compliance
- Identify combinations of community characteristics signaling the most need for financial assistance or additional flexibility
1. INTRODUCTION

Some public services that can affect environmental quality are provided by community governments\textsuperscript{1} and are subject to federal environmental regulations.\textsuperscript{2} Financial burdens on community governments due to environmental regulations have received a lot of attention in the policy arena in the past few years. Concerns about costs to governments of small communities (SCGs) are particularly widespread. In response, U.S. EPA and RAND entered into a cooperative agreement to develop methods to estimate the costs and benefits of environmental regulations for small communities.

This study has two objectives:

- First, to assess the feasibility of collecting interpretable, quantitative information on costs and benefits of federal environmental regulations in communities with populations of up to 50,000.

- Second, to develop methods for collecting such data, if our research showed that doing so is feasible.

This report describes our research activities and conclusions related to these objectives.

UNFUNDED MANDATES

Much of the recent public discussion of governmental costs of environmental regulations has taken place within the context of what has been known as the "unfunded mandates" issue. This term is commonly used--primarily by proponents of reform--to refer to activities that federal and state governments require of lower-level governments without the direct provision of the financial resources to implement them.\textsuperscript{3} A central concern is that the cumulative effect of such requirements--environmental and non-environmental--might exceed the fiscal capacity of some SCGs.

\textsuperscript{1}Generally speaking, "community governments" can include all municipal, township, county and special-purpose governments. The focus of our study is general purpose governments serving populations of up to 50,000. Some of the methods developed in this study might be applicable to general purpose governments serving somewhat larger populations, as well as some special purpose governments.

\textsuperscript{2}Among the most important of these services are provision of drinking water, treatment and discharge of wastewater, and collection and disposal of solid waste.

\textsuperscript{3}"Mandates are generally defined as any constitutional, statutory, or regulatory provision that imposes requirements on local governments for which they must bear the costs." (GAO 1994)
Several studies by concerned organizations have highlighted the unfunded mandates issue. These include:

- “Impact of Unfunded Federal Mandates on U.S. Cities: A 314-City Survey,” (U.S. Conference of Mayors and Price Waterhouse, October 26, 1993), a survey of cities with populations over 30,000;

- “The State of America’s Cities: The Tenth Annual Survey of Municipal Elected Officials,” (National League of Cities, January 1994), a survey of communities with populations over 10,000; and

- “Mandate Costs: A Kansas Case Study,” (Kansas Association of Counties, May 1993), a survey of 22 of the 105 counties in Kansas, 17 of which had population less than 50,000.

The report of the U.S. Conference of Mayors and Price Waterhouse focused on federal mandates, while the views concerning unfunded mandates surveyed by the National League of Cities pertain to federal and state mandates jointly. Of twelve mandates singled out in the Kansas study, ten resulted from action of the state government.

In addition, some relatively large local governments have undertaken their own analyses of the costs of environmental regulations:

- “Environmental Legislation: The Increasing Costs of Regulatory Compliance to the City of Columbus,” Report of the Environmental Law Review Committee to the Mayor and the City Council of the City of Columbus, May 13, 1991, which considered federal and state environmental mandates; and


Those studies and others sponsored by state and local governments generally criticize higher-level governments for imposing mandates upon lower-level governments without provisions of funds. In contrast, the Natural Resources Defense Council offers a different perspective in suggesting that “many state and local officials...have ignored the offsetting impact of significant unmandated federal funds--federal funding for state and local programs without accompanying mandates.” (“Unfunded Mandates or Unmandated Funds??” Natural Resources Defense Council, 1994)
ENVIRONMENTAL MANDATES AND SMALL COMMUNITIES

Environmental regulations figure prominently in studies and public debates of unfunded mandates. For example, of the ten federal mandates selected for study by the U.S. Conference of Mayors and Price Waterhouse, eight are environmental in nature. The prominence of environmental mandates reflects several factors: substantial costs to community governments, new regulations that will increase costs in the future,\(^4\) reductions in federal financial aid for some of the activities required by environmental regulations, and Congressional deliberation in 1994 to reauthorize the Safe Drinking Water Act and the Clean Water Act.\(^5\)

Per capita environmental costs can be much higher for SCGs than for governments of larger communities. A fundamental reason is that many activities involved in providing environmental services are subject to economies of scale. This means that the total cost of providing a service to the entire population of a community increases less than proportionately with increases in the size of the population. According to the Chafee-Lautenberg report (Exhibit 4.3), for example, per household costs for compliance with testing and treatment requirements for drinking water are 87 times as large for a community of 50 as for a community of 750,000 ($131 per household versus $1.50). In addition, grants to construct infrastructure have declined in recent years, and this is believed to pose particular difficulties for small communities with relatively high per capita costs.

ARGUMENTS FOR REFORM

Those advocating reform—of regulations, funding arrangements, or both—often focus on the sheer magnitude of costs. Three types of claims are central to arguments for reform and policy deliberations.

First, it is claimed that the costs of all environmental regulations taken together are unaffordable for some small community governments. If a community truly cannot afford to comply with some environmental regulations, then some required activities will not be undertaken and environmental protection will be undermined. This possibility motivates consideration of subsidies targeted to

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\(^4\)For drinking water systems, see “Technical and Economic Capacity of States and Public Water Systems to Implement Drinking Water Regulations,” Report to Congress, Environmental Protection Agency, 810-R-93-001, September, 1993, p. 42. (This report is often called the Chafee-Lautenberg report, after two U.S. Senators. We refer to it this way below.)

communities for which ability to pay is particularly doubtful (because of high costs per capita, fiscal difficulties, or both).

Second, the costs of some regulations are claimed to exceed the benefits in some communities. Communities that believe that some activities required by regulations are not worth their costs may choose not to comply with them even if they could afford to do so. When communities choose not to comply, environmental protection can suffer. If communities comply, resources devoted to these activities may not be put to their highest-value use.

Third, some advocates maintain that regulatory efficacy might be improved by allowing regulations to be tailored according to differing circumstances in differing locations. Many regulations are claimed to be “inflexible” and require the same activities or performance standards of all communities or of broad groupings of them. This is often referred to as a “one size fits all” approach. (See Appendix B for discussion of perceptions of focus-group participants concerning this and other issues.) Since costs and benefits vary across communities there is a potential for improvement from more flexible approaches. While federal rules provide some scope for exemptions, our investigations indicate that the prevalence of such exemptions is rather limited.

NEED FOR QUANTITATIVE INFORMATION

Currently, there is very little reliable, quantitative information available to assess the validity of various claims and identify reforms that might reduce costs without undue sacrifices in environmental protection. Thus, our research efforts have been focused on developing information on the costs and benefits of federal environmental regulations on SCGs. Without much more information than is currently available, policy makers will not have reliable answers to questions such as:

- How much do SCGs pay to comply with federal environmental regulations?
- For how many SCGs can full compliance⁶ be accurately described as "unaffordable"? How might such communities be identified?
- What regulations seem to be inefficient, i.e., involve relatively high costs and low benefits?
- How much improvement might be gained by adopting more flexible approaches to regulation?

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⁶We use the term “full compliance” to indicate explicitly complete compliance with all environmental regulations.
Our study begins to remedy the lack of information relevant to such questions.

RESEARCH APPROACH

In order to address the two study objectives—assessing feasibility and developing methods of data collection—we undertook several research tasks.

Define Objectives. Before attempting to assess the feasibility of reliably estimating costs of environmental regulations, we needed to define key concepts. First, we wanted to measure costs caused directly by federal environmental regulations—i.e., incremental costs—not the costs of activities required by federal regulations. For example, the federal government regulates the treatment and disposal of wastewater, and responses to the regulations may increase the costs of providing these services. However, the entire cost of wastewater treatment and disposal is not due to environmental regulation—in the absence of regulation, communities would still invest in some wastewater facilities.

There is no way to measure incremental environmental costs directly; they must be inferred. Reasonable precision can be obtained. Rather than attempting to collect incremental cost estimates directly from community respondents, whose responses might be biased or unreliable, we think it is most promising to collect cost information disaggregated by activities that SCGs undertake in providing services. We also concluded that efforts should be limited to three areas that account for the majority of regulatory costs for SCGs: drinking water, wastewater, and solid waste management. Given this information, estimates of incremental costs can be derived from cost reports for those activities that appear truly incremental.

It is also crucial to define what we mean by benefits. As with costs, we are interested in incremental benefits—those benefits that flow from activities that are undertaken in response to federal environmental regulations and thus actually result from those regulations. Another important distinction is the difference between actual and perceived benefits. Actual benefits are of interest because they are the principal motivation for environmental activities. Perceived benefits are of interest because people act on the basis of their perceptions.

Measures of perceived benefit can help us better understand what activities SCGs would engage in even in the absence of regulation. These activities cannot be

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7In the case of drinking water, for example, activities would include: taking samples; testing; disinfecting; record keeping and reporting; public notification; operator training; wellhead protection; applying for waivers; and upgrading or replacing plant and equipment.
observed, but any claim or inference about incremental costs of regulations must implicitly or explicitly invoke a position on this question. Measures of perceived benefit can also aid understanding of determinants of compliance with regulations. For example, most of the respondents in the focus groups we conducted for this study perceived that it was important to test drinking water for coliform and giardia but placed a much lower priority on testing for radon, copper, and lead. This suggests that the costs of testing for radon, copper, and lead are much more likely to be incremental than the costs of testing for coliform and giardia and that compliance with testing requirements for radon, copper, and lead may be considerable lower than with testing requirements for coliform and giardia.

Comparison of actual and perceived benefits could also be revealing. For example, if such comparisons find major disparities between environmental risks as perceived by community decision makers and what is suggested by the best scientific evidence, improving the communication of risks to community decision makers could improve compliance.

**Gather Background Information.** We reviewed literature from a variety of sources. Academic literature provided perspectives on the psychology of risk perception, exposure assessment, and the budgeting choices of local governments. Industry association and city literature offered case studies of environmental costs. Government documents yielded a range of information on environmental laws and their relative success in implementation. We also reviewed a comprehensive case study of the effects of unfunded mandates on four SCGs in Idaho, interviewed EPA staff, and monitored developments in Congress.

**Assess Data Availability.** We examined financial reports from communities in five states—Michigan, Montana, Oregon, Pennsylvania, and Washington—to their state governments to determine whether state governments might be able to provide the kind of cost data needed for the purposes of our project. We found that cost data reported to state governments typically combined costs of several activities, some of which are and some of which are not likely to be incremental in the sense defined above. Cost data available from state governments are, then, too aggregated to be useful for our purposes.

Likewise, census data (Census of Population, Census of Governments) alone would not support the needed analysis, although these data would be useful in selecting sample communities and in future analyses linking census and survey data. In the case of benefits, we explored the possibility of using an exposure
assessment approach to link environmental monitoring data to community health data. Specifically, we examined the feasibility of retrieving drinking water quality data from federal agencies and agencies in two states (California and Kansas). We found that the requisite information is not centrally located and in many cases is not even computerized. As a result, we discontinued our efforts along these lines.

**Develop Instruments for Data Collection.** Based on the results of the preceding task, which demonstrated that data on incremental costs and benefits are not readily available, we developed pilot questions to collect the pertinent data directly from officials of SCGs and designed different formats in which to present the questions to them. We then held three sets of meetings to further our understanding of the issues involved. The first meeting was with officials from about twenty small communities in Kansas, all with populations of approximately 3,000 to 15,000. The meeting's purpose was to identify activities involving major incremental environmental costs, gauge the willingness of officials to cooperate with a data collection effort, and clarify availability of information in existing community accounting records. Second, we met with officials in Washington's Department of Ecology and Department of Health responsible for programs in drinking water, wastewater, and solid waste management. We discussed environmental regulations and challenges in the state, the waiver process through which communities could petition for relief from certain regulations, and reactions of state officials to concerns of SCG officials. Finally, we interviewed an official of the Association of Washington Cities, discussing community attitudes toward EPA regulations and other environmental issues.

**Develop Theoretical Framework and Estimation Strategy.** We devised a preliminary theoretical framework for analyzing SCG issues before the project started and presented it in our proposal to EPA. Based on the results of the preceding tasks, the economists, statistician, and survey researchers on the project modified and extended the theoretical framework. We used this framework to formulate a strategy for estimating incremental costs and benefits among SCGs. The major considerations in formulation were availability and reliability of data, cost of data collection, and potential policy impact. The econometric strategy--detailed in Appendix A--involves assessment of determinants of degrees of regulatory compliance--which we assume cannot be measured directly--and estimation of relationships between expenditures on incremental activities and demographic variables (such as income or population). The benefits assessment
strategy is focused on perceived benefits, and addresses community priorities among environmental activities and other activities, attitudes about benefits, perception and evaluation of environmental risks, and behavioral intentions.

**Pilot Test Instruments.** We discussed pilot questionnaires in a four-hour meeting with the Directors of Public Works in two small California communities that operate their own drinking water and wastewater systems. Based on these discussions and guided by our theoretical framework, we revised the questionnaires and then conducted four focus groups consisting of 22 mayors and city administrators from SCGs in Washington State. Each focus group session lasted two to three hours and included a general discussion of the issues as well as the participants completing the cost and benefit questionnaires. Our objective was to learn whether the questions we developed made sense, whether respondents could answer them with ease and accuracy, and whether the participants could suggest better ways to ask them.

**CONCLUSIONS AND RECOMMENDATIONS**

Regarding the first study objective (feasibility assessment), we have concluded based on our findings that it is feasible to collect interpretable, quantitative cost and perceived benefit information pertaining to federal environmental regulations in small communities. We have learned from our focus group participants that the activity-specific cost data can be obtained either retrospectively from historical information kept on file for several years, or prospectively with survey participants recording expenditures in a project-specific format as they are incurred. For benefits data, we concluded that it is not feasible (given realistic projections of future project budgets) to estimate actual benefits using an exposure assessment approach, nor is it feasible to elicit perceived benefits from community residents. However, we were successful in eliciting perceived benefits from community officials, such as mayors, council members, directors of public works, and facilities operators, who participated in our focus groups. Since their perceptions are likely to play a crucial role in how SCGs respond to environmental regulations, we believe it is worthwhile to collect such information.

For the second study objective (methods development), we have developed methods, recommendations, and pilot survey instruments for carrying out such an effort. Pilot survey instruments for drinking water and wastewater are attached as Appendices D and E, respectively. Earlier versions of those instruments have been
tested on a preliminary basis in our Washington State focus groups. Our specific recommendations on the methods for data collection are as follows.

Methods for Collecting Cost Data

- Collect cost data for drinking water, wastewater, and solid waste management, which account for the majority of environmental costs to SCGs.
- Use an activity-based data collection scheme, rather than a department-based scheme or subjective individual judgments about what costs would not be incurred in the absence of federal regulations. Such an approach offers two advantages:
  - There are readily identifiable environmental activities for which communities can produce cost estimates.
  - This method gives the research team the responsibility of exercising judgment concerning what activities are incremental and allows for sensitivity analysis of the conclusions.
- Administer the pilot survey to mayors and city administrators in SCGs, with a follow-up telephone interview in cases where clarification is needed.
- Based on the results of the pilot survey, revise and administer a full-scale, national mail survey with telephone follow-up. A mail survey will be more cost-effective and will allow for more extensive data and generalizable results than a face-to-face data collection approach.

Methods for Collecting Benefits Data

- Administer--jointly with the pilot cost survey--a pilot mail survey on perceived benefits. Based on the responses of the focus groups, the pilot survey has been revised and is now ready for further field testing. Results from the pilot test were consistent across different formats, suggesting that survey results will be interpretable.
- Use the perceived benefits data and other secondary data sources, such as the Census of Governments, to better understand environmental compliance of SCGs.

Information from the above surveys and data from secondary sources would enable investigators to:

- Estimate incremental costs and perceived benefits of various federal environmental regulations
- Compare costs with perceived benefits for selected regulations or activities
• Analyze issues related to compliance
• Identify combinations of community characteristics signaling special need for financial assistance or additional flexibility

2. FUNDAMENTAL CONCEPTUAL ISSUES

COSTS

Before attempting to assess the feasibility of reliably estimating costs of environmental regulations, it is crucial to define precisely which costs are of interest.

First, we focus on the costs that are actually incurred by small community governments. We do not seek to estimate hypothetical costs that would be incurred in activities that are not undertaken even if such activities are required for full compliance with federal regulations. This does not imply that these costs are unimportant.\textsuperscript{8}

Second, we focus on costs that are actually incurred because of federal environmental regulations; we refer to these as \textit{incremental} environmental costs. We do not seek to measure the more encompassing costs of all environmental activities--which also include costs that would be incurred even in the absence of federal environmental regulations--because the policy issues discussed relate to the impacts of federal regulatory activity. For example, the federal government regulates the treatment and disposal of wastewater and responses to these regulations may increase the costs of providing those services. However, it is incorrect to characterize the \textit{entire} cost of wastewater treatment and disposal as "costs of federal environmental regulation." Undoubtedly, in the absence of regulation, communities would still make some investments in wastewater facilities and incur some costs.

To summarize, we focus on the incremental costs that are actually incurred by SCGs and are caused by federal environmental regulations. However, there is no

\textsuperscript{8}Hypothetical costs of full compliance--often referred to as "needs"--are often estimated by EPA in the course of rulemaking.
way to measure such costs directly; they must be inferred. This has implications for the survey design and estimation strategy, as developed later in this report.

The third fundamental issue relates to the degree of compliance with federal environmental regulation. Suppose it is possible to estimate incremental environmental costs that are actually incurred. Without some knowledge of the levels of compliance by communities, these cost figures are subject to different interpretations with very different policy implications. Several questions would immediately present themselves:

- What are the activities that drive these costs--whatever their magnitude--accomplishing in terms of environmental protection?
- If actual costs are substantially lower than estimated costs of full compliance (i.e., "needs"), does this reflect lack of compliance or overestimation of needs or both?
- If costs are high, does this represent compliance or underestimation of needs?

Although understanding the level of compliance is important, compliance is very difficult to measure. We found that data from field inspections--which are not very common in many states--are scarce, and information from enforcement actions seem to be very unreliable as indicators of the incidence and degree of compliance. Further, it is unknown whether community officials would voluntarily report failure to obey the law. Analytic approaches for dealing with the compliance issue are discussed in Appendix A.

A final fundamental issue is the distinction between financial and economic costs of SCGs. Financial costs are incurred by an SCG whenever it makes an expenditure for which it will not be reimbursed from outside the community. Economic costs are incurred whenever an SCG incurs any loss of value, whether this involves an expenditure or not. Our interest pertains to burdens on SCGs, and both financial and economic costs are relevant in this regard.

To elaborate on the distinction between economic and financial costs--and implications for our purposes--consider a partial deterioration of the infrastructure of a community water system during a particular year. This deterioration involves a loss of the value--and hence an economic cost--because it reduces the future service life of (and stream of service flows from) the infrastructure. However, if

\footnote{A series of GAO documents report that compliance with some regulations (e.g., wastewater) is low (GAO 1989, 1990, 1991a,b,c). The Chafee-Lautenberg report suggests major concerns about compliance with drinking water regulations among small systems.}
such deterioration does not involve an expenditure during that year--i.e., because nothing is done about it during the year--it does not involve a financial cost.

Accounting records of SCGs document expenditures during a particular time period. Accounting records do not document costs that are not reflected in expenditures. Costs that are not reflected in expenditures during a study period would have to be imputed (e.g., from estimates of replacement costs of facilities and useful service lives). Moreover, expenditures on capital equipment during a particular year overstate economic costs during that year if the equipment has a service life of more than one year. Such expenditures would have to be annualized--using estimates of useful service lives and appropriate discount rates to express all values on a common time basis--to be included in cost estimates for a study period.

Considerations in Developing Cost Information

To assess feasibility of collecting meaningful cost information for small communities, a series of questions was considered:

- What cost information is needed to support analysis of the fundamental policy questions?
- What information is readily available from centralized sources (i.e., wouldn't require collection from individual SCGs)?
- What information resides in existing accounting records in the possession of individual community governments?
- Could the information that does not currently exist be developed by use of special accounting procedures by study participants?

Answers to the four questions are offered in Section 4.

BENEFITS

It is also crucial to define precisely what we mean by benefits. First, we are interested in the incremental benefits of federal environmental regulations. These benefits are all of the desirable outcomes for SCG residents or other Americans\textsuperscript{10}--improvements in health or other elements of quality of life such as reductions in anxiety or aesthetic improvements--that result from federal environmental regulations. To be attributable to federal regulations, the benefits must flow from those activities that are actually undertaken but would not have been undertaken in the absence of the regulations. Returning to the wastewater example used in the discussion of costs, the benefits of interest for present purposes would include the

\textsuperscript{10}The distinction between social (national) and local benefits is discussed below.
benefits attributable to treatment that would not have occurred in the absence of federal regulations, but not the benefits of treatment that would have occurred even in the absence of federal regulations.

A second important issue is the distinction between actual and perceived benefits, both of which are of interest for our purposes. Actual benefits refer to desirable results of physical improvements in environmental quality—such as lowering levels of human exposure to drinking water contaminants, reducing exposure of fish to toxic substances released from wastewater systems, or lowering risks of increases in such physical quantities. In contrast, perceived benefits refer to the beliefs of community residents and community officials concerning such physical realities. Actual and perceived benefits may or may not be similar. In fact, we expect that perceptions are quite accurate in some contexts and quite inaccurate in others.

Actual benefits are of interest because they are the principal motivation for environmental protection activities. Perceived benefits are of interest because people act on the basis of their perceptions. In particular, in deciding whether to incur the costs of compliance with any particular federal regulation, SCG officials are likely to consider their perceptions of the benefits of doing so and these perceptions may be based in part on the perceptions of their constituents. Information concerning perceived benefits could be invaluable in attempting to make inferences about two crucial issues: what activities SCGs would engage in even in the absence of regulation, and the degree of compliance with regulations. Finally, comparison of actual and perceived benefits is of considerable direct policy interest. For example, if decision makers' beliefs are substantially at odds with what is suggested by the best scientific evidence, then there is an important policy role for improved communication of risks to those whose decisions affect environmental quality.

Considerations in Developing Benefit Information

To assess feasibility of collecting meaningful benefit information for small communities, a series of questions was considered:

- What information is available that would allow assessment of actual benefits?
- What would it take to elicit benefits perceptions from community residents?
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- What could be learned from eliciting benefits perceptions from community officials? Whose perceptions--e.g., mayors or public works directors--are of interest for what purposes?
- What are the most promising methods of eliciting perceptions?

Further discussion of these questions is contained in Section 5 and Appendix C.

Social costs and benefits vs. local costs and benefits

A final fundamental issue involves distinctions between social and local costs and benefits. Social costs (benefits) include undesirable (desirable) effects aggregated across the country; local costs (benefits) include undesirable (desirable) effects borne only within the local community. Both perspectives are relevant for our purposes.

For the purpose of determining what activities are appropriate from the point of view of national policy making, it is social (i.e., national) costs and benefits that are relevant. For example, a policy would be viewed as economically efficient if the total benefits aggregated across the country exceed the total costs aggregated across the country. This is a normative or prescriptive view.

However, for the purpose of predicting the behavior of SCG decision makers in the absence of regulations--a positive or descriptive analytical objective--it is local costs and local (perceived) benefits that are relevant. In particular, in making decisions concerning environmental protection activities, SCG officials would be expected to compare the costs to their community with the benefits to their community (as they are perceived) and do what appears to be in the best interest of their constituents. Environmental enforcement activities may be viewed as an attempt to increase the local benefits of undertaking required environmental activities--i.e., by adding to local benefits of compliance the avoidance of anticipated costs associated with actions for non-compliance--and thereby to increase the likelihood that SCGs will choose to undertake required activities.
3. REASONS FOR FOCUS ON DRINKING WATER, WASTEWATER, AND LANDFILL

Various considerations have led us to focus our attention on provision of drinking water, treatment and discharge of wastewater, and disposal of solid waste into landfill. As we proceeded, and as detailed below, we concluded that cost and benefit information would have to be collected separately for fairly detailed activities. Attempting to do this for activities related to all federal environmental regulations seems unwise for two reasons: limitations on project resources and avoidance of unreasonable burdens on the respondents. Thus, we decided to narrow our focus.

We chose to focus on drinking water, wastewater and landfill regulations because of consistent indications that these areas are central to the concerns raised in the policy debate. In particular, these areas appear to involve the largest incremental costs to SCGs and (not surprisingly) most of the regulations that are most energetically criticized by state and local officials.

The “Guide to Mandates”, Governing, March 1994, provides estimates of aggregate costs to cities over the following five years. These estimates indicate that costs of compliance with federal regulations are concentrated in the areas of drinking water, wastewater, and landfill. In particular, there it is reported that over the following five years cities of all sizes expected to spend:

- $29 billion to upgrade wastewater treatment plants
- $8.5 billion to treat drinking water
- $5.5 billion to comply with landfill regulations
- $3.7 billion to comply with air quality regulations
- $1 billion on underground storage tanks

Thus the three areas which we focused on are estimated to be the three most costly in aggregate terms. In addition, it is likely that costs of air quality regulations to local governments are disproportionately concentrated in relatively

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11 Federal environmental regulations that we do not consider further relate to such activities as protection of air quality, pesticide use, prevention of leakage from storage tanks, handling of hazardous wastes, and ocean dumping or incineration of solid waste.

12 For example, some SCG officials in focus groups reported that they receive a survey each week. They reported that long surveys that are difficult to understand or fill out tend to be discarded.
large communities. Finally, community officials corroborated the view that these three areas were of most concern to them.

4. ISSUES AND FEASIBILITY OF COLLECTING COST INFORMATION

CRITERIA FOR DATA COLLECTION STRATEGY
As discussed in previous sections, collection of expenditure information directly from SCG respondents is necessary. A strategy for doing this was developed with the following criteria in mind:

- Respondents must be able to supply accurate information
- Respondent burden needs to be reasonable to enable a high response rate
- The data must allow—in combination with other available information—analysis of incremental costs and interpretation with regard to the compliance issue
- The information must allow sensitivity analysis to see how expenditures vary with assumptions about what constitutes an incremental environmental activity

OVERVIEW OF STRATEGY
Based on what was learned from the focus groups, we concluded that all of the criteria can be satisfied by use of a mail survey with telephone follow-up. Respondents from SCGs—public works officials in most cases—would be asked to report their expenditures for specific activities in the areas of drinking water, wastewater, and landfill.

A mail survey is best because analysis of the issues of concern will require information from more SCGs than could be interviewed face-to-face with a reasonable budget (i.e., more than a few dozen). Phone follow-up is expected to be necessary because first, the survey would ask for information that respondents might not record in their standard financial accounts (e.g., the required information

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13 Many SCGs are in rural communities where air pollution is less of a problem. In addition, in none of our interviews or focus groups did participants mention air quality regulations as very burdensome.

14 While a relatively large sample of respondents is required for analysis of the issues of interest to this project, much of our survey instruments could be used in face-to-face interviews.
is much more detailed than what is typically reported to state agencies) and, second, because SCGs usually have very low response rates to mail surveys.

Our field work in Kansas, California, and Washington State has suggested that the required information might be available from historical information that many SCGs keep on file for several years. Thus a retrospective data collection strategy may be sufficient. However, it might be discovered during future pilot testing that our focus group participants are not representative in this regard and prospective data collection—with survey participants recording expenditures as they are incurred in a project-specific format—may be necessary. Retrospective data collection has the major advantage that it does not require recruitment of data collection sites ahead of time. Retrospective surveys may be sent out to hundreds or thousands of sites.

To keep the response burden manageable, a respondent would be asked to supply expenditure information for activities related to only one of the three service areas (i.e., drinking water, wastewater, landfill). A sampling scheme for survey participants would be developed using the EPA-sponsored “Survey of Small Municipal Governments” (fielded in 1994) to target modules to SCGs that are known to own or operate the relevant facilities.

For most items, the pilot survey instrument requests cost data reflecting expenditures over the previous 12 months. Cost data for capital (e.g., construction, plant, equipment) purchases—defined as any item costing more than $1,000—since 1992 are requested. In cases where records containing the requested information are not available, respondents are asked to estimate cost items and indicate in each case whether a reported cost figure is an estimate.

It would be useful for analysis purposes to know not only whether a cost figure is an estimate but also the degree of confidence a respondent attaches to an estimated cost figure. For example, a respondent could be asked to pick a category characterizing his or her belief about the accuracy of an estimate (e.g., “right on target”; within 10%, 20%, 50%, or 100%; “within an order of magnitude”). The pilot survey does not attempt to collect such information because it would be too burdensome to ask respondents to provide such information for every estimate they provide, which could be a dozen or more. A revised instrument might request such information for selected cost categories, for example, cost categories that pilot testing reveals to involve especially high costs or categories for which most respondents do not have records available.
We next explain why it is desirable to collect expenditure information by activity; the criteria used for defining activities; and the process for developing specific activity lists.

Some of the activities that SCGs undertake to provide services in the areas of drinking water, wastewater, and solid waste would be undertaken even in the absence of federal environmental regulations and others would not. We seek cost estimates for the latter. There is no direct way to measure such costs; incremental environmental costs must be inferred. Any such estimates are bound to be controversial because of the contentiousness surrounding the "unfunded mandates" issue. To contribute to the public debate on this, researchers must be able to assess the credibility of their information and others must be in a position to review their judgments.

One data-collection strategy is similar to that adopted in other studies, namely asking SCG respondents to provide a dollar figure for incremental costs—which could be explained in the survey instrument--of federal environmental regulations. Responding accurately to this question requires judging a hypothetical counterfactual situation--never an easy thing to do. Further, it is likely that critics would claim that respondents adjusted their answers to suit their views on the unfunded mandates debate.

As an alternative strategy, we propose to measure costs by activity--i.e., tasks performed by governments that might or might not be done in response to a regulation. Examples are taking drinking water samples, testing drinking water, disposing of wastewater sludge according to regulations, lining landfills and remediating contaminated landfill groundwater. This method of collecting costs has a number of advantages. Specifically, this strategy:

- Asks respondents to provide information about concrete activities
- Does not require respondents to exercise judgment about what they would do in the absence of regulations
- Allows analysis of the sensitivity of conclusions to different researcher judgments about what activities are incremental
- Allows the costs of specific activities required by regulations to be compared with perceived benefits of those activities

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15This is similar, for example, to the approach taken in the "Impact of Unfunded Federal Mandates on U.S. Cities: A 314-City Survey," discussed earlier. Specifically--see p. A-3--respondents were asked to provide cost information for "any function related to compliance." See U.S. Senate, Committee on Environment and Public Works (1994b) for a critique of this report.
HOW DATA ON COSTS OF ACTIVITIES COULD BE USED

As discussed further in Appendix A, such data could be combined with data from the benefit survey and secondary data to assess incremental costs and analyze issues related to compliance. An overview of that discussion is provided here.

**Incremental costs.** Incremental costs could be assessed using various approaches. The heart of any approach is a method for inferring what actual activities are undertaken—or what portions of actual costs are incurred—because of federal environmental regulations.

*A priori* assumptions about activities that clearly would or would not be undertaken in the absence of regulations could be used to estimate upper and lower bounds for costs. For example, costs associated with applying for permits, assuring financial responsibility for closed landfills, reporting to regulatory authorities or applying for waivers would likely not be undertaken in the absence of regulations. Basic infrastructure costs—such as land for landfills and pipes for water systems—would be viewed as not due to regulations as long as the physical characteristics of the infrastructure are unrelated to regulations.

Such bounds could be refined by: a) making inferences about activities that don’t obviously fall into one category or the other, or b) estimating portions of reported costs for each activity that would be incurred because of regulations.

One method for refining the cost bounds relies directly on survey responses. For example, we could rely on responses of SCG officials to questions about activities that they would or would not undertake—or fractions of costs that they would or would not incur—in the absence of federal regulations. Another approach involves inferring behavior from questions about perceived benefits. For example, actual costs for a particular SCG might be allocated to incremental costs for those activities for which officials report: a) zero perceived benefits, b) that benefits are perceived to be (perhaps, substantially) smaller than costs, or c) lack of cost effectiveness. Estimates from any approach would be subjected to sensitivity analysis involving different assumptions within the framework of that approach (e.g., different cutoffs on the degree of perceived cost effectiveness used to infer that an activity would not be undertaken in the absence of regulation).

**Studying Determinants of Compliance.** In the absence of direct measures on compliance—which may not be possible—analysis of the compliance issue would involve statistical (or econometric) analysis using models of compliance behavior. However, standard conceptual models of compliance with legal requirements do not seem very promising for our purposes.
The basic economic approach to modeling compliance--e.g., in the theoretical literatures on regulation of firms or criminal deterrence--views decision makers as weighing the costs of compliance against the expected consequences of non-compliance. Consequences of non-compliance involve the likelihood that non-compliance is detected and the size of the penalty or punishment, given detection.

Our investigations into the motivations of SCG officials and environmental enforcement activities related to SCGs have led us to conclude that this economic "crime and punishment" paradigm is not particularly promising for modeling compliance in our context. There are three fundamental reasons for this conclusion.

First, most SCG officials are likely to place a high personal value on compliance (i.e., obeying the law) because of belief in the importance of and dedication to public activities or because of political costs of failing to do so. Thus, the basic premise of the "crime and punishment" paradigm--that only the threat of enforcement action can induce SCG decision makers to take actions for which local costs exceed local perceived benefits--apparently fails to capture an important motivation of these decision makers.

Second, assuming SCG decision makers are motivated to an important extent by the expected costs of enforcement actions for non-compliance, it does not appear possible to assess the relationship between enforcement and compliance empirically. This is because: on-site inspections of and enforcement actions against SCGs are not very common in at least some jurisdictions (i.e., the probability of detection of non-compliance is rather low); there may not be much meaningful variation in enforcement action across jurisdictions (i.e., the probability of detection of non-compliance and the penalties for non-compliance seem not to vary much across jurisdictions); and in any case, there does not appear to be reliable data capturing varying levels of enforcement actions relevant to SCGs.

Third, the standard paradigm--involving probabilities of detection of non-compliance and penalties that result directly from detection--does not correspond to how environmental enforcement actually operates. In particular, detection of non-compliance does not lead directly to penalties. When governmental non-compliance with environmental regulations is detected--unless it is especially serious, frequent or persistent--the result is not typically assessment of penalties. Rather, non-compliance generally leads to an effort on the part of enforcement (usually state) officials and SCG officials to develop and implement a plan to establish compliance.

In sum--in contrast to what one might anticipate on the basis of standard conceptual views--many SCG's may comply with regulations even if they do not view
them as producing local benefits that exceed local costs, and it is difficult to establish an empirical link between the threat of costly (i.e., punitive) enforcement consequences of failing to comply and the behavior of SCG officials. Even if there is such a link, it is difficult to obtain the data that would allow us to estimate this link.

Compliance seems to be much more sensitive to factors such as: a) how costly---on a per capita or per household basis---it is for a community to comply, which depends on environmental conditions (such as threats to drinking water purity) and community size (because of economies of scale); and b) the ability and willingness of the community to pay to comply, which depends on factors such as income, tax base, tax and water rates, borrowing costs and existence of other fiscal commitments of the SCG.\textsuperscript{16}

Econometric analysis of cost and perceived benefit data from an SCG survey, in conjunction with secondary data (e.g. from the Censuses), would allow us to address central policy issues such as:

- To what extent do actual costs reflect needs vs. non-compliance?
- How do actual costs vary with community characteristics that might reflect ability and willingness to pay?

The econometric analysis would be considerably simpler---and the required survey sample size considerably smaller---if data on full-compliance costs can be constructed.\textsuperscript{17} Such measurement of full-compliance costs might be possible from special runs of EPA needs models. Doing so seems most promising for selected drinking water activities.

Analyzing the questions above would involve: a) estimating regression models of (per capita) actual costs by activity as functions of several variables including full-compliance costs and hypothesized determinants of ability and willingness to pay for environmental compliance; and b) using the estimates to predict the effects on actual costs of various types of changes in the circumstances of particular SCGs. For example, we could predict how much lower actual costs of particular SCGs would be if full-compliance costs were, say, 25% lower (e.g., because of improved technology, larger community size, less stringent regulations or waivers). We could also predict how much higher actual costs would be if community characteristics

\textsuperscript{16}The distinction between ability to pay and willingness to pay is discussed in Appendix A.

\textsuperscript{17}If not, we would have to estimate the determinants of full-compliance costs along with the determinants of compliance.
were more conducive to compliance (e.g., if poorer communities had more financial resources).\textsuperscript{18}

**CRITERIA FOR SELECTING ACTIVITIES**

The challenge is to define a set of activities with the following characteristics:

- They are easy to identify by respondents
- They might not be undertaken in the absence of federal environmental regulations (they must be required by or be a means of complying with federal environmental regulations)
- The costs might be substantial
- SCG respondents are likely to be able to provide accurate information on the expenditures involved in these activities
- They are likely to reflect a single motive (either regulatory compliance or something else)
- They are disaggregated no more than necessary to meet the other criteria (to limit respondent burden)

**PROCESS OF SELECTING ACTIVITIES**

A preliminary list of activities was developed. It was then refined using input from interviews in California and our focus group discussions in Washington State.\textsuperscript{19}

One step in developing the preliminary list was to examine federal environmental regulations pertaining to drinking water, wastewater, and solid waste services. American Management Systems (1992) was a particularly useful source of this information.\textsuperscript{20} Interviews with EPA policy and program staff were invaluable in clarifying the meaning and importance of many of the regulations. To guard against a failure to include activities that meet our criteria, we consulted numerous sources that discussed federal environmental regulations. These included the National Conference of Mayors and Price Waterhouse (1994, Appendix D) and the focus groups in Kansas, California, and Washington.

The preliminary lists were then presented to SCG officials in California and Washington. We explained the purpose of the lists and asked them to consider and respond to the following questions:

\textsuperscript{18}For more detail on the approach, see Appendix A.
\textsuperscript{19}In the case of landfill activities, we obtained information only from the Washington focus groups because neither of the communities in California owned or operated a landfill.
\textsuperscript{20}Particularly, Subchapters D, I, N, and O.
• Does each item make sense to you?
• Does each involve significant costs?
• Could you provide cost figures for each item separately?
• How hard would it be for you to do so?
• Are there important activities missing from the list?
• Should we combine any of the activities?
• Should we separate activities that are currently combined?

The lists were then refined on the basis of the feedback we received. We now have lists that are ready for inclusion in a pilot test where respondents would be asked to supply cost figures for each activity. Pilot survey instruments for drinking water and wastewater are attached as Appendices D and E. The next three subsections present these lists, with more detailed information about the views of focus group participants, and comments about issues specific to each service area.

**DRINKING WATER**

The list of activities that seems most useful is:

• Taking samples
• Testing for specific contaminants
• Disinfection
• Reporting and record keeping
• Public notification
• Applying for waivers
• Operator training
• Wellhead protection
• Upgrading or replacing plant and equipment

The groups were asked if they could provide cost figures or estimates associated with those activities, either retrospectively using existing records or prospectively by filling out cost forms over time. Everyone in the groups, with an exception or two, said that he or she could provide such information. They considered some of the costs easy to report or estimate (e.g., expenditures for laboratory testing of water samples), and others more difficult.

The groups were asked about more difficult tasks such as disaggregating costs. An example of a potential incremental cost contained within a larger labor cost category would be an employee who spends a few hours a month taking water samples. Respondents said they could accurately assess how many hours are spent on activities like this and could attach costs to them.
There did not appear to be more significant response problems for the smallest communities. Perhaps almost all smaller communities would need to perform some disaggregation to obtain environmental costs and so the difficulty of the task does not decrease with community size.

In many cases, the cost information is available in SCG records (for example, the laboratory costs of water testing). However, such information was not available in some communities. The groups were asked if it would be possible to collect information prospectively. Most agreed that it could be done and that they would be willing to do it, although some said that it would be costly, and they would need to be reimbursed to do it.

Environmental programs vary by state. State-to-state differences may make some parts of the survey difficult to implement (e.g., it might require different lists of activities for different states).

**WASTEWATER**

The list of activities that seems most useful is:

- Pre-treatment program (if any), separating costs for setting standards, identifying discharge sources, analyzing reports, dealing with violations, investigations
- Secondary treatment, separating costs by type of treatment
- Sludge disposal
- Monitoring and reporting
- Operator training
- Applying for NPDES permit
- Lab work to support wastewater activities

The focus groups judged the collection of retrospective or prospective cost data to be of roughly the same degree of difficulty as for drinking water—easy for some activities, but more difficult for others.

A large part of the difficulty in attributing environmental costs in wastewater will be in separating true environmental costs from the costs of upgrading old infrastructure that exists in many small communities.\(^2\) Despite these difficulties,

\(^2\)From the focus groups and interviews with Washington State officials, we learned that the distinction between incremental environmental costs and general infrastructure improvement may be especially important for wastewater. Numerous small communities in Washington complained about the high expense of the new wastewater regulations. Some confessed to be at a loss as to how they were going to pay for new wastewater facilities that the Department of Ecology was “requiring” them to construct. In a subsequent interview with a department official, the official—while
the focus groups thought that collecting cost information for wastewater activities would be feasible.

In sum, the focus groups participants generally agreed that wastewater may be the most difficult to survey but also likely to be the source of the largest incremental costs.

LANDFILL

The list of activities that seems most useful is:

- Routine operating activities, including daily covering, maintenance, pest control, runoff control, environmental record keeping
- Groundwater monitoring
- Operator certification and training
- Upgrading facilities to comply with regulations (e.g., installing a liner)
- Maintaining a closed facility (e.g., groundwater monitoring)
- Remediation groundwater contamination
- Closing facilities (e.g., covering, planning, certification, financial assurance)
- Costs associated with a special location (e.g., flood plain, earthquake zone)

The participants in the Washington focus groups felt that identifying the correct respondent may be more difficult with landfills than with drinking water or wastewater. With the latter two, the Director of Public Works is usually the most informed person. With landfills, it may be someone else. Additional effort will be required to identify the right individuals.

The Washington focus group participants and state officials reported that landfills have undergone substantial consolidation, and most small landfills have closed in recent years. For the purposes of the survey, it is important to consider costs of upgrading and maintaining an open landfill and costs of closing and monitoring a closed landfill.

expressing some sympathy for the small communities' plight—pointed out that much of the "required" improvements had less to do with new wastewater regulation and much more to do with the need to replace "crumbly" sewage infrastructure that in some cases was 25 years old and had been built with substantial federal cost sharing. Today, much of the cost sharing has been withdrawn, which makes funding infrastructure difficult, regardless of the stricter environmental regulation. According to the official, the stricter regulations exacerbate the problem.
5. ISSUES AND FEASIBILITY OF COLLECTING BENEFIT INFORMATION

Information on the benefits to SCGs--actual and perceived--of federal environmental regulations could be useful for several purposes:

- Information on actual benefits is very helpful in modifying existing regulations or designing future ones
- Information on perceived benefits can be very useful in drawing inferences about what SCGs would do in the absence of regulations
- Comparison of perceived and actual benefits can help identify ways to improve risk communication

One of our goals was to determine if systematic benefit information serving these functions could be collected, and, if so, how. Below, we describe methods for collecting both actual and perceived benefits information.

ACTUAL BENEFITS

For some routes of human exposure (e.g., drinking water), environmental monitoring data can be used to estimate the effect of different levels of exposure on health outcomes. More specifically, within this exposure assessment approach, environmental monitoring data for SCGs--such as the levels of specific contaminants in drinking water--could be used to estimate changes in exposures experienced by the residents. For pollutants with reliable quantitative estimates of health effects (such as carcinogenicity potency) of varying exposure levels, we could further estimate avoided adverse health outcomes (such as avoided cancer risk).²²

We conducted exploratory research in California and Kansas to assess the availability of water quality monitoring data for samples of SCGs and the feasibility of collecting them. Unfortunately, we concluded that the data are too dispersed, selectively sampled, and difficult to retrieve for research purposes, especially for research aimed at national totals.

²²The most promising contaminants to focus on are likely to be those whose levels are likely to have been reduced substantially in the recent past, presumably because of recently promulgated standards. Specifically, when a contaminant is newly regulated some communities are likely to have levels that exceed the MCL when mandated testing begins, and the levels of the contaminant will be reduced because of remedial actions required to achieve compliance with the new regulation. In addition, much of what is known about health effects of a newly regulated contaminant will be summarized in the Regulatory Impact Analysis used in the process of developing the regulation.
For example, the California Department of Health (DOH) collects all data related to the Safe Drinking Water Act for community systems with at least 200 connections. For smaller systems, the data are collected and stored at the county level. The DOH has 20 district offices throughout the state and each one collects data on the distribution systems in their district. When monitoring data are received, state enforcement officials determine if a violation has occurred and, if so, they submit quarterly reports to EPA headquarters, where they are entered into the Federal Reporting Database System (FRDS). These data are not computerized at the State level and are discarded after a few years.

The FRDS—inaugurated in 1976—contains information on public drinking water supplies, including compliance with monitoring requirements and maximum contaminant levels. While FRDS is useful for EPA enforcement and compliance purposes, it is inadequate for the purposes of our exposure assessment for at least three reasons. First, the database emphasizes water supply systems with violations. In order to estimate the level of exposure to specific contaminants within a community and how those levels change over a specific time period, however, we need information for communities that have not had violations and information about contaminant levels that are not in violation of EPA standards. Second, public water supply systems are allowed to combine up to five samples—from the same system for those serving populations of 3,300 or more and across different systems if they serve less than 3,300 people. Combining samples—especially across different systems—is problematic when we seek to measure exposure at the level of the individual community. Finally, data related to ongoing enforcement cases are confidential. Since many of the systems with high exposure levels may fall in this category, access to information for a statistically reliable sample of communities might not be possible. Therefore, we concluded that the FRDS data would not be sufficient for our purposes.

For some rules—such as the federal lead and copper rules—data are collected by the states and submitted directly to EPA. Once again, however, some of these data can be confidential and not accessible for analysis. Moreover, even if these data could be obtained, lead and copper constitute only two of several contaminants of interest for our purposes. Thus, the effort necessary to acquire such data was judged to be excessive given our limited resources.
A recent RAND study of health effects of drinking reclaimed water highlights the kinds of data-acquisition difficulties just discussed. Much of the information we sought had been discarded or was not in a usable format. This study was specifically designed to collect information about consumption of reclaimed water, and doing this required a large-scale effort over a three-year period.

For these reasons, we concluded that it was not feasible to collect actual benefits measures.

PERCEIVED BENEFITS

Although regulations affect community residents, eliciting perceived benefits from community residents is not feasible given the scope of this project because it would require surveying a large number of residents in a large number of communities. In addition, some of our focus group participants believed that many community residents are unaware of the activities under study and hence their perceptions concerning the benefits of these activities would be of limited use for our study.

We focused, instead, on community officials (e.g., mayors, members of city councils, directors of public works, operators of facilities). Their perceptions are likely to play a crucial role in how SCGs respond to environmental regulations.

The survey questions focused on drinking water, wastewater, and landfill activities that are plausibly undertaken because of regulations. After reviewing the environmental psychology and risk perception literatures, as well as various reports, we developed a preliminary set of questions.

Focus group discussions with elected officials and administrators from small communities in Washington State and California were used to evaluate the feasibility of various self-report data collection methods and refine the questions that seemed most promising. To understand how decisions about environmental activities are made, it was important that both points of view be represented. As agents of community members, mayors must make decisions within a broad community context (i.e., considering the full variety of services that might be supported with community government revenues) while public works officials have more narrow sets of professional concerns.

The most appropriate respondent for specific items in a survey of perceived benefits depends on what information is sought. Perceptions may vary across

different officials. Suppose a mayor has identified a crime prevention measure as the top priority and the SCG does not have sufficient resources to comply with the lead and radon drinking water rules. Under such circumstances, the mayor might perceive very little—if any—benefit from regulatory compliance. A public works official, on the other hand, may perceive a large benefit to compliance with drinking water regulations because these activities are under his or her jurisdiction and crime prevention is not, or because he or she has more extensive familiarity with the scientific evidence concerning health effects of lead or radon exposure.

Perceived benefits are important because different officials may have authority on different types of decisions, and one of our main concerns in this study is to predict what activities would be undertaken in the absence of regulations. It is likely that administrators and managers are most informed about particular functions, and it is possible that elected officials defer to them in assessing the benefits of activities in their areas of expertise. However, elected officials are most likely to know about the benefits of non-environmental activities, which may also be important in determining SCG behavior, especially for SCGs with difficulty to afford compliance with regulations.

**Questionnaire design** - We developed and pre-tested several methods for measuring perceived benefits. Most questions were given pre-coded response categories to minimize respondent burden. In addition to general perceptions about how environmental regulations affected quality of life in their communities, we sought information on four specific issues:

- *Priorities and preferences* for selected environmental activities
- *Attitudes and perceptions* about the benefits of selected environmental activities
- *Perception and evaluation of risks* associated with environmental activities (including knowledge, awareness, and beliefs)
- *Behavioral intentions* to adopt and implement environmental regulations

Priorities and preferences for various programmatic activities were addressed in several different ways. Under hypothetical situations, respondents were asked how they would allocate resources (time and money). These questions were asked in each of three contexts: (1) across all SCG programs, (2) within environmental programs, and (3) confined to a specific environmental program, such as drinking water activities. Questions were asked about priorities in terms of cost-
effectiveness; such information is especially valuable for drawing reliable inferences about what activities would be undertaken even in the absence of regulations requiring them.

Perceived benefits questions used in the pretest included a general question to understand SCG officials' attitudes about the main reasons for carrying out six selected activities. The list below represents only a subset of activities that could have been examined. They were selected to represent a variety of stages of regulatory enforcement in the three areas of environmental regulation emphasized in this study. The six selected activities are:

- Testing for lead and copper from taps in homes instead of within the drinking water system itself
- Testing for coliform as frequently as required by regulations
- Lining landfills
- Notifying water customers about results of drinking water tests and MCLs
- Renewing wastewater permits
- Implementing proposed radon standard

Respondents were also asked to rate the extent to which each activity was perceived to be beneficial for the protection of public health in their own community, and also for the health of individuals in other communities.

To understand perceived benefits better, we asked respondents about some of the characteristics of the risks themselves, focusing on a subset of drinking water contaminants: lead and copper, disinfection by-products, coliform, giardia, and radon. The questions were based on the broader risk assessment approach and published instruments used by Slovic, Fischhoff, and Lichtenstein (1978; 1980). For pilot testing, questions were asked about knowledge of illness associated with the risk, strength of the scientific basis for standard setting, and the extent to which citizens in the community understand the risk.

Measures of behavioral intentions (e.g., willingness to perform various activities) were devised to better understand what officials are willing to do. Further, questions such as these can help determine under what circumstances SCG officials might make particular choices for their communities. Three separate formats to elicit preferences for regulation were tried: respondents were asked about the likelihood of performing the activity in the absence of regulation, the frequency of performing the activity, and the willingness to pay for the activity. Specific
measures of behavioral intention were developed, rather than general evaluative measures, because it is well established in the social psychological literature that they are better predictors of actual behavior (Ajzen & Fishbein, 1977; Heberlein & Black, 1976).

Selected benefits questions and the formats that were most successful based on pre-testing are:

- Please rate the extent to which each of the environmental management activities is beneficial for protecting the public health of individuals in your community (rated from “not at all beneficial” to “extremely beneficial”):
  
a. testing for lead and copper from taps in homes instead of within the drinking water system itself
b. testing for coliform as frequently as required by regulations
c. lining landfills
d. notifying water customers about results of drinking water tests and maximum contaminant levels (MCLs)
e. renewing wastewater permit
f. implementing proposed radon standard

- Consider the potential risk to your community for each of the following drinking water contaminants if found in your drinking water at a level just above the MCL.

To the best of your knowledge, how strong is the scientific basis for setting the MCL for this contaminant? (rated from “not at all valid” to “extremely valid”)
  
a. lead and copper
b. disinfection by-products
c. coliform
d. giardia
e. radon

- If all environmental regulations are repealed, both at the state and Federal levels, how likely would you be to carry out each of the activities (same as a-f above) listed below at all? (rated from “not at all likely” to “extremely likely”)


SUMMARY OF RESULTS ON PERCEPTIONS FROM FOCUS GROUPS

Some of the results from the focus groups are summarized below (for a more complete discussion, see Appendix C):

- The reasons for performing required activities varied by activity. Coliform testing, lining landfills, and public notification were done mostly to protect human health or the environment. Testing for lead and copper, renewing wastewater permits, and implementing the radon standard were done mostly because they were required.
- There is better awareness of environmental regulation among the larger of the small communities represented in our focus groups (5,000 to 15,000 population).
- Responses were consistent across the three formats (likelihood, frequency, and willingness to pay for an activity), which suggests that reliable interpretation of full survey results will be possible.
- Perceived health risk was high for coliform and giardia violations, and low for radon, disinfection by-products, and lead and copper violations. These risk ratings correlated highly with the perceived strength of the scientific risk data. In this small sample of activities, acute risks were perceived as high risk but chronic risks were not.

6. DIRECTIONS FOR FUTURE RESEARCH

The activities and conclusions reported above suggest a number of tasks which can be undertaken. We describe these tasks below.

Task 1: Pilot testing of cost and benefit surveys.

The cost survey is designed for small-community public works officials. The benefits survey is designed to elicit perceptions on the benefits of environmental activities and environmental risks from two groups of small-community officials: elected community officials such as mayors and council members, and city staff such as public works officials.

We have produced two draft instruments, based on findings about key issues and promising ways to elicit information. The questionnaires focus on two major
program areas: drinking water and wastewater. Separate cost items pertain to 8 to 10 activities within each program area, and ask for past costs for each activity. Perceived benefit questions focus on selected, specific activities and have two objectives: first, to allow inferences about the likelihood that particular activities would be undertaken and the levels at which they would be undertaken in the absence of EPA regulations; and second, to identify activities where benefits are not well understood.

For pilot testing, the instrument would be administered by mail to approximately twenty-five communities selected from among those who participated in the EPA Survey of Small Municipal Governments. It would also be useful to compare pilot survey responses with responses from a prospective survey (using diaries) for a subset of those communities.

Task 2: Modeling and preliminary statistical analysis of cost data.
Modeling could proceed without Task 1, analysis would require data from the pilot survey. Community costs per capita of various activities would be modeled as functions of variables such as the size of the community, estimates of need from EPA models, and indicators of ability to pay or fiscal capacity (incomes, tax base, other activities funded by the same government). (See Appendix A for details.) Results concerning fiscal capacity could be useful in designing aid formulas. Analysis of discrepancies between actual spending levels and needs could allow inferences about determinants of compliance.

Task 3: Analysis of EPA “Survey of Small Municipal Governments” data and secondary data.
It would be worthwhile to investigate questions such as how community environmental activities and financing methods vary with factors such as community size, fiscal capacity, and population density. One issue that could be investigated is the potential number of communities of various sizes and fiscal capacities that operate drinking water or wastewater systems or landfills.

Task 4: Risk communication intervention and analysis.
This task would take two years (the major survey effort could be initiated while this task was in progress). The methodology would be developed in the first year; the methodology will then be implemented in the second year.
The purpose of this task would be to assess the effect of risk education materials in shaping respondents' perceptions about the benefits of environmental
regulations. The respondents would be either community officials, community residents, or both. There are two options for a study design. One option would be a controlled pre-post comparison study, in which the respondents in the intervention group are provided with education materials, and the respondents in the control group are not. Another option would be to compare the effects of different packages of education materials.

With either option, a baseline perceived benefits survey would be administered in approximately 20 small communities. The respondents would then be divided into groups in such a way that the distributions of initial perceptions are similar across groups. Members in the control group would receive no education materials. Members in the intervention group(s) would receive risk education materials. If the second option were selected, we would form separate intervention groups, and present each intervention group with a separate package of education materials. A second perceived benefit survey would then be administered to measure and compare the effects of the risk communication interventions.

If this study targeted both officials and residents, it would also be possible to evaluate variations in their perceptions as well as their responses to the risk communication intervention.

**Task 5: Exposure assessment for drinking water.**

This task would attempt to measure the effects of selected EPA regulations on levels of recently regulated contaminants in drinking water. This evaluation would be possible if one or more states can be identified for which results of laboratory tests can be assembled for a number of communities over time (e.g., for three years starting with the time that a contaminant is first regulated). The data can then be used to address a number of questions. For example, what fraction of communities have test results above the MCL initially, either prior to or soon after the regulation went into effect? What are the characteristics of such communities? What fraction of communities with contaminant levels initially above the MCL come into compliance within particular periods of time after the regulation goes into effect (e.g., two years)?

A secondary goal for this task would be to assess the feasibility of locating and procuring drinking water quality data from centralized sources such as state water agencies and to evaluate the possibility of linking these data to other health and environmental databases. The integration of the data might enable future health or
epidemiological studies to measure the health benefits of environmental regulations.
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APPENDIX A: EMPIRICAL STRATEGIES FOR ANALYSES OF INCREMENTAL COSTS AND COMPLIANCE

This appendix sketches how data from a costs and benefits survey of SCGs might be used in conjunction with secondary data to analyze the two fundamental cost issues discussed in section 2: incremental costs of regulations for SCGs and interpretation with reference to compliance. It considers analyses of costs of activities for a cross-section of SCGs at a single time (e.g., for a particular year for operating costs, for a number of years for capital costs). Throughout we assume that direct measures of degrees of compliance are not available.

Many details of the analyses have yet to be worked out (hence the term "strategy"). Some of these details—such as the variables that we would want to use for econometric analyses—would need to be worked out before finalizing a survey. For example, some useful information might be available from secondary sources only at a high cost but easily collected in a survey with little burden for respondents (e.g., prices SCGs pay for different laboratory analyses of drinking water samples). Other details—such as precise statistical specifications and procedures—need not (and probably should not) be worked out before data collection commences. Most important for present purposes is that considerations presented here to support the conclusion that cost and perceived benefit data that could be collected by the methods described in the text—supplemented with other obtainable information of various kinds—would allow revealing analyses of the issues at hand.

The first two subsections contain conceptual discussions of full-compliance costs and SCG decisions concerning compliance, respectively. These provide theoretical foundation for the empirical strategies sketched in the last two subsections. The first of these is relatively short and straightforward; it expands on the discussion in section 4 of empirical approaches to estimating actual incremental costs. The last subsection is longer and more technical; it outlines an econometric approach to analysis of the compliance issue, discusses some implementation issues, and indicates in general terms how resulting estimates could be used to inform the questions of interest.

The determinants of full-compliance costs: theory

Let $i$ index SCGs and $j$ index activities and let symbols in boldface type denote column vectors. Let $C_{ij}$ denote “full-compliance cost of SCG $i$ for activity $j$”: the
minimum amount that activity \( j \) would cost SCG \( i \) on a *per capita* basis to comply fully with EPA regulations.\(^{24}\) At any particular time, the environmental quality associated with full compliance in all activities—call it \( q^* \)—is assumed fixed across communities (i.e., regulatory performance standards are assumed constant across SCGs). Conceptually, full-compliance cost (what EPA calls "needs") per capita for particular SCGs depend on \( q^* \) and on factors that vary across communities. Most importantly, these factors include: a) \( e_{ij} \)—factors determining the threat to environmental quality in the geographic area of SCG \( i \) that are relevant to activity \( j \); b) \( s_{ij} \)—the scale of operation relevant to activity \( j \) for SCG \( i \); c) \( d_{ij} \)—a measure of geographic density of land use relevant to activity \( j \) for SCG \( i \); and d) \( w_{ij} \)—cost conditions in area \( i \) relevant to activity \( j \). Each of these is discussed in turn.

Costs for some activities are expected to vary considerably across SCGs—even though regulatory standards are assumed constant—because of differences in the difficulty of meeting those standards. "Threats to environmental quality" is how we refer to these difficulties. Consider two examples:

- If activity \( j \) is wastewater treatment, \( e_{ij} \) would subsume factors determining the costs to SCG \( i \) of secondary treatment and disposal in conformance with its facility's NPDES permit. These full-compliance costs would be expected to vary considerably across SCGs. Most obviously, costs would depend on: a) the characteristics of wastewater discharged into the public wastewater system (or publicly owned treatment works—POTW), which are likely to reflect industrial activities in the service area, the extent of industrial pre-treatment, and perhaps also the existence and effectiveness of recycling programs to mitigate household discharge of contaminants into the system; and b) the physical characteristics required by the POTW's NPDES permit for water discharged from the public wastewater system (e.g., permitted levels of concentrations of various contaminants), which could vary according to the environmental characteristics—ecological sensitivity and uses—of the bodies of water into which the POTWs discharge and those bodies of water that are under their influence.\(^{25}\)

- If activity \( j \) is treatment of water for drinking, the vector \( e_{ij} \) would subsume factors determining the costs of meeting all of the applicable MCLs. These costs

\(^{24}\)Throughout this discussion "per capita" should be interpreted broadly to accommodate various notions of "population" size that are appropriate in different contexts. For example, if the activity involves drinking water, the appropriate interpretation of "per capita costs" might be costs per hookup; see also below.

\(^{25}\)This may also vary systematically across states because performance standards for wastewater are not specified by federal law.
could vary considerably across SCGs according to whether the raw water source is surface, underground, or purchase (or some combination); and the quality of--level of contaminants in--the untreated water, which would depend on neighboring agricultural and industrial activities, waste sites, and climatic and geologic conditions.

As discussed above, many of the activities of interest here are believed to be subject to substantial economies of scale. Thus full-compliance costs per capita for such activities would depend importantly on the scale of the operation of which activity j is a part. For example, if activity j is related to drinking water, the appropriate measure of scale might be the number of hookups, and if activity j is related to wastewater the appropriate measure of scale might be the system flow rate.

Full-compliance costs for some activities might also depend substantially on some aspect of density of land use--d_{ij}. For example, various activities--such as drinking water sampling or visiting industrial pre-treatment sites--might cost more per capita in less densely populated locales. In addition, if replacing or upgrading of pipes in a drinking water or sewage collection system are truly required for SCG i to comply with environmental regulations (e.g., rather than preventing leakage that would not violate regulations), the quantity of these pipes (and hence the cost of replacing or upgrading them) would be greater the more widely dispersed are the locations connected to the system.

Underlying cost conditions (input prices) may vary considerably among SCGs. Different types of inputs are used in different activities. Depending on the activity, the vector w_{ij} might include local wage levels, material inputs prices (e.g., for chemicals used in water treatment activities), borrowing costs for SCG i (for activities that involve substantial capital inputs), or prices for laboratory tests of drinking water samples (at the state lab in some instances, at private labs in others).

The dependence of full-compliance costs on these sets of factors is represented formally as:

\[ (A.1) \ C_{ij} = C_j(e_{ij}, s_{ij}, d_{ij}, w_{ij}; q^*) \]

where: \( C_{ij} = \) full-compliance cost per capita of activity j for SCG i
\( e_{ij} = \) threats to environmental quality relevant to activity j for SCG i
\( s_{ij} = \) the scale of operation relevant to activity j for SCG i
\[ d_{ij} = \text{density of land use surrounding SCG i relevant to activity j} \]
\[ w_{ij} = \text{cost conditions relevant to activity j for SCG i} \]
\[ q^* = \text{the environmental quality associated with full compliance in all activities} \]

Using subscripts to denote partial derivatives, economies of scale would be expressed as \( C_s < 0 \): full-compliance costs per capita decrease with the scale of an activity, other things equal.

**The determinants of actual costs: theory**

If compliance with federal regulations is incomplete, actual incremental costs of federal regulations will be less than the incremental costs of full compliance.\(^{26}\)

Let \( c_{ij} \) denote the actual cost of activity \( j \) to SCG \( i \). If compliance is incomplete, then \( C_{ij} > c_{ij} \). The basic analytic strategy is to express actual costs in terms of "needs" and non-compliance, because these components are best conceptualized (modeled) separately.

It is natural to think of actual costs as being the product of full-compliance costs and the degree of compliance in activity \( j \):\(^{27}\)

\[
(A.2) \ c_{ij} = C_{ij} f^*_{ij}
\]

We have a conceptualization of \( C_{ij} \); the remaining modeling task relates to \( f^*_{ij} \).\(^{28}\)

This quantity is by definition the fraction of full-compliance costs of activity \( j \) that the SCG \( i \) chooses to incur. We thus need to theorize about how SCG officials decide on compliance matters.

As discussed in section 4, standard "crime and punishment" views of compliance behavior do not seem promising. Rather, compliance seems much more driven by: a) the cost per capita of compliance (i.e., \( C_{ij} \) itself); b) \( y_1 \)--factors determining the financial capacity of SCG \( i \) (e.g., per capita incomes, percentage of

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\(^{26}\)We do not consider here the possibility that some SCGs--because of lack of access to engineering expertise or inefficient execution of some activities--will have actual costs that exceed the corresponding full-compliance costs. If it were to become apparent that this possibility is important, one possible analytic response would be to employ methods developed in the econometric literature on "frontier" estimation (e.g., composed-error models).

\(^{27}\)As will become apparent below, this multiplicative form leads to some substantial--albeit apparently manageable--complications when \( C_{ij} \) cannot be measured directly. But a simpler conceptualization of how full-compliance cost and compliance behavior combine to determine actual costs--i.e., that \( c_{ij} = C_{ij} + f^*_{ij} \)--is unappealing a priori.

\(^{28}\)The * is used to indicate that the degree of compliance is (by assumption) unobservable.
population in poverty, property tax base, amount of industrial activity relative to size of resident population, borrowing costs, tax rates); and c) \( r_i \)--other financial commitments of the SCG (e.g., per capita expenditures on police, education, other environmental activities).\(^29\) Note that factor (a)--the per capita cost of full compliance--is analogous to a price in standard microeconomic theories of choice, and factors in (b) are analogous to income variables in those theories.

Actual costs or compliance are assumed to depend on the financial capacity of SCG \( i \) (\( y_i \)) because these variables directly measure ability to pay. Actual costs are assumed also to depend on other fiscal commitments (\( r_i \)) on the view that view environmental services compete for funding with other services of value to the community.\(^30\) In theory, expenditures on other services are choices that reflect both ability to pay and the values to the community of various types of services (e.g., tastes as reflected in marginal rates of substitution). Thus, we interpret our specification as incorporating both ability and (indirectly) willingness to pay for environmental activities.

It seems likely that tastes for environmental protection also vary considerably across SCGs. While this possibility is not considered further here, we may be able to account for this empirically, e.g., by using information from the perceived benefit survey or by using predictors of ideological commitment to environmentalism that might be computable from Censuses of Population or Governments or from other data.\(^31\)

Formally, we assume:

\[
(A.3) \quad f^{*}_{ij} = f(C_{ij}, y_i, r_i, q^*_i),
\]

where: \( C_{ij} = \) full-compliance cost per capita of activity \( j \) for SCG \( i \)

\( y_i = \) factors determining the financial capacity of SCG \( i \)

\(^29\)In addition to the factors emphasized and analyzed in the text, compliance may also depend importantly on whether the SCG has previously been identified as non-compliant and (as a result) is under special scrutiny from enforcement authorities. (Often what this means is that state and local officials are working together to develop and implement plans to achieve compliance). It is possible that information on the presence of such activity could be obtained through the survey or directly from state or federal enforcement authorities (because it doesn't seem particularly sensitive). However, this possibility is not considered further here.

\(^30\)These variables are specified--i.e., we propose to condition on them to study environmental expenditures--to avoid the (daunting) task of modeling the determinants choices of SCGs of both environmental and non-environmental service levels.

\(^31\)A preliminary search for social science literature relevant to this idea did not turn up much useful information, and this line of inquiry was not pursued further.
\( r_i = \) factors describing other fiscal commitments of SCG \( i \)
\( q_j^* = \) the environmental quality associated with full compliance in activity \( j \)

**Empirical analysis of incremental costs: some possibilities**

Section 4 describes several approaches for making inferences about activities that would not be undertaken in the absence of regulations. These estimates—expressed or totaled in various ways—would be of considerable policy interest in themselves.

Various descriptive analyses of incremental cost estimates would also be of considerable policy interest. For example, it would be useful to analyze how actual costs vary with community size or the scale of the relevant operation. This would allow a characterization of the extent to which the financial burdens associated with economies of scale (as indicated by engineering considerations) are mitigated by compliance choices of SCGs (albeit with potentially adverse environmental consequences). It would also be of interest to compare our estimates of incremental costs with estimates of costs derived from other surveys of SCGs, particularly those that leave it up to the respondent to interpret what costs are relevant and do not require detailing of the judgments involved. Finally, comparison of estimates of actual incremental costs with estimates of "needs" from EPA models—perhaps from special runs using the characteristics of the SCGs in the survey sample—would be useful in gauging the extent to which compliance appears to be less complete as community size or scale of operation declines.

**Interpretation of actual costs of activities in terms of compliance: empirical strategy**

Econometric analysis—while unlikely to be definitive—would allow us to develop valuable, systematic information concerning issues such as:

- To what extent do actual costs reflect needs vs. non-compliance?
- How do actual costs vary with community characteristics or choices assumed to reflect ability and willingness to pay?
- How much higher would incremental costs be if communities with lesser ability or willingness to pay were to comply more fully?

The analyses sketched here indicate why we think it is possible to develop valuable information about these central policy issues.

Equations (A.1), (A.2) and (A.3) provide conceptual guidance for econometric modeling of data on actual incremental costs. It would be of interest to analyze costs by narrowly defined activities (e.g., treatment of drinking water) and also costs
aggregated over activities (e.g., all drinking water activities jointly). Different empirical strategies are suggested depending on whether \( C_{ij} \) can be measured directly. Consider the simpler situation first.

**Case I:** \( C_{ij} \) is observed (i.e., is measured directly).

This case is relevant for activities \( j \) for which EPA has developed models to estimate needs (e.g., models used to construct estimates contained in the Chafee-Lautenberg report). In particular, for such activities measures of \( C_{ij} \) might be computed for each sample community using special runs of the EPA “needs” models.\(^{32}\)

Recall that we are assuming throughout that direct measurement of compliance is not possible. Thus, \( f^*_{ij} \) must be modeled. Using (A.3), the degree of compliance is specified in regression terms as:\(^{33}\)

\[
(A.4) \quad f^*_{ij} = \beta C_{ij} + \gamma y_i + \theta' r_i + \eta_{ij}
\]

where: \( \beta, \gamma, \) and \( \theta \) are regression coefficients (the latter two are vectors), \( \eta_{ij} \) is a stochastic disturbance term, and definitions of \( C_{ij}, y_i, \) and \( r_i \) are given below (A.3). The most appropriate functional forms for a relationship like (A.4)—i.e., what transformations of \( f^*_{ij}, C_{ij}, \) or elements of \( y_i \) and \( r_i \) might be appropriate—has not been considered in detail.

Next let \( z_{ij} = c_{ij}/C_{ij} \) be the ratio of actual costs of activity \( j \) for SCG \( i \) to its corresponding full-compliance level. Note that here (i.e., in Case I) \( z_{ij} \) is observable. Then using (A.2) and (A.4) we can write:

\[
(A.5) \quad z_{ij} = f^*_{ij} = \beta C_{ij} + \gamma y_i + \theta' r_i + \eta_{ij}
\]

Equation (A.5) suggests that the parameters of the compliance equation (A.4)—namely \( \beta, \gamma, \) and \( \theta \)—can be estimated by a multiple linear regression of (perhaps some transformation of) \( z_{ij} \) on (perhaps transformations of) \( C_{ij} \) and the variables in the vectors \( y_i \) and \( r_i.\(^{34}\)

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\(^{32}\)The costs and benefits survey could be supplemented to collect any SCG-specific information needed for those runs that are not available from other sources.

\(^{33}\)Throughout, constant terms (regression intercepts) are suppressed to simplify the notation.

\(^{34}\)Stochastic specifications for \( \eta_{ij} \) are not discussed here (nor for the disturbance \( \varepsilon_{ij} \) introduced below). Discussion of such issues would be premature given that it is yet to be determined what we will be able to condition on (i.e., measure and use as independent variables) in the regressions.
Estimates of these parameters would be informative about the determinants of the degree of compliance. For example, if we estimate—as one might hypothesize—that $\beta < 0$, we would infer that holding ability and willingness to pay constant, increases in full-compliance cost per capita (i.e., the "price of compliance") lead to lower degrees of compliance. The magnitude of $\beta$ would be informative about how sensitive compliance is to this factor. The results would also be informative about the effects of hypothesized determinants of ability to pay for environmental compliance. Consider, for example, an element of $\mathbf{y}_i$ for which increases are associated with higher abilities to pay, e.g., per capita income in SCG $i$. We would expect to estimate a positive coefficient for such a variable in the regression suggested by (A.5). Similar comments apply to coefficients estimated for variables contained in $\mathbf{r}_i$.

In addition, estimates of the regression coefficients in (A.5) could be used to predict the effects on the degree of compliance of changes in full-compliance costs (that result, for example, from improvements in technology, changes in regulations or granting of waivers) or hypothesized determinants of ability to pay. Specifically, this could be done by computing predicted values for $z_{ij}$ using the actual data on some of the variables in $(C_{ij}, \mathbf{y}_i, \mathbf{r}_i)$ and hypothetical values for others. For example, we might predict the effect on $f^*_{ij}$ of decreasing full-compliance cost by 25% say or increasing per capita income of SCG $i$ by 50% say, holding the other elements of $(C_{ij}, \mathbf{y}_i, \mathbf{r}_i)$ constant at their actual values.

**Case II:** $C_{ij}$ is not observed.

For activities for which $C_{ij}$ cannot be treated as data, $C_{ij}$ would also have to be modeled in order to estimate the parameters of the compliance equation (A.4). In this case, (A.1) would also be represented in terms of a multiple regression specification. Consider empirical analogs (i.e., measures) of the conceptual variables assumed in (A.1) to determine full-compliance cost.\(^{35}\) Collect these in a

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\(^{35}\)Precisely what variables would be included is far from clear at this point. The most obvious considerations are feasibility, costs of data development, and respondent burden. Another fundamental consideration is the analytic benefits of obtaining measures of various factors. In particular, the effects of variables suggested by (9.1)—i.e., the determinants of full-compliance costs—are not of direct interest, but these variables are viewed as useful in estimating the determinants of
vector denoted by $x_{ij}$. As discussed above, depending on what activity is under consideration, some candidates for inclusion in this vector include measures of surrounding industrial activity, the source of raw water, the number of hookups in the system, the proximity of the landfill to groundwater, local wage rates, etc. For tractability (see below) and simplicity of this exposition, full-compliance cost is expressed in log-linear terms as:

$$\ln C_{ij} = \alpha' x_{ij} + \varepsilon_{ij}$$

where $\alpha$ is a vector of regression coefficients and $\varepsilon_{ij}$ is a stochastic disturbance term. Since $C_{ij}$ is unobservable, it must be eliminated to arrive at a regression equation involving only observables. The most tractable way to do this is to use logarithmic transformations (as in (A.6)). The exposition here follows this strategy.

First reexpress (A.4) in log-linear terms (i.e., change its functional form) as

$$(A.4') \ln f^*_{ij} = \beta \ln C_{ij} + \gamma y_i + \theta' r_i + \eta_{ij}$$

and note that the transformation of $f^*_{ij}$ is likely to suggest transformation of some variables in $y_i$ and $r_i$ as well. Next, note that (A.2), (A.4') and (A.6) imply

$$\ln c_{ij} = \ln C_{ij} + \ln f^*_{ij} = (\beta + 1) \alpha' x_{ij} + \gamma' y_i + \theta' r_i + [\eta_{ij} + (\beta + 1) \varepsilon_{ij}]$$

Equation (A.7) suggests a regression of $\ln c_{ij}$ (the natural logarithm of actual per capita costs) on (perhaps transformations of) the variables in $x_{ij}, y_i,$ and $r_i$. Doing so would provide estimates of $(\beta + 1)$ times each of the elements in the vector $\alpha$ (i.e., coefficients of the measured determinants of full-compliance cost in (A.6)) and the elements of the parameter vectors $\gamma$ and $\theta$. As in Case I, the estimates and hypothetical (counterfactual) values of elements of $y$ and $r$ could be used to predict how costs would differ for different levels of measured variables assumed to determine ability to pay for environmental compliance.

compliance. If the absence of measures of some particular variables would seem to result in inconsistent estimates of the parameters of (9.5) (i.e., according to analyses of "omitted variable biases"), then very considerable efforts would be appropriate in developing these measures. If this is not the case, the absence of such data would compromise the efficiency of estimation—but not consistency—and such variables would be developed only if the costs of doing so were correspondingly modest.
APPENDIX B: PERCEPTIONS OF REGULATIONS IN SMALL COMMUNITIES

Three general conclusions about perceptions of regulations emerged from our discussions with SCG officials.

- **Low Awareness Levels and Lack of Trust**
  Low levels of awareness of health risks or other risks associated with noncompliance may explain some failures to comply. For example, many respondents noted that there is no firm evidence of risks from lead and copper in drinking water or that they don't "believe" the information available. There also tended to be greater concern about acute health risks than about chronic health risks. One explanation for this lack of information and trust is poor communication of risk information to the local community.

  Community officials were not convinced that many of the existing regulations are worthwhile. Sources of information range from the EPA, state Departments of Health and Ecology, local agencies (e.g., providing information on municipal solid waste), other organizations providing scientific risk data (e.g., NAS), mass media, and academic institutions. Much of the poor coordination and mistrust could be remedied with a risk communication program designed to convey relative risks to members of the community and also to those who interact with local members (e.g., state and county officials) to facilitate consistency in comprehension of the issues and how they affect the local environment and quality of life for citizens.

- **Shared Dislike of "One-Size-Fits-All" Regulations**
  Many of the officials interviewed felt that environmental regulations were designed to meet the goals of EPA or Congress for big cities, which placed undue burden on their communities since most regulations did not or should not apply.

  Focus group participants expressed a strong negative reaction to what they characterized as a “lack of flexibility” of “one-size-fits-all” federal regulations. As used by officials in small communities, the term “inflexibility” subsumes at least three concerns.

  The first concern is that small communities, because of the major fiscal demands of the federally mandated regulations, are unable to pursue other locally important municipal goals, such as crime prevention. One of our focus group members, a city manager from Washington State, said: “EPA and Congress treat us
like irresponsible teenagers"—who cannot be trusted to produce or enforce sensible rules.

The second concern pertains to individual SCGs not being allowed to tailor regulations for specific local conditions (e.g., allowing an isolated trailer park to have lower quality drinking water because the residents vehemently oppose higher expenses for cleaner water).

The third type of criticism encountered under the heading of inflexibility is regulations that seem to be irrelevant in a particular local or regional setting. An example offered is requiring lead and copper testing in an area with no lead or copper pipes.

• Regulations Create Perceptual Barriers to Compliance

When taken at face value, environmental regulations are seen as beneficial for protecting the public health of community members, in some cases for protecting the health of those in other communities, and for protecting the environment. However, a number of perceptual barriers create a dismal outlook for realizing such benefits. For example, because of the impact of environmental regulations on funds available for non-environmental programs, support for them by councils in these small communities was reported to be low. This may explain why SCG officials consistently viewed environmental regulations as having a negative impact on quality of life for their communities, which, in turn, creates barriers to comply with the regulations.

Some of these barriers include a sense of hopelessness and helplessness arising from the allegedly overwhelming cost of compliance. For example, because some respondents felt that the costs of compliance with many components of our three sets of environmental regulations were so high, they found themselves essentially paralyzed and did nothing. Further, they felt that since costs were also skyrocketing out-of-control as time passed, even if funding were currently available, it would be insufficient by the time the compliance efforts were undertaken because costs would have risen. There was also a sense among SCG officials that they have little or no control over constant changes in regulations.
APPENDIX C: FINDINGS FROM WASHINGTON STATE FOCUS GROUPS

We conducted four focus groups in the state of Washington. The 22 participants in the four groups were city mayors and city administrators (e.g., finance, public works) from communities across the state. One group consisted of officials from communities of under 1,000 population, two had populations between one and five thousand, and one group consisted of officials from towns of 5,000 to 15,000 residents. Table 1 describes the numbers of each type of official by community size.

Table 1. Number of Washington State Officials by Type of Official and Community Size

<table>
<thead>
<tr>
<th>Type of Official</th>
<th>Community Size (population)</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt; 1,000</td>
<td>1,000-5,000</td>
<td>5,000-15,000</td>
<td></td>
</tr>
<tr>
<td>Mayor</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Administrator¹</td>
<td>4</td>
<td>4</td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

¹Includes city or town administrators, finance directors, clerk/treasurers, community development directors, and public works directors.

Each focus group discussion lasted for approximately two to three hours. The discussion was organized in three parts. It began with consideration of the perceived benefits of environmental regulations, because we were interested in obtaining responses that were not distorted by discussions about costs. The objective of the discussion was to learn whether the questions tested made sense, whether respondents could answer them with ease and accuracy, and whether they could suggest better ways to ask them. After discussing some general questions about the impact of environmental regulations on quality of life, and about cost-effectiveness, a hand-out consisting of selected paper-and-pencil questions was presented. Participants were asked to complete the questionnaire and to editorialize it as they responded. After questionnaires were completed, the respondents were asked for specific feedback. In the second part of the sessions, respondents were asked about the feasibility of collecting cost information using the instruments and questions described in Section 4. The sessions ended with brief
discussions of issues related to environmental federalism (i.e., intergovernmental relations and sharing of responsibilities).

**Focus Group Responses: Benefits**

Environmental regulation was consistently viewed as having a negative impact on quality of life for the small communities represented. For each group, environmental regulations were characterized as the most burdensome across all community activities and programs. Participants reported that the city council is almost always against these regulations because they impinge upon other community needs.

Participants had some specific suggestions and comments about the six activities that were selected for our pilot benefits question formats. They reported that implementing the proposed radon standard and testing for lead and copper from taps in homes were both carried out only because of regulatory requirements. This is largely because these contaminants are not perceived to be a problem by most of these community representatives. In contrast, testing for coliform was seen as an important activity to carry out because coliform contamination was perceived to be a potential threat to public health. In addition, several of the communities noted that they have been in violation, which links this activity closely to public notification requirements.

Another important point about coliform requirements is that there is no maximum contaminant level. Rather, each community must draw a specific number of samples from its water supply (depending on their population size). The set of samples may not contain more than 5% coliform-positive samples. Two consecutive total coliform-positive sets of samples (one of which contains fecal coliform/E. coli) constitutes an MCL violation. These requirements are quite stringent and elevate the concern about this contaminant.

Lining landfills and renewing wastewater permits were seen as being important for the protection of those living in other communities and for the protection of the environment. However, for landfills it is important to distinguish between solid waste and hazardous waste disposal because of the vast difference in regulatory requirements and concern about relative health risks. Solid waste landfills do not have to meet the stricter standards of hazardous waste disposal sites specified by the Resource Conservation Recovery Act (RCRA) and they do not elicit the same NIMBY (Not In My Back Yard) response. The main reasons
respondents reported for performing selected environmental activities are summarized in Table 2.

Table 2. Main Reasons for Performing Each Environmental Activity

<table>
<thead>
<tr>
<th>Activity</th>
<th>Ranking of Main Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Most Important</td>
</tr>
<tr>
<td>Lead and copper testing</td>
<td>Required</td>
</tr>
<tr>
<td>Coliform testing</td>
<td>Protect own health</td>
</tr>
<tr>
<td>Lining landfills</td>
<td>Protect environment</td>
</tr>
<tr>
<td>Public notification</td>
<td>Protect own health</td>
</tr>
<tr>
<td>Renewing wastewater permit</td>
<td>Required</td>
</tr>
<tr>
<td>Implementing radon standard</td>
<td>Required</td>
</tr>
</tbody>
</table>

With a few exceptions, there tended to be better awareness of environmental regulations in the larger of the small communities (i.e., 5,000-15,000 population). This may have been due to the lower visibility of regulations to the smallest towns until recently. In addition, there is a perception that because a community is rural and has done fine with compliance up until now, all is well and the EPA is just creating more unnecessary rules for them to follow. Smaller community representatives were less trusting and less certain about the validity of the data that regulations are based on. In addition, they questioned the state Department of Ecology for enforcing the rules too strictly.

Participants indicated that among the different activities, those seen as posing a threat to public health were rated as having the most benefit (e.g., coliform testing). Public notification was also viewed as having high benefit, in accordance with prior experiences of coliform violations noted above. Renewing wastewater permits was also perceived as beneficial to protecting health. The lowest perceived benefit was for implementing the proposed radon standard. See Table 3 for a summary of perceived benefits responses.
Table 3. Perceived Benefit of Environmental Activities in Own Community vs. Other Communities

<table>
<thead>
<tr>
<th>Activity</th>
<th>Perceived Benefit to:</th>
<th>Own Community</th>
<th>Other Community</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead and copper testing</td>
<td>Low</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>Coliform testing</td>
<td>High</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>Lining landfills</td>
<td>Moderate</td>
<td>Moderate</td>
<td></td>
</tr>
<tr>
<td>Public notification</td>
<td>Moderate</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>Renewing wastewater permit</td>
<td>Moderate</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>Implementing radon standard</td>
<td>Low</td>
<td>Low</td>
<td></td>
</tr>
</tbody>
</table>

Reported behavioral intentions were consistent with attitudes and perceptions. Respondents reported being most willing to carry out activities that were also viewed as beneficial to protecting public health to individuals in their own community (e.g., coliform). All three formats yielded consistent response patterns and appeared to be successful in obtaining the desired information. For example, most said that if all drinking water regulations were repealed, they would be unlikely to test for lead and copper, that they would not do it as frequently as before, and that they wouldn't do it even if they didn't have to pay for it. In contrast, for coliform testing, they were very likely to do it, would do it as often as before, and would pay for it. Table 4 summarizes our findings for each activity across the different perceptual categories. Management of coliform was perceived to have the most benefit, while lead and copper testing and implementing the proposed radon standard had the lowest perceived benefit. Across all activities, the benefit was mostly to their immediate community rather than to other communities.
Table 4. Reported Behavioral Intention to Engage in Each Activity

<table>
<thead>
<tr>
<th>Activity</th>
<th>Likelihood</th>
<th>Frequency</th>
<th>Willingness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead and copper testing</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Coliform testing</td>
<td>High</td>
<td>Moderate</td>
<td>High</td>
</tr>
<tr>
<td>Lining landfills</td>
<td>Low</td>
<td>Low</td>
<td>Moderate</td>
</tr>
<tr>
<td>Public notification</td>
<td>Moderate</td>
<td>Moderate</td>
<td>High</td>
</tr>
<tr>
<td>Renewing wastewater permit</td>
<td>Low</td>
<td>Low</td>
<td>Moderate</td>
</tr>
<tr>
<td>Implementing radon standard</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>

Perceptions about the level of risk associated with selected contaminants found in drinking water mirror our other findings. These patterns are summarized in Table 5 for each type of risk by each of the three evaluative dimensions: (1) the extent to which the risk is associated with illness, (2) the strength of the scientific data that the risk criteria are based upon, and (3) the extent of knowledge that citizens have for understanding the risk. Again, lead/copper and radon were seen to pose little threat of illness, to have low scientific validity, and there was little knowledge of risk by citizens in their communities. Coliform and giardia were seen as contaminants associated with high health risk, having a valid scientific basis, and were moderately known by citizens in the community.

Table 5. Perceived Risk to Community if Contaminant Was Found in Drinking Water Just Above the MCL

<table>
<thead>
<tr>
<th>Risk</th>
<th>Risk of illness</th>
<th>Strength of data</th>
<th>Public understands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead and copper</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Disinfection by-products</td>
<td>Low</td>
<td>Moderate</td>
<td>Low</td>
</tr>
<tr>
<td>Coliform</td>
<td>High</td>
<td>High</td>
<td>Moderate</td>
</tr>
<tr>
<td>Giardia</td>
<td>High</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Radon</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>
Finally, perception of risk also appears to be correlated with the level of acute (versus chronic) risk with which the pollutant is associated. Clearly the health risks associated with coliform or giardia are much more immediate than the long-term risk for adverse neurologic effects or cancers that are associated with lead, copper or radon exposures.
APPENDIX D: Survey Of Drinking Water Treatment Operations
Dear Local Government Official (personalize if at all possible):

We are conducting a survey of local governments with fewer than 50,000 residents. This survey is sponsored by U.S. Environmental Protection Agency. We estimate that it will take you approximately xx minutes to complete this survey.

The purpose of this survey is to assess the costs and benefits to community governments due to environmental activities required by federal regulations. Your assistance in completing the enclosed survey is needed in order to make this effort a success. The data will help the federal government formulate future environmental policies to address the specific needs of small local governments.

Please call our toll-free line (1-800-xxx-xxx) if you need assistance or have any questions. The toll-free line will be answered by a member of the survey team from 9AM to 6PM, (time zone), Monday through Friday.

Please return the completed survey to us in the enclosed postage-paid envelope. The target date for returning the survey is xxxx, 199x. If we don’t receive your survey by that date, we’ll call to see if you have any questions. In appreciation for your participation, we will send you a copy of the study results.

Sincerely,
Survey of Drinking Water Testing and Treatment Operations

Instructions:

- Please answer each question by checking the appropriate box or filling in a number. You should provide some information for each question, unless an instruction directs you to skip to a specific question.

- Please be assured that the information you provide will be kept strictly confidential.

- If you have any questions about a specific item, your participation, or the study in general, please call our toll-free line at 1-800-xxx-xxxx.

Thank you for your assistance.
Background Information

We need some information about the community you serve and its drinking water system.

1. What is the size of the population in your community?
   
   _______________ PEOPLE

2. What kinds of activities are of special importance to the economy of your community?

   (Check All That Apply)

   [ ] 1 Agriculture
   [ ] 2 Light industry
   [ ] 3 Heavy industry
   [ ] 4 Retail
   [ ] 5 Tourism
   [ ] 6 Other (specify): ________________________________

3. Are there any unusual fiscal conditions we should be aware of (e.g., high indebtedness, strong industrial tax base)?

   (Check One)

   [ ] 0 No
   [ ] 1 Yes (please describe): ________________________________

4. Are there any unusual geologic or environmental conditions?

   (Check One)

   [ ] 0 No
   [ ] 1 Yes (please describe): ________________________________

5. How many service connections are in use?

   _____________ CONNECTIONS

5A. What is the average daily flow in your system?

   _____________ DAILY FLOW MEASURED IN _____________ (UNIT).
6. What is the source of untreated water?

(Check All That Apply)

☐ 1 Surface
☐ 2 Underground
☐ 3 Purchased

6A. Is untreated water subject to local contamination?

(Check One)

☐ 0 No
☐ 1 Yes (please describe the source of contamination):

7. Below we’ve listed common financing sources. Please indicate the three most important financing sources to your system by entering a 1 next to the most important source, a 2 next to the second most important source, and a 3 next to the third most important source.

_____ General Obligation Bonds
_____ Revenue Bonds
_____ Loans
_____ Grants
_____ User Fees
_____ Tax Revenues
_____ Permit Fees
_____ Other (specify):
Costs of Drinking Water Testing and Treatment

The next three questions ask about costs to your community of activities required by federal regulations. If records containing the requested information are not available, please provide your best estimate of the actual number and indicate that this is an estimate.

### (COMPLETE COLUMN A)

8A.
Please report the total costs for the past 12 months of the following activities. Typical costs include labor and lab or consulting fees. Include expenditures for construction, plant or equipment only for items costing less than $1000. If your records do not contain dollar amounts for some costs, please provide estimates. Estimate labor costs by estimating the annual hours of labor devoted to the relevant activities and multiplying by hourly wage rates of workers who perform these activities.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. Taking drinking water samples</td>
<td>$ ____________</td>
</tr>
<tr>
<td>From records OR estimate</td>
<td></td>
</tr>
<tr>
<td>ii. Testing for contaminants</td>
<td>$ ____________</td>
</tr>
<tr>
<td>From records OR estimate</td>
<td></td>
</tr>
<tr>
<td>iii. Reporting and record keeping (e.g., clerks, filing, EPA correspondence)</td>
<td>$ ____________</td>
</tr>
<tr>
<td>From records OR estimate</td>
<td></td>
</tr>
<tr>
<td>iv. Public notification (e.g., mailers, newspaper ads)</td>
<td>$ ____________</td>
</tr>
<tr>
<td>From records OR estimate</td>
<td></td>
</tr>
<tr>
<td>v. Waiver application activities</td>
<td>$ ____________</td>
</tr>
<tr>
<td>From records OR estimate</td>
<td></td>
</tr>
<tr>
<td>vi. Operator training or certification (conferences, courses, etc.)</td>
<td>$ ____________</td>
</tr>
<tr>
<td>From records OR estimate</td>
<td></td>
</tr>
<tr>
<td>vii. Wellhead protection</td>
<td>$ ____________</td>
</tr>
<tr>
<td>From records OR estimate</td>
<td></td>
</tr>
</tbody>
</table>

### (CHECK ONE ON EACH LINE IN COLUMN B)

8B.
Do state regulations supersede federal regulations for this activity? IF YES: Do the additional state regulations have any cost impact?

| Do state regulations supersede federal regulations for this activity? |
|---------------------------|-------------------|---------------------|---------------------|---------------------|
| Yes, but no cost impact   | Yes, small cost impact | Yes, significant cost impact | Don't know |
| No impact                 | (less than 25% of cost) | (25% or more of cost) | |

1 2 3 4 5
8A. Please report the total costs for the past 12 months of the following activities. Typical costs include labor and lab or consulting fees. Include expenditures for construction, plant or equipment only for items costing less than $1000. If your records do not contain dollar amounts for some costs, please provide estimates. Estimate labor costs by estimating the annual hours of labor devoted to the relevant activities and multiplying by hourly wage rates of workers who perform these activities.

viii. Treatment method (specify method used):

Please report the items (e.g. labor, chemicals, power usage) and cost of secondary treatment below. Please check in the box provided whether the information is based on actual records or your estimate.

<table>
<thead>
<tr>
<th>Item</th>
<th>Annual Cost</th>
<th>Record or Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>$</td>
<td>1 2</td>
</tr>
<tr>
<td>b.</td>
<td>$</td>
<td>1 2</td>
</tr>
<tr>
<td>c.</td>
<td>$</td>
<td>1 2</td>
</tr>
<tr>
<td>d.</td>
<td>$</td>
<td>1 2</td>
</tr>
</tbody>
</table>

ix. Other (describe below): $  

☐ From records OR ☐ estimate

Use this space to comment on the information you have provided in Columns A and B:
9. Since 1992, have you made any capital expenditures (for construction, equipment, etc.) of more than $1000 for drinking water treatment or testing?

(Check One)

☐ 0 No  SKIP TO QUESTION 11
☐ 1 Yes

10. Please list below each capital expenditure (i.e., for construction, plant or equipment) since 1992 of more than $1000, the year it was made, and its cost. If records are not available, please provide your best estimate of actual costs and indicate that the figure is an estimate.

<table>
<thead>
<tr>
<th>Item or Service Purchased</th>
<th>Year</th>
<th>Cost</th>
<th>Records</th>
<th>OR</th>
<th>Estimates</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>g.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>h.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>j.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

We would like to understand the way in which you allocate resources (time and money) to community programs in general, and environmental activities required under federal environmental regulations in particular. Our primary goal is to learn how you prioritize the allocation of community resources.

11. In terms of cost-effectiveness, what activities give your community the most benefit relative to their costs? Please answer for each type of program listed below.

a. Across all community programs (such as fire, police, environment, etc.):

b. Within environmental programs:

c. Within the drinking water program:
12. In terms of cost-effectiveness, what activities give your community the least benefit relative to their costs? Please answer for each type of program listed below.

a. Across all community programs (such as fire, police, environment, etc.):

b. Within environmental programs:

c. Within the drinking water program:
Benefits of Water Treatment

13. Please rate the extent to which each of the environmental management activities is beneficial for protecting public health of individuals in your community.

(Circle One Number On Each Line)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Not at all beneficial</th>
<th>Slightly beneficial</th>
<th>Moderately beneficial</th>
<th>Very beneficial</th>
<th>Extremely beneficial</th>
<th>Not applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drinking Water</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Testing for lead and copper from taps in homes instead of within the drinking water system itself</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>b. Testing for coliform as frequently as required by regulations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>c. Any treatment of the drinking water</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>d. Treating the drinking water as frequently as required by regulations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>e. Notifying water customers about results of drinking water tests and MCLs</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
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<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>f. Implementing proposed radon standard</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
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<td>5</td>
<td>6</td>
</tr>
<tr>
<td>If you do not have wastewater facilities, skip to Q.14.</td>
<td></td>
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</tr>
<tr>
<td>Wastewater</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>g. Renewing wastewater permit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>h. Any secondary treatment of wastewater</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>i. Secondary treatment as stringently as required by regulations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>j. Sludge disposal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

14. Consider the potential risk to your community for each of the following drinking water contaminants, if found in your drinking water at a level just above the maximum contaminant level (MCL).

To the best of your knowledge, what is the extent of the health risk? (Please answer even if this contaminant is not a factor in your area).

(Circle One Number On Each Line)

<table>
<thead>
<tr>
<th>Contaminant</th>
<th>Not at all risky</th>
<th>Slightly risky</th>
<th>Moderately risky</th>
<th>Very risky</th>
<th>Extremely risky</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Lead and copper</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>b. Disinfection by-products</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>c. Coliform</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>d. Giardia</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>e. Radon</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
15. To the best of your knowledge, how valid is the scientific basis for setting the MCL for this contaminant?

(Circle One Number On Each Line)

<table>
<thead>
<tr>
<th></th>
<th>Not at all valid</th>
<th>Slightly valid</th>
<th>Moderately valid</th>
<th>Very valid</th>
<th>Extremely valid</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Lead and copper</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>b. Disinfection by-products</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>c. Coliform</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>d. Giardia</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>e. Radon</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

16. Consider the potential risk to your community for each of the following drinking water contaminants, if found in your drinking water at a level just above the maximum contaminant level (MCL).

How accurately is this risk known by citizens of your community?

(Circle One Number On Each Line)

<table>
<thead>
<tr>
<th></th>
<th>Not at all known</th>
<th>Slightly known</th>
<th>Moderately known</th>
<th>Very known</th>
<th>Extremely known</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Lead and copper</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>b. Disinfection by-products</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>c. Coliform</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>d. Giardia</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>e. Radon</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

17. If all environmental regulations were repealed -- both at the state and federal levels -- how often would you carry out each of the activities listed below?

(Circle One Number On Each Line)

<table>
<thead>
<tr>
<th></th>
<th>Would not do at all</th>
<th>Would do much less often</th>
<th>Would do slightly less often</th>
<th>Would do as often as now</th>
<th>Would do more often than now</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Testing for contaminants</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>b. Waiver application activities</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
18. If all environmental regulations were repealed -- both at the state and federal levels -- how extensively would you carry out each of the activities listed below?

<table>
<thead>
<tr>
<th>Activity Description</th>
<th>Would not do at all</th>
<th>Would do much less</th>
<th>Would do slightly less</th>
<th>Would do the same as now</th>
<th>Would do more</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Reporting and records (e.g., clerks, filing, EPA correspondence)</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
<tr>
<td>b. Public notification (e.g., mailers, newspaper ads)</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
<tr>
<td>c. Wellhead protection</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
<tr>
<td>d. Treatment</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
<tr>
<td>e. Other (specify)</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
</tbody>
</table>

19. How long did it take you to complete this questionnaire?

______________ MINUTES

20. We may need to contact you to clarify the information you have provided. Please write your name and daytime phone number below.

NAME:__________________________________________________________

DAYTIME PHONE NUMBER: (_____ ) _____ - _______

21. What is your position in the local government (mayor, council member, director of public works, etc.)?

LOCAL GOVERNMENT POSITION:____________________________________

Thank you for your cooperation. Please place your completed questionnaire in the envelope provided and mail to:
APPENDIX E: Survey Of Wastewater Treatment Operations
Dear Local Government Official (personalize if at all possible):

We are conducting a survey of local governments with fewer than 50,000 residents. This survey is sponsored by U.S. Environmental Protection Agency. We estimate that it will take you approximately xx minutes to complete this survey.

The purpose of this survey is to assess the costs and benefits to community governments due to environmental activities required by federal regulations. Your assistance in completing the enclosed survey is needed in order to make this effort a success. The data will help the federal government formulate future environmental policies to address the specific needs of small local governments.

Please call our toll-free line (1-800-xxx-xxx) if you need assistance or have any questions. The toll-free line will be answered by a member of the survey team from 9AM to 6PM, (time zone), Monday through Friday.

Please return the completed survey to us in the enclosed postage-paid envelope. The target date for returning the survey is xxxx, 199x. If we don't receive your survey by that date, we'll call to see if you have any questions. In appreciation for your participation, we will send you a copy of the study results.

Sincerely,
Survey of Wastewater Treatment Operations

Instructions:

- Please answer each question by checking the appropriate box or filling in a number. You should provide some information for each question, unless an instruction directs you to skip to a specific question.

- Please be assured that the information you provide will be kept strictly confidential.

- If you have any questions about a specific item, your participation, or the study in general, please call our toll-free line at 1-800-xxx-xxxx

Thank you for your assistance.
Background Information

We need some information about the community you serve and the wastewater systems.

1. What is the size of the population served by this system?
   
   ___________ PEOPLE

2. What kinds of activities are of special importance to the economy of your community?
   
   (Check All That Apply)
   
   ☐ 1 Agriculture
   ☐ 2 Light industry
   ☐ 3 Heavy industry
   ☐ 4 Retail
   ☐ 5 Tourism
   ☐ 6 Other (specify): ____________________________

3. Are there any unusual fiscal conditions we should be aware of (e.g., high indebtedness, strong industrial tax base)?
   
   (Check One)
   
   ☐ 0 No
   ☐ 1 Yes (please describe): ____________________________

4. Are there any unusual geologic or environmental conditions?
   
   (Check One)
   
   ☐ 0 No
   ☐ 1 Yes (please describe): ____________________________

5. What is the daily flow of your wastewater facility?
   
   ___________ MILLION GALLONS PER DAY
6. What communities are served by this facility?


7. Below we've listed common financing sources. Please indicate the three most important financing sources to your system by entering a 1 next to the most important source, a 2 next to the second most important source, and a 3 next to the third most important source.

   ___ General Obligation Bonds
   ___ Revenue Bonds
   ___ Loans
   ___ Grants
   ___ User Fees
   ___ Tax Revenues
   ___ Permit Fees
   ___ State Revolving Fund
   ___ Other (specify): ____________________________
Cost of Water Treatment

The next three questions ask about costs to your community of activities required by federal regulations. If records containing the requested information are not available, please provide your best estimate of the actual number and indicate that this is an estimate.

<table>
<thead>
<tr>
<th>(COMPLETE COLUMN A)</th>
<th>(CHECK ONE ON EACH LINE IN COLUMN B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8A.</td>
<td>8B. Do state regulations supersede federal regulations for this activity? If YES: Do the additional state regulations have any cost impact?</td>
</tr>
</tbody>
</table>

Please report the total costs for the past 12 months of the following activities. Typical costs include labor and lab or consulting fees. Include expenditures for construction, plant or equipment only for items costing less than $1000. If your records do not contain dollar amounts for some costs, please provide estimates. Estimate labor costs by estimating the annual hours of labor devoted to the relevant activities and multiplying by hourly wage rates of workers who perform these activities.

☐ 1 CHECK IF NO PRETREATMENT PROGRAM AND SKIP TO ii ON NEXT PAGE

OR

Activity

i. Pretreatment

a. Setting standards $ ________________
   ☐ From records OR ☐ estimate

b. Dealing with violations $ ________________
   ☐ From records OR ☐ estimate

c. Removal credits $ ________________
   ☐ From records OR ☐ estimate

d. Identifying sources $ ________________
   ☐ From records OR ☐ estimate

e. Analyzing reports $ ________________
   ☐ From records OR ☐ estimate

Yes, but no cost impact
Yes, small cost impact
Yes, significant cost impact
Don't know

No impact

(less than 25% of cost)
(25% or more of cost)
8A.

Please report the total costs for the past 12 months of the following activities. Typical costs include labor and lab or consulting fees. Include expenditures for construction, plant or equipment only for items costing less than $1000. If your records do not contain dollar amounts for some costs, please provide estimates. Estimate labor costs by estimating the annual hours of labor devoted to the relevant activities and multiplying by hourly wage rates of workers who perform these activities.

ii. Secondary treatment (list method used): __________

Please report the items (e.g. labor, chemicals, power usage) and cost of secondary treatment below. Please check in the box provided whether the information is based on actual records or your estimate.

<table>
<thead>
<tr>
<th>Item</th>
<th>Annual Cost</th>
<th>Records or Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. <strong><strong><strong><strong><strong>→ $</strong></strong></strong></strong></strong></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>b. <strong><strong><strong><strong><strong>→ $</strong></strong></strong></strong></strong></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>c. <strong><strong><strong><strong><strong>→ $</strong></strong></strong></strong></strong></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>d. <strong><strong><strong><strong><strong>→ $</strong></strong></strong></strong></strong></td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

iii. Laboratory fees (if any) $__________

☐ From records OR ☐ estimate

iv. Study/consulting fees $__________

☐ From records OR ☐ estimate

v. Sludge disposal $__________

☐ From records OR ☐ estimate

vi. Operator training or certification (conferences, courses, etc.) $__________

☐ From records OR ☐ estimate

vii. Reporting and record keeping $__________

☐ From records OR ☐ estimate

viii. Other (describe below): $__________

☐ From records OR ☐ estimate

(CHECK ONE ON EACH LINE IN COLUMN B)

8B.
Do state regulations supersede federal regulations for this activity? IF YES: Do the additional state regulations have any cost impact?

<table>
<thead>
<tr>
<th>Yes, but no cost impact</th>
<th>Yes, small cost impact (less than 25% of cost)</th>
<th>Yes, significant cost impact (25% or more of cost)</th>
<th>Don't Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
Use this space to comment on the information you have provided in Columns 8A and 8B:

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

9. Since 1992, have you made any capital expenditures (for construction, plant, equipment, etc.) of more than $1000 for wastewater treatment?

(Check One)

☐ 0 No → SKIP TO QUESTION 12

☐ 1 Yes

10. Please list below each capital expenditure (i.e., for construction, plant or equipment) since 1992 of more than $1000, the year it was made, and its cost. If records are not available, please provide your best estimate of actual costs and indicate that the figure is an estimate.

<table>
<thead>
<tr>
<th>Item or Service Purchased</th>
<th>Year</th>
<th>Cost</th>
<th>Records</th>
<th>OR</th>
<th>Estimates</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>b.</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>c.</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>d.</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>e.</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>f.</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>g.</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>h.</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>i.</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>j.</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

11. Why were these expenditures made?

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

12. What expenditures have been made, if any, to renew your NPDES permit?

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________
We would like to understand the way in which you allocate resources (time and money) to community programs in general, and environmental activities required under environmental regulations in particular. Our primary goal is to learn how you prioritize the allocation of community resources.

13. In terms of cost-effectiveness, what activities give your community the most benefit relative to their costs? Please answer for each type of program listed below.
   a. Across all community programs (such as fire, police, environment, etc.):

   b. Within environmental programs:

   c. Within the wastewater program:

14. In terms of cost-effectiveness, what activities give your community the least benefit relative to their costs? Please answer for each type of program listed below.
   a. Across all community programs (such as fire, police, environment, etc.):

   b. Within environmental programs:

   c. Within the wastewater program:
Benefits of Water Treatment

15. Please rate the extent to which each of the environmental management activities is beneficial for protecting public health of individuals in your community.

(Circle One Number On Each Line)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Not at all beneficial</th>
<th>Slightly beneficial</th>
<th>Moderately beneficial</th>
<th>Very beneficial</th>
<th>Extremely beneficial</th>
<th>Not applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wastewater</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Renewing wastewater permit</td>
<td>¹</td>
<td>²</td>
<td>³</td>
<td>⁴</td>
<td>⁵</td>
<td>⁶</td>
</tr>
<tr>
<td>b. Any secondary treatment of wastewater</td>
<td>¹</td>
<td>²</td>
<td>³</td>
<td>⁴</td>
<td>⁵</td>
<td>⁶</td>
</tr>
<tr>
<td>c. Secondary treatment as stringently as required by regulations</td>
<td>¹</td>
<td>²</td>
<td>³</td>
<td>⁴</td>
<td>⁵</td>
<td>⁶</td>
</tr>
<tr>
<td>d. Sludge disposal</td>
<td>¹</td>
<td>²</td>
<td>³</td>
<td>⁴</td>
<td>⁵</td>
<td>⁶</td>
</tr>
</tbody>
</table>

If you do not have drinking water facilities, skip to Q. 16

**Drinking Water**

e. Testing for lead and copper from taps in homes instead of within the drinking water system itself                      | ¹                     | ²                    | ³                     | ⁴              | ⁵                    | ⁶             |

f. Testing for coliform as frequently as required by regulations                                                   | ¹                     | ²                    | ³                     | ⁴              | ⁵                    | ⁶             |

g. Any treatment of the drinking water....                                                                               | ¹                     | ²                    | ³                     | ⁴              | ⁵                    | ⁶             |

h. Treating the drinking water as frequently as required by regulations                                                | ¹                     | ²                    | ³                     | ⁴              | ⁵                    | ⁶             |

i. Notifying water customers about results of drinking water tests and MCLs                                            | ¹                     | ²                    | ³                     | ⁴              | ⁵                    | ⁶             |

j. Implementing proposed radon standard                                                                                | ¹                     | ²                    | ³                     | ⁴              | ⁵                    | ⁶             |

16. If all environmental regulations are repealed -- both at the state and federal levels -- how often would you carry out each of the activities listed below?

(Circle One Number On Each Line)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Would not do at all</th>
<th>Would do much less often</th>
<th>Would do slightly less often</th>
<th>Would do as often as now</th>
<th>Would do more often than now</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Pretreatment</td>
<td>¹</td>
<td>²</td>
<td>³</td>
<td>⁴</td>
<td>⁵</td>
</tr>
<tr>
<td>b. Secondary treatment</td>
<td>¹</td>
<td>²</td>
<td>³</td>
<td>⁴</td>
<td>⁵</td>
</tr>
<tr>
<td>c. Laboratory tests (if any)</td>
<td>¹</td>
<td>²</td>
<td>³</td>
<td>⁴</td>
<td>⁵</td>
</tr>
<tr>
<td>d. Conducting studies and employing consultants</td>
<td>¹</td>
<td>²</td>
<td>³</td>
<td>⁴</td>
<td>⁵</td>
</tr>
<tr>
<td>e. Sludge disposal</td>
<td>¹</td>
<td>²</td>
<td>³</td>
<td>⁴</td>
<td>⁵</td>
</tr>
</tbody>
</table>
17. If all environmental regulations are repealed -- both at the state and federal levels -- how stringently would you carry out each of the activities listed below?

<table>
<thead>
<tr>
<th>Activity</th>
<th>Would not do at all</th>
<th>Would do much less</th>
<th>Would do slightly less</th>
<th>Would do the same as now</th>
<th>Would do more</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Operator training/certification</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>b. Reporting and record keeping</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

18. How long did it take you to complete this questionnaire?

___________ MINUTES

19. We may need to contact you to follow-up on the information you have provided. Please write your name and daytime phone number below.

NAME:__________________________________________________________

DAYTIME PHONE NUMBER: (______) _______ - _________

20. What is your position in the local government (mayor, council member, director of public works, etc.)?

LOCAL GOVERNMENT POSITION: ____________________________________

Thank you for your cooperation. Please place your completed questionnaire in the envelope provided and mail to: