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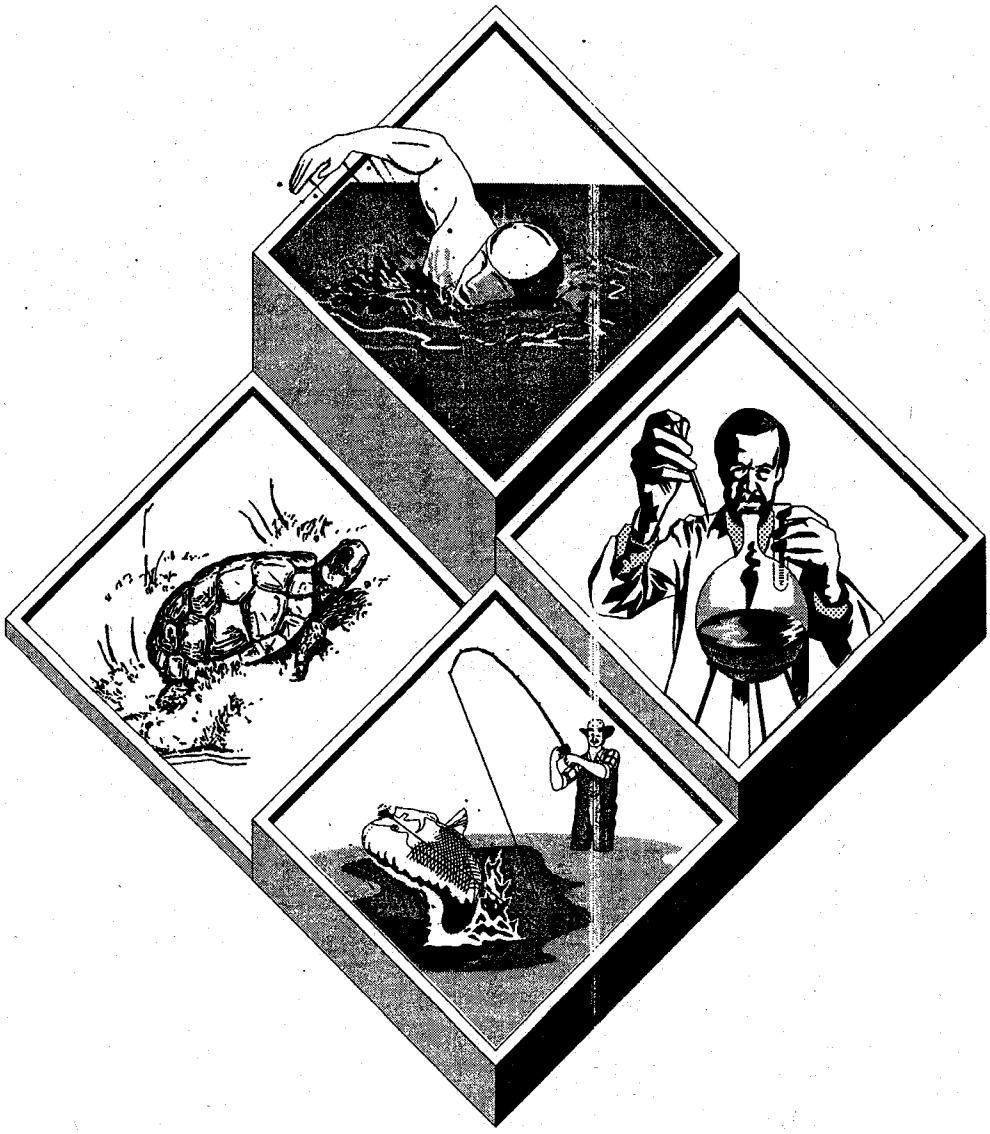
EPA

Interim Economic Guidance for Water Quality Standards

Workbook



"... to restore and maintain the chemical, physical, and biological integrity of the Nation's waters."

Section 101(a) of the Clean Water Act

Appendix M to the
Water Quality Standards Handbook - Second Edition

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

APR 27 1995

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OFFICE OF WATER

MEMORANDUM

SUBJECT: Economic Guidance for Water Quality Standards--Workbook

FROM: Tudor T. Davies, Director
Office of Science and Technology

TO: Water Management Division Directors
Regions I - X

PURPOSE

The purpose of this memorandum is to transmit the Interim Economic Guidance for Water Quality Standards Workbook for use by the States and Regions in considering economics at various points in the process of setting or revising water quality standards.

POLICY IMPLEMENTATION:

We recommend the subject guidance, including the various screening levels and measures presented, be implemented as reference points and used as guides by the States and Regions. The measures outlined in the guidance are not intended to be applied as absolute decision points. States may use other economically defensible approaches in lieu of those suggested in this interim guidance.

This guidance is designed for use in the water quality standards program and does not represent Agency guidance outside of that program.

BACKGROUND:

Economic factors may be considered at several different points in the water quality standards program. The water quality standards regulation provides for such consideration in the following areas:

Section 131.10--Designation of Uses (also applies to variances)

(g)(6) Controls more stringent than those required by Sections 301(b) and 306 of this Act would result in substantial and widespread economic and social impact.

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Section 131.12--Antidegradation

(a)(2)...allowing lower water quality is necessary to accommodate important economic or social development in the areas in which the waters are located...

Since publication of the water quality standards regulation in 1983 we have produced extensive guidance on the interpretation and application of the various regulatory requirements. None of this guidance, however, dealt extensively with the economic considerations.

This guidance workbook is intended to fill that gap. It is anticipated that the guidance will be revised from time to time to reflect State and Regional experience in its application. For example we intend to add case studies as appendices to the guidance to reflect real-world experiences in its application. In addition, the Agency is considering revising the water quality regulation. If revisions to the regulation are made with respect to economic considerations, the applicable guidance will be revised accordingly. However, it is likely to be at least 3 years before any revisions to the regulation are finally promulgated and no way of anticipating whether any changes will be made in the economic provisions.

This guidance is presented to assist States and EPA Regional Offices, along with other interested parties, in understanding the economic factors that <u>may</u> be considered, and the types of tests that <u>can</u> be used to determine: (1) if a designated use cannot be attained, (2) if a variance to an individual discharger can be granted, or (3) if degradation of high-quality water is warranted.

The regulatory requirement that <u>must</u> be met is that attaining a designated use or obtaining a variance would result in substantial and widespread economic and social impacts. The regulatory requirement for antidegradation is that it <u>must</u> be shown that lower water quality is necessary to accommodate important social and economic development. This guidance provides a framework for making these determinations.

The measures and tests suggested in this guidance are standard economic analytical tools, but the States are free to provide other kinds of analysis to support their position. The guidance does provide information on the kinds and types of analysis that are appropriate and how the information can be assembled in order to make a decision. It is not an exhaustive description of all appropriate economic analysis. Additional information and tests may be necessary and/or desirable in certain circumstances.

The economic impacts to be considered are those that result from treatment beyond that required by technology-based regulations. All economic analyses of water quality standards should address only the cost of improving the water to meet water quality standards or the cost of maintaining water quality in high-quality waters.

Although EPA is responsible for approving a State's water quality standards, the State is responsible for interpreting the circumstances of each case and determining where there are substantial and widespread economic and social impacts, or where important economic and social development would be inappropriately precluded.

Various drafts of this guidance were reviewed by EPA headquarters and regional offices, States, and other organizations. State and Regional staff should feel free to contact the Economic and Statistical Analysis Branch in the Office of Science and Technology for advice and assistance regarding this guidance or related concerns. We would appreciate receiving feedback from the users of this guidance so that it can be improved as necessary. As with all guidance related to the water quality standards program, this document is considered to be part of the Water Quality Standards Handbook--Second Edition.

cc: Lee Schroer , OGC
Jim Pendergast, OWM
John Meagher, OWOW
William Painter, OPPE
Regional WQS Coordinators, Regions I - X

INTERIM ECONOMIC GUIDANCE FOR WATER QUALITY STANDARDS

WORKBOOK

Economics and Statistical Analysis Branch

Office of Science and Technology

Office of Water

U.S. Environmental Protection Agency

March 1995

ECONOMIC GUIDANCE FOR WATER QUALITY STANDARDS WORKBOOK
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ECONOMIC GUIDANCE FOR WATER QUALITY STANDARDS

WORKBOOK

1. INTRODUCTION

As presented in the Water Quality Standards Regulation, economic factors are taken into consideration at various points in the process of setting, enforcing, or changing Water Quality Standards This guidance is presented to assist States and applicants in understanding the economic factors that may be considered, and the types of tests that can be used to determine if a designated use cannot be attained, if a variance can be granted, or if degradation of high-quality water is warranted. In order to remove a designated use or obtain a variance, the State or discharger must demonstrate that attaining the designated use would result in substantial and widespread economic and social impacts. Likewise, if a degradation in high-quality water is proposed, it must be shown that lower water quality is necessary to accommodate important social and economic development.

This workbook provides guidance for those seeking to remove a designated use (such as might occur under a Use Attainability), or obtain a variance based on economic considerations, or to lower water quality in a high-quality water. In addition, it provides guidance to States and EPA regions responsible for reviewing requests for variances and modifications to designated uses, and for approval of antidegradation analyses. The guidance describes the types of information and analyses that should be considered by applicants and reviewers. The guidance, however, is not an exhaustive description of appropriate economic impact analyses. Additional information and tests may be necessary and/or desirable in certain circumstances.

The economic impacts considered are those that result from treatment beyond that required by technology-based regulations. Since water quality cannot be lower than that resulting from technology-based limits applied to direct and indirect point source discharges and reasonable Best Management Practices (BMP) applied to nonpoint sources, these are considered to be the baseline. All economic impact analyses of water quality standards should, therefore, address only the cost of improving the water to meet water quality standards or the cost of maintaining water quality in high-quality waters.

Although EPA is responsible for approving a State's water quality standards, the State is responsible for interpreting the circumstances of each case and determining

where there are substantial and widespread economic and social impacts, or where important social and economic development would be inappropriately precluded. Each analysis of economic impacts must demonstrate:

- that the polluting entity, whether privately or publicly owned, would face substantial financial impacts due to the costs of the necessary pollution controls (substantial impacts or would interfere with development), and

- that the affected community will bear significant adverse impacts if the entity is required to meet existing or proposed water quality standards (widespread impacts or important development).

This Workbook supplements the description contained in the *Water Quality Standards Handbook*, which should be read first as it contains many important definitions and descriptions of the regulations. Specific attention should be paid to Chapters 2 (Designation of Use) and 4 (Antidegradation), which describe the context in which this guidance is to be used. This Workbook is designed as a series of worksheets and accompanying guidance to be used when actually calculating the impacts of pollution control.

The intent of this workbook is to point States and dischargers in the right direction. It does not give definitive answers as to whether or not an entity has demonstrated substantial, widespread, or important economic and social impacts. If a State or discharger has difficulty with any part of the analysis presented in this workbook, they should consider seeking the assistance of a financial expert. In addition, State and regional EPA water quality staff should feel free to contact EPA headquarters' Economic and Statistical Analysis Branch in the Office of Water for advice and assistance.

The remaining sections of Chapter 1 provide an overview of the analysis and describe various factors and concepts that generally apply to analyzing the economic impacts of compliance with water quality standards. The following four chapters provide detailed guidance.

Throughout this Workbook, the term "financial impacts" refers to impacts on the entity or party that will pay for the pollution control, whereas the term "socioeconomic impacts" refers to changes in the social and/or economic conditions of the affected community. For public-sector entities, such as a publicly owned treatment works (POTW), substantial impacts include financial impacts on the community, taking into consideration current socioeconomic conditions. Widespread, on the other hand, refers to changes in the community's socioeconomic conditions. By contrast, for private-sector entities, substantial impacts refer to financial impacts and widespread

impacts refer to socioeconomic impacts on the surrounding community. In addition, the term "applicant" refers to whomever will actually complete the economic impact analysis, whether it be the State, an individual discharger, a consultant, or some other organization.

1.1 Designated Uses, Variances, and Antidegradation

Pursuant to the Water Quality Standards Regulation (40 CFR 131), States must define statewide water quality goals by: 1) designating water uses and 2) adopting water quality criteria that protect the designated uses. When designating uses, States must consider the use and value of the waterbody for public water supplies, protection and propagation of fish, shellfish and wildlife, recreation in and on the water, agricultural, industrial, and other purposes including navigation. The designated use may or may not coincide with the existing use, but it cannot reflect lower water quality than the existing use. As described in the *Water Quality Standards Handbook*, if the designated use of a water body is also an existing use, the designated use cannot be downgraded to one that requires less stringent water quality criteria. If, however, the designated use is not an existing use the States may, under certain circumstances, remove the designated use, create new subcategories of the use, or grant a water quality standard.

Before a designated use is removed a State or a discharger must conduct and submit a use attainability analysis to EPA. Briefly, a use attainability analysis is an assessment of the physical, chemical, biological and, if necessary, economic factors affecting the attainment of a use. If the analysis shows that, based on any one of these factors, conditions exist which make the use unsuitable or impossible to achieve, then the State may remove the designated use.

In many cases, a designated but unattained use for a stream segment need not be removed. Instead, individual dischargers may be granted variances from the water quality standards for a limited time with the expectation that they will be able to comply with water quality standards by the time their variance expires. A variance is preferable to a removal of a designated use since other dischargers, who are capable of meeting the standards, must comply with the standards through their permits. In cases where a discharger can meet water quality based permit limits for some parameters, a variance would not be granted for those parameters. The variance procedure is designed to encourage compliance with the Clean Water Act within a reasonable timeframe.

States are also required to adopt an antidegradation policy to protect existing uses, high-quality waters, and water quality in waters that are considered to be outstanding national resources. The antidegradation policy allows States to lower water quality in

higher-quality waters only if it is necessary to accommodate important economic or social development. The use of the term "important" communicates a general sense of the level of economic and social development. This provision is intended to permit degradation of high-quality water bodies in only a few extraordinary cases where the benefits of the economic or social development unquestionably outweigh the costs of lowering water quality. Under no circumstances, however, may water quality fall below that required to protect existing or designated uses.

For each of the circumstances described above, the Water Quality Standards Regulation allows the applicant to take economic considerations into account. When applying for a change in a designated use or for a variance, the applicant must demonstrate that meeting water quality standards will cause substantial and widespread economic and social impacts. The antidegradation provision requires that the applicant demonstrate that important economic or social development would be prevented unless lower water quality is allowed. In all three cases, the same general tests of impacts are used.

1.2 Pollution Sources

The choice of methods used to evaluate the economic impacts of meeting water quality standards depend, in part, on whether pollution control is the responsibility of a privately or a publicly owned entity. Since the polluting entity or party may not be the one to pay for reductions, the analyses focus on the party that pays for pollution control. Some of the more common privately owned entities include, but are not limited to: manufacturing facilities, agricultural operations, shopping centers and other commercial development, residential developments, and recreational developments. Publicly owned entities include: publicly owned sewage treatment works, roads, and other municipal infrastructure.

In an economic impact analysis, the distinction between private-sector and public-sector entities is important as it determines not only who will pay for the necessary pollution control, but also the types of funding mechanisms available. For example, in the case of a privately-owned entity, the facility can raise the money through loans and equity funds but may try to pass some or all of the cost on to the consumer in the form of higher prices. In the case of a publicly-owned entity, the community can float bonds to pay for the capital costs, with the cost of the bonds and operating expenses covered by user fees and/or tax revenues. The different impact measures are addressed in two separate chapters. Chapter Two provides guidance on public-sector entities and Chapter Three provides guidance on private-sector entities.

Whether publicly or privately owned, polluting entities can be point (direct discharge) or nonpoint (runoff and erosion) sources of pollution. Attainment of water

quality standards is not limited to controls placed on point sources. Water quality standards are applicable to nonpoint sources of pollution despite the fact that there may be no direct implementation mechanisms for nonpoint sources. Although pollution control approaches used by nonpoint sources may differ substantially from approaches typically employed by point sources, analysis of the ensuing economic impacts still depends upon whether the entity providing the pollution control is privately or publicly owned.

1.3 Substantial Impacts

A financial analysis of the discharger should be conducted to determine if the capital and the operating and maintenance costs of pollution control will have a substantial impact. This analysis is typically performed by the discharger and reviewed by the State, although there may be cases where the State or some other group completes the analysis on behalf of the discharger. The first step is to estimate the capital and the operation and maintenance costs of the necessary pollution control (see Figure 1-1). The second step is to determine how the entity will finance the necessary reductions. If the entity is publicly-owned (e.g. a municipal sewage treatment plant), the households in the community will bear the cost either through an increase in user fees, an increase in taxes or a combination of both. The burden to households resulting from total annual pollution control costs must be estimated. In addition, the financial impact analysis must consider the community's ability to obtain financing and the general economic health of the community.

If the entity is privately-owned (e.g. a manufacturing facility), the analysis should consider factors such as the entity's ability to secure financing and the degree to which it will be able to pass the cost of pollution control on to its customers in the form of higher prices. The financial impact analysis of private-sector entities employs a variety of financial ratios and tests. Some of these ratios and tests include benchmark values to help in the analysis.

Demonstration of substantial financial impacts is not sufficient reason to modify a use or grant a variance from water quality standards. Rather, the applicant must also demonstrate that compliance would create widespread socioeconomic impacts on the affected community.

1.4 Widespread Impacts

States and dischargers will need to consider the possibility that financial impacts could cause far reaching and serious impacts to the community. An important factor in determining the magnitude of these impacts is defining the geographical area

affected. The affected area might be a town, city, region, county or some combination of these geographical units.

Equally important are the *types* of impacts that might occur. There are no economic ratios or tests per se to evaluate socioeconomic impacts. Instead, the relative magnitude of a group of indicators should be taken into account. For public-sector entities, the applicant will need to estimate the change in socioeconomic conditions that would occur as a result of compliance. Of particular importance are changes in factors such as median household income, unemployment, and overall net debt as a percent of full market value of taxable property. For private-sector entities, the assessment of widespread impacts should consider many of the same socioeconomic conditions. The analysis should also consider the effect of decreased tax revenues if the private-sector entity were to go out of business, income losses to the community if workers lose their jobs, and indirect effects on other businesses.

In some instances, several entities potentially may suffer substantial impacts. For example, this situation can arise where several facilities are discharging to a stream segment that is being considered for a change in designated use. While a separate financial analysis should be performed for each facility, the impacts on all the facilities should be considered jointly in the analysis of widespread impacts.

1.5 Antidegradation

As with removing a use or granting a variance, eco-nomic impacts are considered as part of an antidegradation review. While the terminology is different, the tests are basically the same. In the first case (discussed in Chapters 2, 3, and 4), a finding of substantial and widespread economic impacts can be the basis for granting a variance or changing a designated use. In the case of antidegradation, the analysis must show that maintaining "high-quality waters" will preclude important economic and social development. As such, the two cases can be thought of as two sides of the same coin. Variances and downgrades refer to situations where additional treatment to meet standards may result in declining economic and social conditions, while antidegradation refers to situations where lowering water quality may result in improved social and economic conditions.

When performing an antidegradation analysis, the first question is whether the costs of the pollution controls needed to maintain the high-quality water will interfere with the development. If not, then lower water quality is not "necessary" for the development to take place. If, on the other hand, the costs will interfere with the development and lower water quality is "necessary" for the development to take place, then the analysis must show that the development would be an important economic

and social development. These two steps rely on the same test as the determination of substantial and widespread economic and social impacts.

1.6 Organization of the Rest of the Workbook

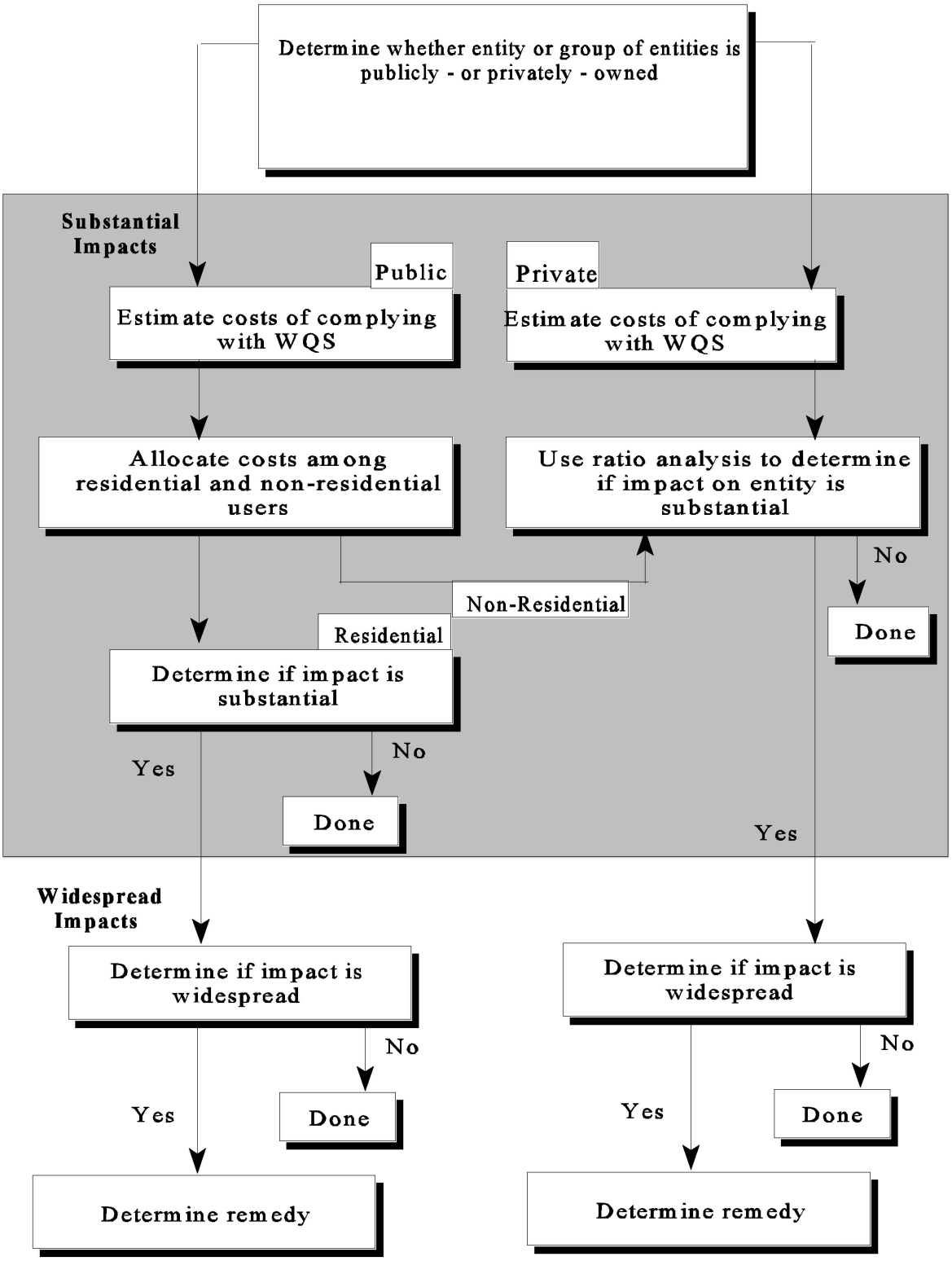
The remainder of this Workbook addresses the measurement of economic impacts. In Chapter 2, guidance is presented to assist applicants in evaluating financial impacts on public-sector entities. Chapter 3 presents guidance on evaluating financial impacts on private-sector entities. Chapter 4 provides a discussion of how to assess whether impacts are widespread as well as substantial. This discussion includes both public-sector and private-sector entities. Chapter 5 applies the concepts developed in Chapters 2, 3, and 4 to antidegradation.

Worksheets are included in each chapter that will assist the reader in calculating potential impacts. Chapters 2 and 3 include worksheets for: 1) estimation of annualized costs of pollution control, and 2) evaluation of the financial burden of pollution control. Chapter 4 includes worksheets that can be used in the evaluation of whether the impacts on the entity(ies) will result in widespread economic and social impacts. Chapter 5 includes worksheets for determining if important social and economic development might be lost.

In addition to presenting step by step guidance on how to estimate impacts, several of the worksheets provide benchmark comparisons that allow an assessment of the magnitude and relative importance of potential impacts. These worksheets, however, should not be used in isolation. Discussion of key sources of information, important entity and community attributes, and interpretation of results are found only in the accompanying text. Applicants, and State Water Quality staff charged with reviewing the application, should be sure to read all text accompanying the worksheets. While Chapter 2 addresses public-sector treatment requirements, if a substantial portion of the costs of a public facility is borne by a private entity (such as a manufacturing facility that pays substantial user charge fees to a POTW), both Chapters 2 and 3 should be referred to.

In all cases, the determination of economic and social impacts must be made on a case by case basis. This determination, therefore, requires the application of good judgement as well as use of the guidance provided in this workbook. Additional information and tests may be required in order to measure the size and extent of the impacts. Applicants should be aware that they will be required to supply documentation to substantiate their claim of substantial and widespread economic and social impacts. In addition to background data, however, this documentation should include a brief written description of why the applicant believes economic and social impacts will occur.

Figure 1-1:
Steps in the Economic Impact Analysis
Determining Whether Impacts Will be Substantial and Widespread



2. EVALUATING SUBSTANTIAL IMPACTS: PUBLIC SECTOR ENTITIES

Public entities seeking relief from meeting water quality standard requirements must demonstrate that the cost of required water pollution control will result in substantial impacts and that there will be "widespread" adverse social and economic impacts if they are required to meet these standards. For the purposes of this workbook, a public entity refers to any governmental unit that must comply with pollution control requirements in order to meet water quality standards. The most common example is a municipality or sewage authority operating a publicly owned treatment works (POTW) that must be upgraded or expanded. Municipalities, however, may also be required to control other point sources or nonpoint sources of pollution within their jurisdiction. The procedures outlined in this chapter apply to all types of publicly financed projects that may be required to meet water quality standards. Throughout this chapter, the term "State/discharger" refers to whoever will actually conduct the financial and socioeconomic impact analysis for the public entity, whether it be the State, the municipality, a consultant or some other organization.

The remainder of this chapter details methodologies and sources of information for determining the financial viability of publicly financed projects. Several worksheets are presented that will assist in demonstrating substantial impacts. States/dischargers are referred to Chapter 4 for guidance on demonstrating widespread impacts. Readers should keep in mind that the guidance in this chapter is not meant to be exhaustive. The State and/or EPA may require additional information or tests in order to evaluate whether substantial and widespread impacts will occur. In addition, the State/discharger should feel free to include any additional information they think is relevant.

As mentioned in Chapter 1, the evaluation of substantial impacts resulting from public entity compliance with water quality standards includes two elements, 1) financial impacts to the public entity and 2) current socioeconomic conditions of the community. Governments have the authority to levy taxes and distribute pollution control costs among households and businesses according to the tax base. Similarly, sewage authorities charge for services, and thus can recover pollution control costs through users fees. In both cases, a substantial impact will usually affect the wider community. Whether or not the community faces substantial impacts depends on both the cost of the pollution control and the general financial and economic health of the community.

If the public entity passes a significant portion of the pollution control costs along to private facilities or firms, then the review procedures outlined in Chapter 3 of this workbook should also be consulted to determine the impact on the private entities. Both public and private entities should consult Chapter 4 for guidance on how to estimate potential widespread impacts on the community.

This chapter focuses on ways to determine if the costs of the proposed project will likely result in substantial impacts. To make this determination the State/discharger will need to complete a five step analysis. As shown in Figure 2-1 the first step in the process is to estimate the cost of the pollution control project and calculate the annual cost of the proposed pollution control project. The second step is to calculate the total annual pollution control cost per household, which includes the cost of the project and existing pollution control costs. In the third step, the Municipal Preliminary Screener is calculated, which quickly identifies entities that clearly will not experience substantial impacts due to the cost of the necessary pollution control. If it is not clear whether there will be substantial impacts, entities should proceed to the fourth step, which is the calculation of the Secondary Test. In this step public entities will need to provide financial and socioeconomic information. For example, the ability of the community to finance the project may depend on existing financial conditions in the community such as debt per capita and the community's bond rating. The socioeconomic health of the community prior to the project's construction will also be an important indicator of whether the pollution control would impose a substantial impact on the community. The fifth and final step of determining whether impacts are "substantial" is evaluating where the community falls in the impacts matrix. This matrix takes into consideration the Municipal Preliminary Screener and the Secondary Test score. Later, in Chapter 4, estimated changes in socioeconomic health indicators will be reviewed to evaluate the extent to which the impacts can be considered widespread.

The remainder of this chapter is divided into five sections that detail the essential steps of an evaluation of substantial impacts for publicly financed projects. Figure 2-1 illustrates the steps and decision points in this process. The five steps are:

- **Verify Project Costs and Calculate the Annual Cost of the Pollution Control Project** - This section discusses factors that should be considered when selecting a pollution control project. It also describes the type of general information about the proposed project that should be provided. In addition, it discusses how to annualize capital costs of the project and calculate total annual costs of the pollution control project.

- **Calculate Total Annualized Pollution Control Costs Per Household** - This section outlines the calculation of total annual pollution control costs per household. The costs of the proposed project and existing pollution control are included.

- **Calculate and Evaluate the Municipal Preliminary Screener Score** - This section explains the "screener" which identifies only those communities that clearly will not face any substantial impacts.

- **Apply the Secondary Test** - This measurement incorporates a characterization of the community's current financial and socioeconomic well-being.

- **Assess where the community falls in The Substantial Impacts Matrix** - This matrix evaluates whether or not communities are expected to incur substantial economic impacts due to the implementation of the pollution control costs. If the applicant cannot demonstrate substantial impacts, then they will be required to meet existing water quality standards. If impacts are expected to be substantial, then the applicant goes on to demonstrate whether they are also expected to be widespread.

2.1 Verify Project Costs and Calculate the Annual Cost of the Pollution Control Project.

Before the impact analysis can be performed, the project costs should be verified and then annual costs calculated.

2.1.a Verify Project Costs

The first step of an economic analysis of a publicly financed project is an evaluation of the proposed project. Public entities should consider a broad range of discharge management options including pollution prevention, end-of-pipe treatment, and upgrades or additions to existing treatment. Specific types of pollution prevention activities that should be considered are:

- Public Education;
- Change in Raw Materials;
- Substitution of Process Chemicals;
- Change in Process;
- Water Recycling and Reuse; and
- Pretreatment Requirements.

Many of these approaches are particularly relevant to industrial indirect discharges to the public system. Whatever the approach, the applicant must demonstrate that the proposed project is the most appropriate means of meeting water quality standards and must document project cost estimates. If at least one of the treatment alternatives that meets water quality standards will not have a substantial financial impact, then the community should not proceed with the analysis presented in the rest of this workbook. General information regarding the proposed pollution control project and other projects considered should be supplied in **Worksheet A**.

The most cost-effective approach to meeting water quality standards should be considered. Submissions should include assumptions about excess capacity, population

growth, and consideration of alternative technologies where appropriate. The most accurate estimate of project costs may be available from the discharger's design engineers. If site-specific engineering cost estimates are not available, preliminary project cost estimates can be derived from a comparable project in the State or from the judgement of experienced water pollution control engineers. (See Appendix A for sources of engineering cost information.) Capital, operation and maintenance (O&M), and other project costs can be summarized using **Worksheet B**. For comparative purposes, cost estimates (e.g. capital, O&M, other project costs) for each alternative being considered should be presented in the same units (typically annualized costs, $/yr) and for the same year. The next section explains how to annualize project costs.

For illustrative purposes, the example of a local government upgrading their existing wastewater treatment facility in order to meet water quality standards is used throughout this chapter. Details of this example may differ significantly from other projects undertaken to meet water quality objectives. Other types of public-sector water pollution control, however, would be analyzed in a similar fashion using the worksheets included in this chapter.

2.1.b Calculate the Annual Costs of the Pollution Control Project

Since capital costs typically will be paid over several years, annualized costs are used in the evaluation of economic burden to the community. The capital portion of project costs is typically financed over approximately 20 years, by issuing a municipal debt instrument such as a general obligation bond or a revenue bond. Local governments may also finance capital costs using bank loans, state infrastructure loans (revolving funds), or federally subsidized loans (such as those offered by the Farmers' Home Administration).

It should be noted that interest rates used to annualize costs are dependent on the type of debt instrument used as well as the recipient's credit standing. For example, revenue bonds typically are financed at a slightly higher interest rate because of their dependence on revenues from services as opposed to being guaranteed by the full faith and credit of the jurisdiction. Because interest rates affect the interest payment and thus the annualized capital cost of the project, it is important that the interest rate used on **Worksheet B** reflects the debt instrument (i.e. municipal bond, commercial bank loan, state revolving fund loan, or other instrument) likely to be used by the municipality.

The calculation of total annualized cost of the project is presented in **Worksheet B**. First, capital costs are summed and the portion of costs to be paid for with grant monies are deducted, as these costs will not need to be financed. Next, the annualization factor is calculated using the formula supplied on **Worksheet B**, or the annualization factor is found in Appendix B. Annualized capital cost is then calculated by multiplying the total capital costs to be financed by the annualization factor.

Next, annual operating and maintenance costs are summed, and the total is added to the annualized capital cost. These costs should include the costs of monitoring, inspection, permitting fees, waste disposal charges, repair, administration, replacement, and any other recurring costs. All recurring costs should be stated in terms of dollars per year. The sum of the annualized capital cost and total annual operating and maintenance costs is the total annual cost of the project. In the next section, the annualized costs paid by households in the community are calculated.

2.2 Calculate Total Annualized Pollution Control Costs Per Household

In order to assess the burden that total pollution control costs are expected to have on households, an average annualized pollution control cost per household should be calculated for all households in the community that would bear project costs. In order to evaluate substantial impacts, therefore, the analysis must establish which households will actually pay for pollution control as well as what proportion of the costs will be borne by households. These apportioned project costs are then added to existing pollution control costs paid by households.

It is important to first define the affected community. The "community" is the governmental jurisdiction responsible for paying compliance costs. In practice, pollution control projects may serve several communities or just portions of a community. In the case of a sewage agency serving several communities, once project costs are allocated to each community served, the economic analysis is conducted on a community by community basis. In the case of a community in which only a portion of the community is served, the affected community is defined as those who will pay the compliance costs. In such cases, it may be difficult to obtain socioeconomic data for just part of the community and data for the entire community may be used instead. The area that is affected may not be the same as the area that is paying, therefore it may be appropriate to evaluate widespread impacts, described in Chapter 4, over a community that is defined differently than the paying community.

If project costs were estimated for some prior year, these costs should be adjusted upward to reflect current year prices using the average annual national Consumer Price Index (CPI) inflation rate for the period. The CPI inflation rate is available from the Bureau of Labor Statistics. An additional source reporting the CPI inflation rate is the *CPI Detailed Report*, which is published monthly by the U.S. Department of Labor, Bureau of Labor Statistics.

The ratio of the current CPI to the CPI for the year of the cost estimates indicates how much costs have increased over the period. This ratio can be applied to the cost estimates to "bring them up to current year costs." Likewise, there are engineering cost indices that can be used for this purpose.

If project costs are not distributed simply according to wastewater flow or tax revenues, then consideration should be given to separately analyzing the impacts on users who pay a disproportionate share of the costs. This situation can arise, for example, where industrial dischargers to a sewer system are assessed pollutant surcharges to pay for their share of the cost of advanced treatment necessitated by the presence of their pollutants. Remaining costs would then be split among households according to wastewater flow or tax revenues, whichever is appropriate. The total amount of the pollution control project to be recouped by surcharges should, therefore, be removed from the total project cost before costs are allocated according to wastewater flow or tax revenues.

In calculating the total annual cost of pollution control per household, current costs of pollution control must be considered along with the projected annual costs of the proposed pollution control project. The existing cost per household usually can be obtained from the most recent municipal records. For example, it can be found in the sewer enterprise fund accounts for communities that maintain a separate enterprise fund. It is not necessary, in such cases, to sum all the cost components. Instead, use the most recent operating revenues, divided by the number of households served. In cases where the community does not maintain a separate enterprise fund for sewers, the cost elements can be summed from the consolidated statement for the community. If the portion of proposed project costs that households are expected to pay is known or is expected to remain unchanged, then use **Worksheet C** to calculate the total annual cost of pollution control per household. If the portion paid by households is based on flow, then should refer to **Worksheet C: Option A** as well.

The cost per household as a percent of median household income is used in Section 2.3 as a screener to quickly identify those communities that clearly will not face substantial impacts due to pollution control. For guidance in estimating impacts on non-household users (e.g., industrial, commercial), refer to Chapter 3.

2.3 Calculate and Evaluate The Municipal Preliminary Screener Value

Whether or not the community is expected to incur "substantial" economic impacts due to the pollution control project is determined by jointly considering the results of two tests. The first test is a "screener" to establish whether the community can clearly pay for the project without incurring any substantial impacts. The Municipal Preliminary Screener estimates the total annual pollution control costs per household (existing costs plus those attributable to the proposed project) as a percentage of median household income. The screener is written as follows:

$$\textit{Municipal Preliminary Screener} = \frac{\textit{Average Total Pollution Control Cost per Household}}{\textit{Median Household Income}}$$

Median household income information for many municipalities is available from the 1990 Census of Population. If median household income is not available for the current year, it should be estimated for the current year by using the CPI inflation rate for the period between the year that median household income is available and the current year. To calculate the inflation rate over the relevant period, use the "percent change from the previous annual average" (annual inflation rate) presented in the *CPI Detailed Report*. For example, if the current year is 1993, 1990 is the most recent year that median household income is available, and the percentage changes for the 1990, 1991, and 1992 annual averages respectively are: 5.2, 4.1 and 2.9, the adjustment factor equals:

Adjustment Factor = 1.052 * 1.041 * 1.029 = 1.13

Adjusted Median Household Income =
Median Household Income * Adjustment Factor

Depending on the results of the screener, the community is expected to incur little, mid-range, or large economic impacts due to the proposed project (see **Worksheet D**). If the total annual cost per household (existing annual cost per household plus the incremental cost related to the proposed project) is less than 1.0 percent of median household income, it is assumed that the project is not expected to impose a substantial economic hardship on households. The screener is therefore set at 1.0 percent of median household income. Communities with screener results of less than 1.0 but still fairly close to 1.0, however, may still want to proceed to the Secondary Test.

Communities are expected to incur mid-range impacts when the ratio of total annual compliance costs to median household income is between 1.0 and 2.0 percent. If the average annual cost per household exceeds 2.0 percent of median household income, then the project may place an unreasonable financial burden on many of the households within the community. In either case, communities move on to the Secondary affordability Test to demonstrate substantial impacts. For example, assume that Community XYZ has a screener of 2.3 percent. Although it appears that the community faces large impacts, substantial impacts have not necessarily been demonstrated and the community must proceed to the next step and apply the Secondary Test. Dischargers with screener values well below 1.0 percent are assumed to be able to pay for pollution control without incurring any substantial economic impacts and are required to meet existing water quality standards. They do not need to proceed to the Secondary Test (see Figure 2-1).

2.4. Apply Secondary Test

The Secondary Test is designed to build upon the characterization of the financial burden identified in the Municipal Preliminary Screener. The Secondary Test indicates the community's ability to obtain financing and describes the socioeconomic health of the

community. Indicators describe precompliance debt, socioeconomic, and financial management conditions in the community. Using these indicators and the scoring system described below, the impact of the cost of pollution control is estimated. Specifically, applicants are required to present the following six indicators for the community:

Debt Indicators

- Bond Rating (if available) - a measure of credit worthiness of the community;
- Overall Net Debt as a Percent of Full Market Value of Taxable Property - a measure of debt burden on residents within the community;

Socioeconomic Indicators

- Unemployment Rate - a measure of the general economic health of the community;
- Median Household Income - a measure of the wealth of the community;

Financial Management Indicators

- Property Tax Revenue as a Percent of Full Market Value of Taxable Property - a measure of the funding capacity available to support debt based on the wealth of the community; and
- Property Tax Collection Rate - a measure of how well the local government is administered.

A more detailed description of the six indicators, as well as alternative indicators for states with property tax limitations, are presented below. Table 2-1 summarizes the indicators and what is considered to be a strong, mid-range, or weak rating.

Debt Indicators

Bond Rating

Current ratings for the community summarize a bond rating agency's assessment of a community's credit capacity. The ratings generally reflect current financial conditions. If security enhancements like bond insurance have been used for the bond issue, however, the bond rating on a particular issue may be higher than local conditions justify. Only ratings for uninsured bonds, therefore, should be used.

Many small and medium sized communities have not used debt financing for projects

and, as a result, have no bond rating. The absence of a bond rating does not indicate strong or weak financial health. When a bond rating is not available, this indicator should not be included in the analysis of substantial impacts. When available, the rating for the most recent general obligation bond should be used. If a general obligation bond has not been issued recently, the most recent rating for a sewer bond should be used. Recent bond ratings are included in municipal bond reports from rating agencies (e.g., *Moody's Bond Record, Standard and Poor's Corporation*).

Overall Net Debt as a Percent of Full Market Value of Taxable Property

Overall Net Debt is debt repaid by property taxes. It excludes debt that is repaid by special user fees (e.g. revenue debt). This indicator provides a measure of debt burden on residents within the community and measures the ability of local government jurisdictions to issue additional debt. It includes the debt issued directly by the local jurisdiction and debt of overlapping entities, such as school districts. It compares the level of debt owed by the community with the full market value of real property used to support that debt and serves as a measure of the community's wealth.

Debt information is available from the financial statement of each community. In most cases, recent financial statements are on file with the State (e.g., State Auditor's Office). Overlapping debt may or may not be provided in a community's financial statements. The property assessment data (assessment ratio) should be readily available through the community or the State Assessor's Office. The boundary of the affected community generally conforms to one or more community boundaries. Therefore, prorating community data to reflect specific service area boundaries is not normally necessary for evaluating the general financial capability of the affected community.

Socioeconomic Indicators

Unemployment Rate

The unemployment rate is defined as the percent of a community's labor force currently unemployed. If the unemployment rate in the service area is not available, the encompassing county's rate may be used as a substitute. The Bureau of Labor Statistics (BLS) maintains current unemployment rate figures for municipalities and counties. National unemployment data is also needed for comparison purposes. This information can be obtained from the BLS are available by request at (202) 606-6392. A community's unemployment rate is considered to be below the national average if it is more than 1% below the national average. Similarly, a community's unemployment rate is considered to be above the national average if it is more than 1% above the national unemployment rate. If the community's employment rate is equal to the national average unemployment rate, plus or minus 1%, then the community's unemployment rate is assessed as being equal to the national rate.

Median Household Income

Median household income (MHI) is defined as the median of the total income dollars received per household during a calendar year in a given area. It serves as an overall indicator of community spending capacity. Median household income, which was also used in the screener process, is available from the 1990 Census or through state data centers. The state value is also needed for comparison purposes. If a community's median household income is more than 10% below the state's median household income, then it is considered to be below the state's median. If a community's median household income is more than 10% above the state's median, then it is considered to be above the state median value. If, however, the community's median household income is equal to the state median, plus or minus 10%, then the community's median household income is assessed as being equal to the state's median household income.

Financial Management Indicators

Property Tax Revenues as a Percent of Full Market Value of Taxable Property

This indicator can be referred to as the "property tax burden" since it indicates the funding capacity to support new expenditures, based on the wealth of the community. Some states and local jurisdictions may have established legal limits on the amount of property taxes that can be levied as a percent of full market or assessed value of real property. Property assessment data should be readily available through the community or the State Assessor's Office. Property tax revenues are available in communities' annual financial statements.

Property Tax Revenue Collection Rate

This rate is an indicator of the efficiency of the tax collection system and a measure of how well the local government is administered. It compares the actual amount collected from property taxes to the amount levied. Property taxes levied can be computed by multiplying the assessed value of real property by the property tax rate, both of which are available from a community's financial statements or the State Assessor's Office.

Alternative Indicators for States with Property Tax Limitations

Two of the indicators may not be appropriate in states with statutory limits on property tax collections and/or rates, or where data on full-market value of taxable property are not available.

The first of these indicators -- The Overall Net Debt as Percent of Full Market Value of Taxable Property -- can be replaced with:

Overall Net Debt Per Capita

In calculating the Secondary Score, the following ratings for Overall Net Debt Per Capita should be used:

Greater than $3,000	=	weak	=	1
$1,000 - $3,000	=	mid-range	=	2
Less than $1,000	=	strong	=	3

The second of these indicators -- Property Tax Revenues as a Percent of Full-Market Value of Taxable Property -- has no appropriate substitute in cases where property taxes are at their limit or where full-market value of taxable property cannot be estimated. In such cases, this indicator should be dropped and the other five factors are assigned equal weights.

These six indicators are then used to form a composite assessment of the community's economic health and the financial impact of the required project. **Worksheet E** can be used to record each indicator. For each of the six indicators, the community is rated as weak, mid-range, or strong, based on the thresholds presented in Table 2-1. For example, if a community's median household income equals $15,000 and the state's median household income equals $17,000, the community would be considered weak on this measure. If, however, the community's median household income were $19,000, then the community would be considered strong on this measure.

Next, a Secondary Score is calculated for the community by weighting each indicator equally and assigning a value of 1 to each indicator judged to be weak, a 2 to each indicator judged to be mid-range, and a 3 to each strong indicator. A cumulative assessment score is arrived at by summing the individual scores and dividing by the number of factors used. **Worksheet F**,provided at the end of Section 2.4, guides the applicant through this calculation. The cumulative assessment score is evaluated as follows:

- less than 1.5 is considered weak

- between 1.5 and 2.5 is considered mid-range
- greater than 2.5 is considered strong

For example, consider a Community XYZ, which has:

- a weak ratio of overall net debt to full market value of taxable property = 1,
- a weak bond rating = 1,
- a mid-range unemployment rate = 2,
- a mid-range median household income = 2,
- a strong property tax collection rate = 3, and
- a strong ratio of property tax revenues to full market value of taxable property = 3.

$$[(1 + 1 + 2 + 2 + 3 + 3)/6] = 2$$

The Secondary Score for Community XYZ, equal to 2, falls into the mid-range category.

If the applicant is not able to develop one or more of the six indicators, they must provide an explanation as to why the indicator is not appropriate or not available. Since the point of the analysis is to measure the overall burden to the community, the debt and socioeconomic indicators are assumed to be better measures of burden than the financial management indicators. Consequently, if one of the debt or socioeconomic indicators is not available, the State/discharger should average the two financial management indicators and use this averaged value as a single indicator with the remaining indicators. This averaging is necessary so that undue weight is not given to the financial management indicators.

2.5 Assess Where the Community Falls in The Substantial Impacts Matrix

The results of the two tests are considered jointly in determining whether the community is expected to incur substantial impacts due to the proposed pollution control project.

In the following matrix, the cumulative assessment score for the community is combined with the estimated household burden. The combination of factors establishes whether impacts can be expected to be substantial. In the example of Community XYZ, their screener equaled 2.3 percent and their cumulative assessment score equaled 2. They are, therefore, in the middle cell in the far right column and thus have a rating of "X" in the matrix presented below (Table 2-2).

In the matrix, "X" indicates that the impact is likely to be substantial. The closer the community is to the upper right hand corner of the matrix, the greater the impact.

Similarly, "✓" indicates that the impact is not likely to be substantial. The closer to the lower left hand corner of the matrix, the smaller the impact. Finally, the "?" indicates that the impact is unclear.

For communities that fall into the "?" category, if the results of both the Secondary Test and the Municipal Preliminary Screener are borderline, then the community should move into the category closest to it. Take, for example, a community that falls into the center box, with a cumulative assessment score of between 1.5 and 2.5 and a percent of median household income (MHI) between 1.0 and 2.0. If the cumulative score was 1.6 and the percent of MHI was 1.8, then the community should be considered to fall into one of the adjacent "X" categories. If results are not borderline, other factors such as the impact on low or fixed income households, the presence of a failing local industry, and other projects the community would have to forgo in order to comply with water quality standards should be considered. Relevant additional information might include information collected from interviews with municipal financial officers, special reports on industry trends that may affect local employers, and specific financial and economic indicators. The State/discharger should provide any additional information they feel is relevant. This additional information will be critical where the matrix results are not conclusive.

EPA will interpret a "✓" rating to mean that the community is not expected to incur substantial impacts as a result of the pollution control project. Communities falling into this category will be required to meet existing water quality standards. If the applicant State/discharger disagrees with the results of the Secondary Test, they may present additional information to the Regional EPA Administrator documenting the unique circumstances of the community. Since the impacts are not substantial, there is no need to demonstrate widespread impacts. EPA will interpret a "X" rating to mean that the community will incur substantial impacts. Before a water quality standard is modified or changed, however, communities falling into this category must demonstrate that impacts are also widespread. For those communities rated "?", EPA's interpretation will rely on the additional information presented by the State/discharger. It should be noted that, in this case, there is no "correct" set of information. It will be up to the applicant to collect whatever information they feel is relevant in describing the unique circumstances affecting their community. For example, the matrix may suggest that the community's financial condition is strong. At the same time, however, a local industry may be failing. In such a case, it is important to determine the importance of that industry to the local economy (as measured by its contribution to area employment, payroll, and tax revenues) and whether the industry itself would be affected by the project. Communities falling into either the "X" or the "?" category should proceed to Chapter 4 to determine whether the impacts are also expected to be widespread.

Figure 2-1:
Measuring Substantial Impacts
(Public Entities)

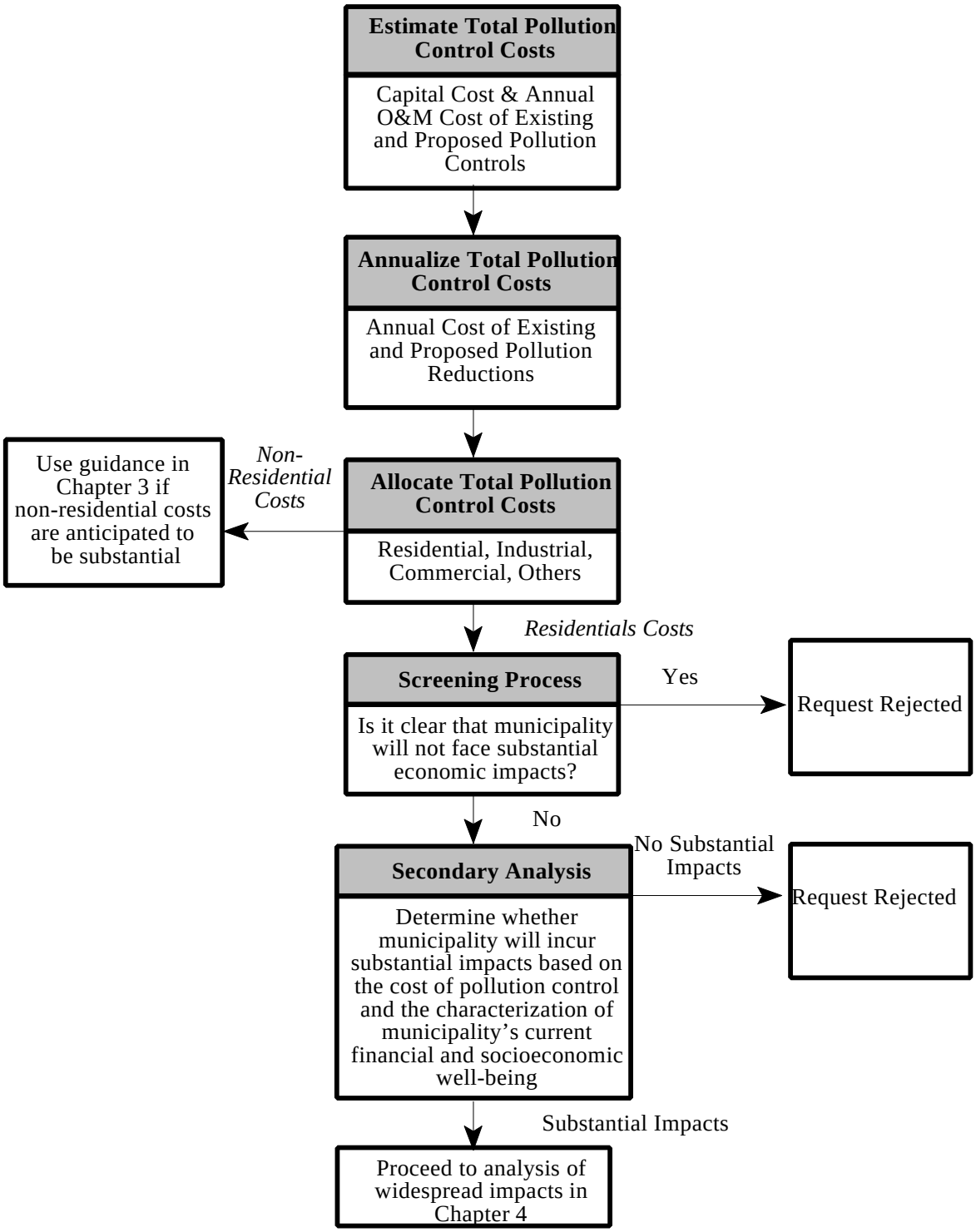


Table 2-1

Secondary Indicators

	Secondary Indicators		
Indicator	Weak	Mid-Range	Strong
Bond Rating	Below BBB (S&P) Below Baa (Moody's)	BBB (S&P) Baa (Moody's)	Above BBB (S&P) or Baa (Moody's)
Overall Net Debt as Percent of Full Market Value of Taxable Property	Above 5%	2%-5%	Below 2%
Unemployment	More than 1% above National Average	National Average	More than 1% below National Average
Median Household Income	More than 10% below State Median	State Median	More than 10% above State Median
Property Tax Revenues as a Percent of Full Market Value of Taxable Property	Above 4%	2%-4%	Below 2%
Property Tax Collection Rate	< 94%	94% - 98%	> 98%

Table 2-2
Assessment of Substantial Impacts Matrix

Secondary Score		**Municipal Preliminary Screener**		
		Less than 1.0 Percent	Between 1.0 and 2.0 Percent	Greater than 2.0 Percent
Less than 1.5		?	X	X
Between 1.5 and 2.5		✓	?	X
Greater than 2.5		✓	✓	?

3. EVALUATING SUBSTANTIAL IMPACTS: PRIVATE-SECTOR ENTITIES

For facilities owned by the private sector, measuring substantial impacts requires estimating the financial impacts on the entities that will pay for the pollution controls. For example, compliance with water quality standards may require that a particular facility, perhaps a factory, install additional wastewater treatment. After estimating the cost of the additional wastewater treatment, the next step is to measure the ability of the factory to pay for the additional treatment. If the analysis shows that the entity will not incur any substantial impacts due to the cost of pollution control (e.g., there will be no significant changes in the factory's level of operations nor profit), then the analysis is completed. If, on the other hand, the analysis shows that there will be substantial impacts on the entity, then the resulting impacts on the surrounding community must be considered (e.g. the impact of lost employment on the community's employment base, or the impact on the overall economy of the community). Impacts to the surrounding community, referred to as widespread impacts, are addressed in Chapter 4.

The following sections describe the steps involved in evaluating whether impacts will be substantial. These steps are outlined in Figure 3-1. This chapter explains how to adapt each of the steps to a range of data sources and provides worksheets to assist the discharger in working through each step. The analytic approach presented here can be used for a variety of private-sector entities, including commercial, industrial, residential and recreational land uses, and for point and nonpoint sources of pollution. The guidance provided in this chapter, however, is not meant to be exhaustive. The State and/or EPA may require additional information or tests in order to evaluate whether substantial and widespread impacts will
occur. In addition, the applicant should feel free to include any additional information they feel is relevant. The steps described in further detail in the rest of the chapter are:

- **Verify Project Costs and Calculate the Annual Cost of the Pollution Control Project** - This section discusses factors that should be considered when verifying that the proposed pollution control project is the most appropriate solution to the pollution problem. It also describes the type of general information that should be provided about the proposed project. In addition, it discusses how to annualize capital costs of the project and calculate total annual costs of the pollution control project.

- **Financial Impact Analysis** - This section describes the types of financial tests that should be applied to measure the impact on the applicant. The primary measure is profitability. The secondary measures include indicators of liquidity, solvency, and leverage.

Most of this chapter is written in terms of evaluating whether there will be a substantial impact on a particular discharger. This type of analysis is necessary whenever there is a

request for a variance. These same tests, however, can be used to analyze the impact on a group of dischargers, as might be the case in a use attainability analysis. For example, there may be several facilities that would confront similar requirements to improve their waste water discharges in order to meet a higher water quality standard under consideration. The same primary and secondary tests would be used to measure substantial impacts in the dischargers. The difference would be, however, when the analysis moved to measuring widespread impacts. Here the impacts on the total group of dischargers (or all dischargers in the relevant reach) would be used to measure whether or not the impacts are considered widespread.

3.1 Verify Project Costs and Calculate The Annual Cost of the Pollution Control Project

Before the impact analysis can be performed, the project costs should be verified and the annual costs calculated.

3.1.a Verify Project Costs

The first step in the financial impact analysis is an evaluation of the proposed pollution control project. Private entities should consider a broad range of discharge management options including pollution prevention, end-of-pipe treatment, and upgrades or additions to existing treatment. Specific types of pollution prevention activities to be considered include:

- Change in Raw Materials;
- Substitute Process Chemicals;
- Change in Process;
- Water Recycling and Reuse; and
- Pretreatment Requirements.

Whatever the approach, the discharger must demonstrate that the proposed project is the most appropriate means of meeting water quality standards and must document project cost estimates. If at least one of the treatment alternatives that allows the applicant to meet water quality standards would not impose substantial impacts, then they are not able to demonstrate substantial impacts and should not proceed with the analysis presented in the remainder of this workbook.

Since the most cost-effective approach to meeting water quality standards should be considered, submissions should list their assumptions about excess capacity, future facility expansion, and alternative technologies. The most accurate estimate of project costs may be available from the discharger's design engineers. These estimates can be compared to estimates available from EPA.

3.1.b Calculate the Annual Costs of the Pollution Control Project

In order to perform the economic tests, the cost of the pollution control needed to comply with the Water Quality Standards must be calculated and converted to an annualized cost. Initially, pollution control costs are expressed in two parts: (1) the capital costs of purchasing and installing the equipment and (2) the yearly operating and maintenance (O&M) costs. Both the capital and O&M cost estimates should be provided by the discharger requesting relief. To assess whether the costs represent the most cost effective means of meeting the water quality standards, they should be compared to costs at comparable entities that meet the same standards. For dischargers covered by effluent guidelines, compliance costs have been calculated by the Agency and are available for comparative purposes. (See Appendix A.) Costs for nonpoint sources are less readily available.

Instead of assuming that the total capital costs will be paid in the first year of operation, these costs are usually annualized. By assuming that costs are spread out over several years, annualization calculates the amount that will be paid each year, including the financing costs. In order to allow for comparisons across cases, the analysis should assume that the applicant will borrow the capital for the pollution control equipment and repay the loan in even annual installments over a 10 year period. The assumption of ten years is based on the likely life of the equipment. The assumption of even annual installments is made for convenience. The interest rate on the loan should be equivalent to the rate the applicant pays when it borrows money. If it borrows from the parent firm, the interest charge should be equivalent to the interest charged by the parent firm. If the parent firm would lend the entity money without interest, then the interest payments should be equivalent to the interest rate the applicant would pay to borrow from a bank or on its line of credit. If it is impossible to determine the appropriate interest rate, the analysis should assume an interest rate equal to the prime rate plus one percent.

The financial tests discussed below compare the costs of compliance to other costs and revenues of the applicant. Compliance costs and other costs and revenues must, therefore, be comparable. In other words, they should be calculated for the same year. If compliance costs are estimated assuming construction several years in the future, they should be deflated back to the year of the financial data. This can be done by assuming that the inflation rate over the last five years will continue into the future. See discussion in Section 2.2, and Appendix A for references to inflation/deflation indices. Likewise, if costs were estimated for an earlier year, they should be inflated to current year costs. The Annualized Cost of Pollution Control can be calculated using **Worksheet G**.

3.2 Financial Impact Analysis

The purpose of the financial impact analysis is to assess the extent to which existing or planned activities and/or employment will be reduced as a result of meeting the water

quality standards. The tests described in this Workbook are not designed to determine the exact impact of pollution control costs on an entity. They merely provide indicators of whether pollution control costs would result in a substantial impact.

Four general categories of financial tests are presented in the following sections. As indicated below, the four categories are divided into a primary measure of financial impacts and three secondary measures of financial impacts:

Primary Measure

- Profit -- how much will profits decline due to pollution control expenditures?

Secondary Measures

- Liquidity -- how easily can an entity pay its short-term bills?
- Solvency -- how easily can an entity pay its fixed and long-term bills?
- Leverage -- how much money can the entity borrow?

Profit and solvency ratios are calculated both with and without the additional compliance costs (taking into consideration the entity's ability, if any, to increase its prices to cover part or all of the costs). Comparing these ratios to each other and to industry benchmarks provides a measure of the impact on the entity.

For all of the tests, it is important to look beyond the individual test results and evaluate the total situation of the entity. While each test addresses a single aspect of financial health, the results of the four tests should be considered jointly to obtain an overall picture of the economic health of the applicant and the impact of the water quality standards requirement on the applicant's health. The results should be compared with the ratios for other entities in the same industry or activity. In addition, the ratios and tests should be calculated for several years of operations. This will allow long-term trends to be differentiated from short-term conditions.

The structure, size, and financial health of the parent firm should also be considered. An important factor, which may not be reflected in the preceding measures, is the value of an applicant's product or operations to its parent firm. For example, if a facility produces an important input used by other facilities owned by the firm, the firm may be likely to support the facility even if it appears to have only borderline profitability. The results of these tests and other relevant factors, can be used to make a judgement as to the likely actions of the applicant (e.g. shut down entirely, close one or more product/service lines, shift to other products/services, not proceed with an expansion, continue operations at current levels) faced with the pollution control investment.

Each type of test measures a different aspect of a discharger's financial health. The primary measure evaluates the extent to which an applicant's profit rate will change, and compares the profit level to typical profits in that industry. The secondary measures provide additional information about specific impacts that the discharger would bear if required to meet water quality standards. In some cases, the tests might indicate that the discharger would remain profitable (Profit) after investing in pollution control, but would have trouble borrowing the needed capital (Leverage). This situation would indicate a need to work with the discharger in choosing the technology and schedule used to meet the regulations. In other cases the tests might show that the discharger has a short-term problem with meeting the financial obligation imposed by the standards, but could handle it in the long-run (Liquidity vs. Solvency). This is important information when considering whether or not to grant a variance so as to allow more time for compliance.

Since it is the discharger that will have to pay for the wastewater treatment, the financial tests presented in this Workbook use data about the discharger's operations. This data, however, may not be readily available for the discharger itself, and if available, the discharger may consider the information to be confidential. It is EPA policy, however, that applications based on economic considerations must be accompanied by data that demonstrate the impacts.

If the information is not available at the discharger level, it can be estimated from the balance sheets or income statements of the firm that owns or controls the discharger. Estimates can be made in a variety of ways. One commonly used approach is to compare the discharger's sales or revenues to the firm's sales or revenues and apply this ratio to other financial factors. For example, if the discharger is responsible for 20 percent of its firm's revenues, than it is assigned 20 percent of the firm's current assets and current liabilities. In some cases, particularly with manufacturing facilities, the discharger may not sell its production directly, but may ship it to another facility owned by the same firm. In this case, the discharger's share of sales should be calculated by determining the market value of the goods produced by the discharger, using market prices for the year being analyzed.

The primary and secondary measures are described below, along with an example of specific tests to be used. While there are several ratios that could be used for each test, to simplify the presentation only one ratio per test is described in detail. All four primary and secondary measures, however, should be used in the analysis.

In most cases, interpreting the results requires comparisons with typical values for the industry. Among the sources that provide comparative information are: Robert Morris Associates' *Annual Statement Studies*, *Moody's Industrial Manual*, Dun and Bradstreet's *Dun's Industry Norms*, and Standard & Poor's *Industry Surveys*. The *Annual Statement Studies*, *Dun's Industry Norms* , and Standard & Poor's *Industry Surveys* provide composite statistics for firms grouped into various manufacturing and service industries.

The *Moody's Industrial Manual* provides detailed financial information on individual firms that can be used for comparison purposes. Although benchmarks are available for most financial tests, EPA emphasizes that the discharger should consider these benchmarks as indicators of financial health and not as definitive measures.

3.2.a Primary Measure: Profitability

The Profit Test measures what will happen to the discharger's earnings if additional pollution control is required. If the discharger is making a profit now but would lose money with the pollution control, then the possibility of a total shutdown or the closing of a production line must be considered. Greatly reduced, but still positive, profits are also of concern. Likewise in the case of a proposed facility or proposed expansion; if estimated profits would drop considerably with pollution control, then the development might not take place.

Two pieces of information are needed for the Profit Test. The first piece is the total annual cost of the required pollution control from **Worksheet G**. The second piece is the earnings information from the entity's income statement (**Worksheet H**).

$$Profit\ Test = \frac{Earnings\ Before\ Taxes}{Revenues}$$

The Profit Test should be calculated with and without the cost of pollution control. In the former case, the annualized cost of pollution control (including O&M) is subtracted from the discharger's earnings before taxes (revenues minus costs excluding income taxes) for the most recently completed fiscal year. Profits before pollution control investments have been made should be examined to determine whether the discharger was already in trouble (either not profitable or profits far below industry norms) before pollution control investments were made. If the discharger is already not profitable, it may not claim that substantial impacts would occur due to compliance with water quality standards.

The Profit Test can be calculated using **Worksheets H, and I**. Earnings before taxes (EBT) should be calculated for at least the three previous fiscal years in order to identify any trends or atypical years. Earnings with pollution control costs should be calculated for the latest year with complete financial information. Arguably, as long as the applicant maintains positive earnings, it can afford to pay for the pollution control. Over the long run, however, the owner is likely to shift operations to more profitable facilities, if possible. The workbook, therefore, guides the applicant through a more thorough analysis, which compares the EBT, with and without pollution control, to total revenues to yield a profit rate and change in the profit rate due to pollution control. (Use **Worksheet I**.) These profit rates should be compared to those for facilities in similar

lines of business. As with other tests, it may not be possible to compare the discharger's rate directly with the rates of similar facilities. In such cases the discharger's profit rate should be compared with that of firms that concentrate in similar businesses, using data in *Moody's Industrial Manual*, *Dun & Bradstreet's Industry Norms and Key Business Ratios*, *Standard & Poor's Industry Surveys*, or Robert Morris's *Annual Statement Studies*. If the discharger's ratio compares favorably with the median or upper quartile ratio for similar businesses, the discharger is considered to be financially healthy. A typical income statement, like those found in *Moody's Industrial Manual*, has been included in Exhibit 3-1. The appropriate data have been underlined.

Although complicated, the analysis should consider whether the discharger or firm would be able to raise its prices in order to cover some or all of the pollution control costs. In such a case, revenues increase and earnings fall by an amount less than the costs of pollution control. The degree to which the discharger is able to raise prices is difficult to predict, and depends on many factors. Considerations should include the level of competition in the industry, the likelihood of competitors' facilities facing similar project costs, and the willingness of consumers to pay more for the product.

3.2.b Secondary Measures

The following secondary measures provide additional important information about the financial health of the discharger. All primary and secondary measures will be included in the analysis. It is not sufficient to conclude that the discharger will be unprofitable after pollution control investments. In addition, the applicant should feel free to include any additional information about the discharger's financial health that they feel is relevant.

Liquidity

Liquidity is a measure of how easily a discharger can pay its short-term bills. One measure of liquidity is the Current Ratio, which compares current assets with current liabilities. Current assets include cash and other assets that are or could reasonably be converted into cash during the current year. The following items are considered to be current assets:

- **Inventories**-- finished products, products in the process of being manufactured, raw materials, supplies, fuels, etc.;
- **Prepaid expenses** -- expenses paid in advance of use such as prepaid rent;
- **Short-term investments** -- savings accounts, certificates of deposit;
- **Accounts receivable**;

- **Marketable securities**; and

- **Cash**.

Likewise, current liabilities are items that must be paid within the current year. The following items are considered to be current liabilities:

- **Accounts payable** -- purchases of goods for resale and services received in the normal course of business;

- **Wages payable**;

- **Short-term notes payable** -- any debt initially incurred and due in the current year;

- **Accrued expenses** -- expenses that have been incurred but have not yet been paid at the end of the accounting period;

- **Taxes**; and

- **Current portion of any long-term debt**.

A more stringent test is the Quick Ratio, also known as the Acid Test, which compares current assets without inventories to current liabilities. It does not include inventories since they may take time to convert to cash and may be valued on the discharger's books for more than they could be sold.

The Current Ratio should be calculated for each of the last three full fiscal years for which there are data. Comparing ratios for three years will identify any trends that are developing and will ensure that the most recent year is not an unusual year that might distort the results of the analysis.

The Current Ratio is calculated by dividing current assets by current liabilities.

$$Current\ Ratio = \frac{Current\ Assets}{Current\ Liabilities}$$

The Current Ratio can be calculated using **Worksheet J**. The general rule is that if the Current Ratio is greater than 2, the entity should be able to cover its short-term obligations. Frequently, lenders require this level of liquidity as a prerequisite for lending. While a Current Ratio of greater than 2 indicates that the entity can probably cover its short-term obligations, the impact of a major capital investment such as the

pollution control project must be judged in conjunction with the other three financial tests described in this guidance.

In addition, this rule (Current Ratio > 2) may not be appropriate for all types of private entities covered by Water Quality Standards. The Current Ratio of the discharger in question should be compared with ratios for other dischargers in the same line of business. It may not be possible, however, to compare the discharger's ratio directly with other similar dischargers because this information frequently is unavailable at the facility level or is considered confidential. In cases where a direct comparison cannot be made, the discharger's Current Ratio should be compared with the ratio for firms that concentrate in similar businesses. If the discharger's ratio compares favorably with the median or upper quartile ratio for similar businesses, it should be able to cover it's short term obligations. Among the sources that provide comparison information are: Robert Morris Associates' *Annual Statement Studies*, *Moody's Industrial Manual*, and Dun and Bradstreet's *Dun's Industry Norms*. The *Annual Statement Studies* and *Dun's Industry Norms* provide composite statistics for firms grouped by different manufacturing and service industries. The *Moody's Industrial Manual* provides detailed financial information on individual firms. Pages from both of these sources are displayed in Exhibits 3-2 and 3-3, with the appropriate data indicated.

Solvency

Solvency is a measure of an entity's ability to meet its fixed and long-term obligations. These obligations are bills and debts that are owed on a regular basis for periods longer than one year. Solvency tests are commonly used to predict financial problems that could lead to bankruptcy within the next few years. Since any single year of data can easily be distorted by unusually high or low net income or by the timing of debt, solvency tests must be considered over at least three years of data in order to reveal long-term trends.

As with liquidity, there are several possible tests for solvency. One commonly used solvency test (called Times Interest Earned) compares income before interest and taxes to interest expenses. Another solvency test, the Beaver's Ratio, compares cash flow to total debt. This test has been shown to be a good indicator of the likelihood of bankruptcy.

$$Beaver's\ Ratio = \frac{Cash\ Flow}{Total\ Debt}$$

The Beaver's Ratio can be calculated using **Worksheet K**. Cash Flow is a measure of the cash the entity has available to it in a given year. Since depreciation is an accounting cost -- a cost that does not use any currently available revenues -- it is added back to reported net income after taxes to get cash flow. Total debt is equal to the current

debt for the current year plus the long term debt, since current debt includes that part of long-term debt that is due in the current year.

If the Beaver's Ratio is greater than 0.20 the discharger is considered to be solvent (i.e., can pay its long-term debts). If the ratio is less than 0.15 the discharger may be insolvent (i.e., go bankrupt). If the ratio is between 0.15 and 0.20, then future solvency is uncertain. The discharger's Beaver's Ratio should be compared with the ratios of similar dischargers. However, as with other ratios, it may not be possible to compare the discharger's ratio directly with other similar dischargers. In cases where a direct comparison cannot be made, the discharger's Beaver's Ratio should be compared with that of firms that concentrate in similar businesses, using information from income accounts and balance sheets in *Moody's Industrial Manual*. If the discharger's ratio compares favorably with similar businesses, it should be able to meet its fixed and long term obligations. A typical balance sheet and income statement have been included in Exhibits 3-4 (for calculating total debt) and 3-5 (for calculating cash flow). The appropriate data from them has been underlined.

Leverage

Leverage tests measure the extent to which a firm already has fixed financial obligations and thus indicate how much more money a firm is capable of borrowing. Firms that rely heavily on debt may find it difficult and expensive to borrow additional funds. Most leverage tests compare equity to some measure of debt or fixed assets. The Debt to Equity Ratio is the most commonly used method of measuring leverage. Unlike the ratios discussed above, the debt to equity ratio cannot be easily calculated for a single facility; it must be calculated for the firm, since it is usually the firm, not the facility, that borrows money. The ratio measures how much the firm has borrowed (debt) relative to the amount of capital which is owned by its stockholders (equity). Since values for the Debt to Equity Ratio vary widely by the type of enterprise, the ratio should be compared with the ratio for firms in similar lines of business. The ratio also should be calculated with at least three years of data.

The Debt to Equity Ratio is equal to Long-Term Liabilities (long-term debt such as bonds, debentures, and bank debt, and all other noncurrent liabilities like deferred income taxes) <u>divided</u> by Owners' Equity. Owner's Equity is the difference between total assets and total liabilities, including contributed or paid in capital and retained earnings. For publicly held firms, use Net Stockholders Equity (which is the equivalent of Total Stockholder Equity minus any Treasury Stock).

$$\textit{Debt/Equity Ratio} = \frac{\textit{Long-Term Liabilities}}{\textit{Owners' Equity}}$$

The Debt to Equity Ratio can be calculated using **Worksheet L**. Since there are no generally accepted Debt/Equity Ratio values that apply to all types of economic activity, the ratio should be compared with the ratio of firms in similar businesses. If the entity's ratio compares favorably with the median or upper quartile ratio for similar businesses, it should be able to borrow additional funds. These ratios can be calculated using data in Robert Morris Associates' *Annual Statement Studies*, *Moody's Industrial Manual*, and Dun & Bradstreet's *Dun's Industry Norms*. Pages from these sources have been included in Exhibits 3-6 and 3-7, with the appropriate data indicated.

For entities with special sources of funding, leverage is not an appropriate measure of their ability to raise capital. Examples are agriculture and affordable housing, where special loan programs may be available. In these cases, an analysis of the probability that the project would receive this money is appropriate.

3.3 Interpreting the Results

The financial analysis should be used to determine if there will be a substantial adverse impact on the applicant. As indicated above, the Profit Test should be considered first. The Profit Test measures what will happen to the discharger's earnings if additional pollution control is required. If the discharger is making a profit now but would lose money with the pollution control, then the possibility of a total shutdown or the closing of a production line must be considered. Likewise in the case of a proposed facility; if it would make money without the pollution control but would make much less or even lose money with it, then the development might not take place. In either case, there is the chance that employment will be lost and local purchases by the discharger reduced. Whether or not these impacts will be considered widespread is addressed in Chapter 4.

There are several more complicated scenarios that all involve making a judgement as to the likely impacts on the discharger, including questions of the timing of compliance. For example, the Profit Test may indicate that the applicant will continue to maintain profit levels typical for its industry after compliance, but the Debt/Equity Ratio may indicate that they will have trouble raising the required capital through debt. This problem may be solved by giving them more time to meet the regulations (a variance), so that they can restructure their debt and/or find alternative sources of funds. In another case, the applicant might argue that while they will still make money and be able to raise the needed capital, they would alternatively spend those funds on an expansion which would have resulted in increased employment and income for the community. This is a more difficult situation to analyze, and will depend on judgments about the relative importance of water pollution control versus economic growth. These issues are discussed in more detail in Chapter 4.

Another possible scenario is that the discharger may shift to an alternative economic activity (e.g., manufacture another product or produce a different crop). While the

applicant will not have gone out of business, this shift may result in reduced profits, employment, and purchases in the local community that must be considered. In each case, it is important to take the entire picture presented by the four ratios into account in judging whether or not the discharger will incur substantial impacts due to the cost of the necessary pollution reductions.

Using the guidance presented in this chapter, applicants that feel they have demonstrated substantial impacts should proceed to Chapter 4: Determination of Widespread Impacts. If dischargers are not able to demonstrate substantial impacts, the entity must meet existing standards. If a group of dischargers within the community will experience the substantial impacts resulting from compliance with water quality standards, these impacts should be considered jointly when assessing whether or not the impacts will be widespread.

Figure 3-1:
Measuring Substantial Impacts
(Private Entities)

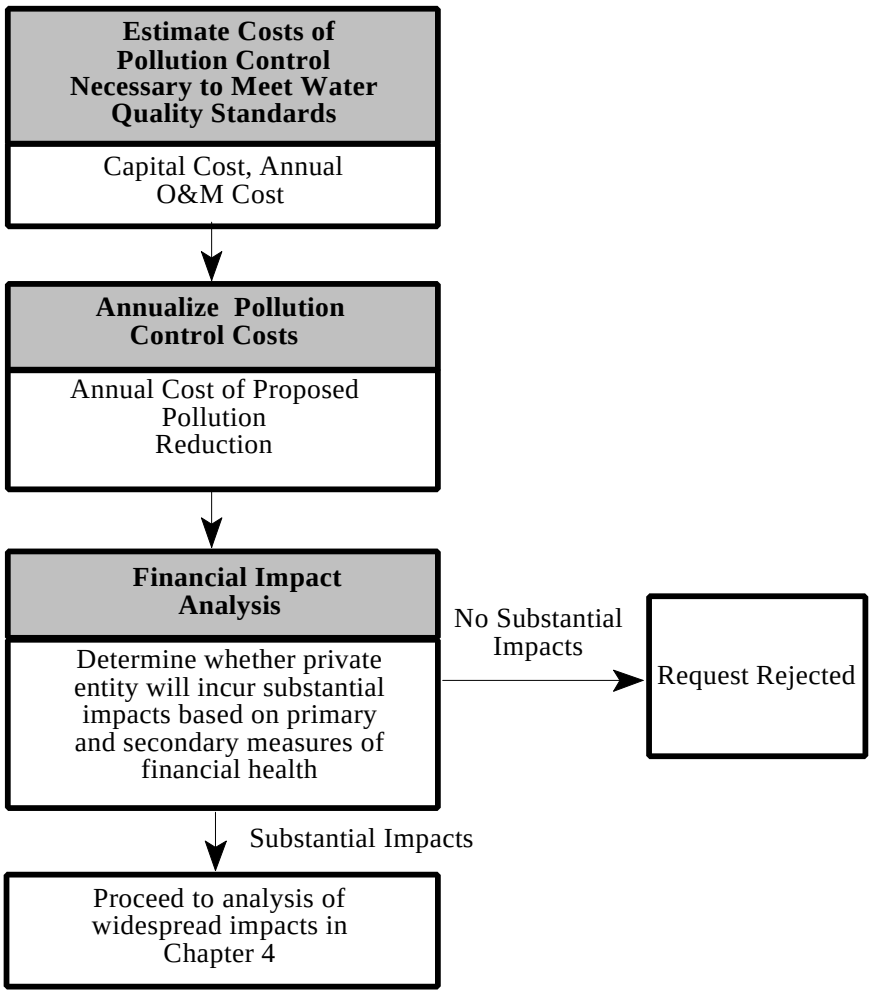


Exhibit 3-1

XYZ, INC.
CONSOLIDATED STATEMENTS OF INCOME AND RETAINED EARNINGS (DEFICIT)
FOR THE YEARS ENDED SEPTEMBER 30, 1988, 1987, 1986

	1988	1987	1986
Net sales	**$42,389,957**	$33,294,962	$30,730,768
Cost of sales	**35,981,363**	26,405,930	24,972,185
Gross profit	**6,408,594**	6,889,032	5,758,583
Selling, general and administrative expenses	**3,957,771**	3,876,206	3,824,226
Income from operations	**2,450,823**	3,012,826	1,934,357
Other income (deductions)			
Interest income	**441,891**	347,613	362,295
Interest expense	**(10,985)**	(22,513)	(46,467)
Other investment income - net			134,690
Miscellaneous	**55,066**	48,660	93,654
Total other income (deductions) - net	**485,972**	373,760	544,172
Income before income taxes	**2,936,795**	3,386,586	2,478,529
Provision for income taxes	**1,139,118**	1,620,012	1,150,949
Net income	**1,797,677**	1,766,574	1,327,580
Retained earnings, beginning of year	**1,157,528**	1,726,292	1,983,007
Stock dividend	**(2,610,888)**	(1,952,645)	(1,365,590)
Cash dividend ($.11 per share, 1988; $.08 per share, 1987; $.06 per share, 1986)	**(391,960)**	(300,693)	(218,705)
Common stock acquired and retired	**(2,591)**	(82,000)	
Retained earnings (deficit), end of year	**$ (50,234)**	$ 1,157,528	$ 1,726,292
Weighted average number of shares outstanding	**3,593,048**	3,630,652	3,637,798
Earnings per common share	**$.50**	$.49	$.36

See accompanying Notes to Financial Statements

INDEPENDENT AUDITORS' REPORT

To the Shareholders of XYZ, Inc.:

We have audited the consolidated balance sheets of XYZ, Inc. at September 30, 1988 and 1987, and the related consolidated statements of income and retained earnings (deficit), and cash flows for each of the three years in the period ended September 30, 1988. These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on these financial statements based on our audits.

We conducted our audits in accordance with generally accepted auditing standards. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

In our opinion, the accompanying consolidated financial statements present fairly, in all material respects, the financial position of the companies at September 30, 1988 and 1987, and the results of their operations and their cash flows for each of the three years in the period ended September 30, 1988 in conformity with generally accepted accounting principles.
DELOITTE HASKINS & SELLS
Minneapolis, Minnesota
December 5, 1988

Exhibit 3-2

MANUFACTURERS • GAMES, TOYS & CHILDREN'S VEHICLES; EXCEPT DOLLS & BICYCLES. SIC # 3944

Comparative Historical Data							Current Data Sorted by Sales					
					1	# Postretirement Benefits						1
						Type of Statement						
					17	Unqualified	1	3	7	10	2	1
					11	Reviewed	3	5		3	1	2
					2	Compiled						
					1	Tax Returns	2	5	2		1	8
					17	Other						
	4/1/90-3/31/91		4/1/91-3/31/92		4/1/92-3/31/93			17(4/1/-9/30/92)		58 (10/1/92-3/31/93)		
	ALL		ALL		ALL		0-1MM	1-3mm	3-5MM	5-10MM	10-25MM	25MM & OVER
	47		68		75	NUMBER OF STATEMENTS	6	13	9	17	8	22
	%		%		%	ASSETS	%	%	%	%	%	%
	7.1		8.9		7.2	Cash & Equivalents		7.4		13.3		5.8
	27.0		30.9		31.8	Trade Receivables - (net)		24.5		32.0		36.0
	31.9		30.4		35.3	Inventory		47.4		31.0		28.3
	2.1		1.9		1.7	All Other Current		.6		2.2		2.7
	68.1		72.1		76.1	Total Current		79.8		78.5		72.7
	19.2		17.5		16.7	Fixed Assets (net)		16.1		14.4		17.2
	4.2		3.7		3.1	Intangibles (net)		1.8		2.2		5.4
	8.5		6.7		4.1	All Other Non-Current		2.3		4.9		4.7
	100.0		100.0		100.0	Total		100.0		100.0		100.0
						LIABILITIES						
	16.4		12.6		14.0	Notes Payable Short-Term		13.9		12.3		11.8
	3.4		2.3		3.0	Cur. Mat.-L/T/D		4.5		3.6		.7
	11.7		13.1		14.6	Trade Payables		14.5		12.0		16.5
	.7		.9		.6	Income Taxes Payable		.5		.5		.7
	8.1		9.0		11.1	All Other Current		5.6		10.8		11.9
	40.3		38.0		43.2	Total Current		38.8		39.2		41.7
	13.2		13.4		12.2	Long Term Debt		15.5		9.4		11.8
	1.2		.5		.4	Deferred Taxes		.1		.5		.6
	2.8		5.3		3.5	All Other Non-Current		2.2		2.1		1.7
	42.4		42.9		40.6	Net Worth		43.4		48.8		44.3
	100.0		100.0		100.0	Total Liabilities and Net Worth		100.0		100.0		100.0
						INCOME DATA						
	100.0		100.0		100.0	Net Sales		100.0		100.0		100.0
	35.5		37.2		36.0	Gross Profit		35.5		33.5		35.8
	28.5		29.3		30.2	Operating Expenses		29.9		28.2		28.6
	6.9		7.9		5.8	Operating Profit		5.7		5.3		7.2
	3.3		1.8		1.2	All Other Expenses (net)		1.1		.4		1.8
	3.7		6.1		4.6	Profits Before Taxes		4.6		4.9		5.3
						RATIOS						
	2.5		2.8		2.9			4.5		2.8		2.8
	1.7		1.9		1.8	Current		2.3		1.9		1.9
	1.2		1.3		1.3			1.5		1.3		1.2
	1.4		1.7		1.4			1.7		2.0		1.8
	.8		1.1		.8	Quick		.6		.8		1.0
	.6		.7		.6			.5		.6		.7
34	10.6	**31**	11.6	**34**	10.8		**14**	25.2	**31**	11.9	**56**	6.5
55	6.6	**49**	7.4	**56**	6.5	Sales Receivables	**37**	10.0	**56**	6.5	**72**	5.1
85	4.3	**85**	4.3	**85**	4.3		**78**	4.7	**89**	4.1	**99**	3.7
62	5.9	**55**	6.6	**63**	5.8		**79**	4.6	**43**	8.5	**68**	5.4
104	3.5	**85**	4.3	**94**	3.9	Cost of Sales/Inventory	**126**	2.9	**78**	4.7	**85**	4.3
146	2.5	**152**	2.4	**146**	2.5		**166**	2.2	**140**	2.6	**118**	3.1
21	17.0	**21**	17.7	**18**	20.1		**10**	38.1	**12**	30.2	**29**	12.5
29	12.4	**27**	13.3	**30**	12.3	Cost of Sales/Payables	**27**	13.3	**22**	16.4	**39**	9.4
50	7.3	**47**	7.8	**61**	6.0		**40**	9.1	**33**	11.0	**66**	5.5
	3.9		3.4		3.3			2.6		3.0		3.3
	7.6		6.2		6.3	Sales/Working Capital		4.4		6.5		5.1
	17.5		10.8		13.8			14.0		11.5		15.0
	7.1		10.1		9.0			6.8		9.2		14.5
(44)	2.4	(66)	3.4	(69)	3.6	EBIT/Interest	(12)	1.9	(14)	4.6	(21)	4.3
	1.0		1.5		1.5			.8		1.3		2.9
	8.9	(34)	13.3	(24)	13.1	Net Profit + Depr., Dep.,						
(23)	2.8		3.3		2.8	Amort./Cur. Mat.L/T/D						
	.5		1.8		1.2							
	.2		.2		.1			.1		.1		.2
	.6		.4		.5	Fixed/Worth		.4		.3		.5
	.8		.8		1.0			1.2		.7		1.0
	.9		.8		1.0			.7		.5		.7
	2.0		1.6		1.8	Debt/Worth		1.5		1.1		1.7
	3.0		3.3		3.3			3.0		5.5		2.6
	34.5		52.8		39.9	% Profit Before Taxes/Tangible		51.2		42.8		37.9
(45)	16.2	(65)	26.1	(70)	22.8	Net Worth		9.2	(16)	27.4	(21)	27.9
	−1.1		7.0		4.6			−2.8		3.2		17.2
	11.7		20.5		17.0	% Profit Before Taxes/Total		21.1		18.6		14.2
	5.5		10.8		7.6	Assets		3.3		9.6		8.2
	−.4		1.9		1.5			−.8		1.5		3.9
	20.1		44.3		35.8			64.6		42.7		21.4
	9.8		15.6		17.1	Sales/Net Fixed Assets		35.8		15.1		11.2
	6.5		7.3		7.5			9.5		7.3		7.2
	2.1		2.5		2.6			2.9		2.6		2.1
	1.6		2.0		2.0	Sales/Total Assets		2.0		1.8		1.9
	1.3		1.5		1.6			1.7		1.5		1.4
	1.1		.8		.7			.4		.8		1.4
(36)	2.1	(61)	1.7	(61)	1.6	% Depr., Dep., Amort./Sales	(11)	.8		2.3		2.6
	2.9		3.3		2.8			2.5		2.9		3.2
	1.8		2.4		2.7	% Officers', Directors',						
(12)	4.3	(23)	4.1	(30)	4.5	Owners' Comp/Sales						
	6.7		9.5		7.8							
	1537661M		**1883457M**		**1840680M**	Net Sales ($)	**3293M**	**27202M**	**36782M**	**116678M**	**115773M**	**1540952M**
	1092333M		**1169085M**		**1136958M**	Total Assets ($)	**1948M**	**13736M**	**20946M**	**72757M**	**52973M**	**974598M**

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M = $thousand MM = $million

See Pages 1 through 15 for Explanation of Ratios and Data

Exhibit 3-3

XYZ, INC.
CONSOLIDATED BALANCE SHEETS
SEPTEMBER 30, 1988 AND 1987

		1988	1987
ASSETS	**Current Assets:**		
	Cash and cash equivalents	**$ 2,944,964**	$ 1,459,475
	Cash investments	**2,244,061**	3,369,289
	Trade receivables - less allowance for doubtful accounts: 1988, $85,352; 1987, $135,353	**5,025,964**	4,171,421
	Inventories	**4,109,264**	3,335,251
	prepaid expenses and other	**725,964**	122,370
	Total current assets	**15,050,217**	12,457,806
	Property, Plant and Equipment:		
	Land	**356,217**	296,217
	Buildings and Improvements	**5,476,155**	4,837,392
	Machinery and equipment	**2,160,671**	1,546,476
	Transportation equipment	**1,866,005**	1,705,107
	Office furniture and equipment	**463,750**	483,769
	Total	**10,322,798**	8,868,961
	Less accumulated depreciation	**4,705,580**	4,207,598
	Property - net	**5,617,218**	4,661,363
	Other Assets:		
	Intangible assets - less accumulated amortization: 1988, $197,437; 1987, $239,281	**226,728**	252,884
	Insurance trust	**1,122,796**	1,066,964
	Other	**89,287**	77,778
	Total other assets	**1,438,811**	1,397,626
	Total	**$22,106,246**	$18,516,795
LIABILITIES AND SHAREHOLDERS' EQUITY	**Current Liabilities:**		
	Current portion of long-term debt	**$ 17,902**	$ 32,405
	Accounts payable - trade	**5,049,234**	2,686,669
	Accrued income taxes		21,400
	Accrued payroll and employee benefits	**681,369**	678,752
	Container deposits	**1,054,373**	1,199,263
	Other accruals	**198,477**	178,736
	Total current liabilities	**7,001,355**	4,797,225
	Long-term debt	**53,706**	71,608
	Deferred income taxes	**249,900**	242,200
	Shareholders' Equity:		
	Common stock - authorized 4,000,000 shares of $.05 par value, issued: 1988, 3,592,673; 1987, 3,268,337		
	Additional paid-in capital	**179,634**	163,417
	Retained earnings (deficit)	**14,671,885**	12,084,817
	Total shareholders' equity	**(50,234)**	1,157,528
		14,801,285	13,405,762
	Total	**$22,106,246**	$18,516,795

See accompanying Notes to Financial Statements

Exhibit 3-4

XYZ, INC.
CONSOLIDATED BALANCE SHEETS
SEPTEMBER 30, 1988 AND 1987

		1988	1987
ASSETS	**Current Assets:**		
	Cash and cash equivalents	**$ 2,944,964**	$ 1,459,475
	Cash investments	**2,244,061**	3,369,289
	Trade receivables - less allowance for doubtful accounts: 1988, $85,352; 1987, $135,353	**5,025,964**	4,171,421
	Inventories	**4,109,264**	3,335,251
	prepaid expenses and other	**725,964**	122,370
	Total current assets	**15,050,217**	12,457,806
	Property, Plant and Equipment:		
	Land	**356,217**	296,217
	Buildings and Improvements	**5,476,155**	4,837,392
	Machinery and equipment	**2,160,671**	1,546,476
	Transportation equipment	**1,866,005**	1,705,107
	Office furniture and equipment	**463,750**	483,769
	Total	**10,322,798**	8,868,961
	Less accumulated depreciation	**4,705,580**	4,207,598
	Property - net	**5,617,218**	4,661,363
	Other Assets:		
	Intangible assets - less accumulated amortization: 1988, $197,437; 1987, $239,281	**226,728**	252,884
	Insurance trust	**1,122,796**	1,066,964
	Other	**89,287**	77,778
	Total other assets	**1,438,811**	1,397,626
	Total	**$22,106,246**	$18,516,795
LIABILITIES AND SHAREHOLDERS' EQUITY	**Current Liabilities:**		
	Current portion of long-term debt	**$ 17,902**	$ 32,405
	Accounts payable - trade	**5,049,234**	2,686,669
	Accrued income taxes		21,400
	Accrued payroll and employee benefits	**681,369**	678,752
	Container deposits	**1,054,373**	1,199,263
	Other accruals	**198,477**	178,736
	Total current liabilities	**7,001,355**	4,797,225
	Long-term debt	**53,706**	71,608
	Deferred income taxes	**249,900**	242,200
	Shareholders' Equity:		
	Common stock - authorized 4,000,000 shares of $.05 par value, issued: 1988, 3,592,673; 1987, 3,268,337		
	Additional paid-in capital	**179,634**	163,417
	Retained earnings (deficit)	**14,671,885**	12,084,817
	Total shareholders' equity	**(50,234)**	1,157,528
		14,801,285	13,405,762
	Total	**$22,106,246**	$18,516,795

See accompanying Notes to Financial Statements

Exhibit 3-5

XYZ, INC.
CONSOLIDATED STATEMENTS OF INCOME AND RETAINED EARNINGS (DEFICIT)
FOR THE YEARS ENDED SEPTEMBER 30, 1988, 1987, 1986

	1988	1987	1986
Net sales	**$42,389,957**	$33,294,962	$30,730,768
Cost of sales	**35,981,363**	26,405,930	24,972,185
Gross profit	**6,408,594**	6,889,032	5,758,583
Selling, general and administrative expenses	**3,957,771**	3,876,206	3,824,226
Income from operations	**2,450,823**	3,012,826	1,934,357
Other income (deductions)			
Interest income	**441,891**	347,613	362,295
Interest expense	**(10,985)**	(22,513)	(46,467)
Other investment income - net			134,690
Miscellaneous	**55,066**	48,660	93,654
Total other income (deductions) - net	**485,972**	373,760	544,172
Income before income taxes	**2,936,795**	3,386,586	2,478,529
Provision for income taxes	**1,139,118**	1,620,012	1,150,949
Net income	**1,797,677**	1,766,574	1,327,580
Retained earnings, beginning of year	**1,157,528**	1,726,292	1,983,007
Stock dividend	**(2,610,888)**	(1,952,645)	(1,365,590)
Cash dividend ($.11 per share, 1988; $.08 per share, 1987; $.06 per share, 1986)	**(391,960)**	(300,693)	(218,705)
Common stock acquired and retired	**(2,591)**	(82,000)	
Retained earnings (deficit), end of year	**$ (50,234)**	$ 1,157,528	$ 1,726,292
Weighted average number of shares outstanding	**3,593,048**	3,630,652	3,637,798
Earnings per common share	**$.50**	$.49	$.36

See accompanying Notes to Financial Statements

INDEPENDENT AUDITORS' REPORT

To the Shareholders of XYZ, Inc.:

We have audited the consolidated balance sheets of XYZ, Inc. at September 30, 1988 and 1987, and the related consolidated statements of income and retained earnings (deficit), and cash flows for each of the three years in the period ended September 30, 1988. These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on these financial statements based on our audits.

We conducted our audits in accordance with generally accepted auditing standards. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

In our opinion, the accompanying consolidated financial statements present fairly, in all material respects, the financial position of the companies at September 30, 1988 and 1987, and the results of their operations and their cash flows for each of the three years in the period ended September 30, 1988 in conformity with generally accepted accounting principles.
DELOITTE HASKINS & SELLS
Minneapolis, Minnesota
December 5, 1988

Exhibit 3-6

MANUFACTURERS • GAMES, TOYS & CHILDREN'S VEHICLES; EXCEPT DOLLS & BICYCLES. SIC # 3944

Comparative Historical Data							Current Data Sorted by Sales					
					1	# Postretirement Benefits						1
						Type of Statement						
17		19		19		Unqualified				4	4	11
11		21		24		Reviewed	1	3	7	10	2	1
2		7		14		Compiled	3	5		3	1	2
		1				Tax Returns						
17		20		18		Other	2	5	2		1	8
4/1/90- 3/31/91		4/1/91- 3/31/92		4/1/92- 3/31/93				17(4/1/-9/30/92)		58 (10/1/92-3/31/93)		
ALL 47		ALL 68		ALL 75		NUMBER OF STATEMENTS	0-1MM 6	1-3mm 13	3-5MM 9	5-10MM 17	10-25MM 8	25MM & OVER 22
	%		%		%	ASSETS	%	%	%	%	%	%
	7.1		8.9		7.2	Cash & Equivalents		7.4		13.3		5.8
	27.0		30.9		31.8	Trade Receivables - (net)		24.5		32.0		36.0
	31.9		30.4		35.3	Inventory		47.4		31.0		28.3
	2.1		1.9		1.7	All Other Current		.6		2.2		2.7
	68.1		72.1		76.1	Total Current		79.8		78.5		72.7
	19.2		17.5		16.7	Fixed Assets (net)		16.1		14.4		17.2
	4.2		3.7		3.1	Intangibles (net)		1.8		2.2		5.4
	8.5		6.7		4.1	All Other Non-Current		2.3		4.9		4.7
	100.0		100.0		100.0	Total		100.0		100.0		100.0
						LIABILITIES						
	16.4		12.6		14.0	Notes Payable Short-Term		13.9		12.3		11.8
	3.4		2.3		3.0	Cur. Mat.-L/T/D		4.5		3.6		.7
	11.7		13.1		14.6	Trade Payables		14.5		12.0		16.5
	.7		.9		.6	Income Taxes Payable		.5		.5		.7
	8.1		9.0		11.1	All Other Current		5.6		10.8		11.9
	40.3		38.0		43.2	Total Current		38.8		39.2		41.7
	13.2		13.4		12.2	Long Term Debt		15.5		9.4		11.8
	1.2		.5		.4	Deferred Taxes		.1		.5		.6
	2.8		5.3		3.5	All Other Non-Current		2.2		2.1		1.7
	42.4		42.9		40.6	Net Worth		43.4		48.8		44.3
	100.0		100.0		100.0	Total Liabilities and Net Worth		100.0		100.0		100.0
						INCOME DATA						
	100.0		100.0		100.0	Net Sales		100.0		100.0		100.0
	35.5		37.2		36.0	Gross Profit		35.5		33.5		35.8
	28.5		29.3		30.2	Operating Expenses		29.9		28.2		28.6
	6.9		7.9		5.8	Operating Profit		5.7		5.3		7.2
	3.3		1.8		1.2	All Other Expenses (net)		1.1		.4		1.8
	3.7		6.1		4.6	Profits Before Taxes		4.6		4.9		5.3
						RATIOS						
	2.5		2.8		2.9			4.5		2.8		2.8
	1.7		1.9		1.8	Current		2.3		1.9		1.9
	1.2		1.3		1.3			1.5		1.3		1.2
	1.4		1.7		1.4			1.7		2.0		1.8
	.8		1.1		.8	Quick		.6		.8		1.0
	.6		.7		.6			.5		.6		.7
34	10.6	31	11.6	34	10.8		14	25.2	31	11.9	56	6.5
55	6.6	49	7.4	56	6.5	Sales Receivables	37	10.0	56	6.5	72	5.1
85	4.3	85	4.3	85	4.3		78	4.7	89	4.1	99	3.7
62	5.9	55	6.6	63	5.8		79	4.6	43	8.5	68	5.4
104	3.5	85	4.3	94	3.9	Cost of Sales/Inventory	126	2.9	78	4.7	85	4.3
146	2.5	152	2.4	146	2.5		166	2.2	140	2.6	118	3.1
21	17.0	21	17.7	18	20.1		10	38.1	12	30.2	29	12.5
29	12.4	27	13.3	30	12.3	Cost of Sales/Payables	27	13.3	22	16.4	39	9.4
50	7.3	47	7.8	61	6.0		40	9.1	33	11.0	66	5.5
	3.9		3.4		3.3			2.6		3.0		3.3
	7.6		6.2		6.3	Sales/Working Capital		4.4		6.5		5.1
	17.5		10.8		13.8			14.0		11.5		15.0
	7.1		10.1		9.0			6.8		9.2		14.5
(44)	2.4	(66)	3.4	(69)	3.6	EBIT/Interest	(12)	1.9	(14)	4.6	(21)	4.3
	1.0		1.5		1.5			.8		1.3		2.9
	8.9	(34)	13.3	(24)	13.1	Net Profit + Depr., Dep.,						
(23)	2.8		3.3		2.8	Amort./Cur. Mat.L/T/D						
	.5		1.8		1.2							
	.2		.2		.1			.1		.1		.2
	.6		.4		.5	Fixed/Worth		.4		.3		.5
	.8		.8		1.0			1.2		.7		1.0
	.9		.8		1.0			.7		.5		.7
	2.0		1.6		1.8	Debt/Worth		1.5		1.1		1.7
	3.0		3.3		3.3			3.0		5.5		2.6
	34.5		52.8		39.9	% Profit Before Taxes/Tangible		51.2		42.8		37.9
(45)	16.2	(65)	26.1	(70)	22.8	Net Worth		9.2	(16)	27.4	(21)	27.9
	-1.1		7.0		4.6			-2.8		3.2		17.2
	11.7		20.5		17.0	% Profit Before Taxes/Total		21.1		18.6		14.2
	5.5		10.8		7.6	Assets		3.3		9.6		8.2
	-.4		1.9		1.5			-.8		1.5		3.9
	20.1		44.3		35.8			64.6		42.7		21.4
	9.8		15.6		17.1	Sales/Net Fixed Assets		35.8		15.1		11.2
	6.5		7.3		7.5			9.5		7.3		7.2
	2.1		2.5		2.6			2.9		2.6		2.1
	1.6		2.0		2.0	Sales/Total Assets		2.0		1.8		1.9
	1.3		1.5		1.6			1.7		1.5		1.4
	1.1		.8		.7			.4		.8		1.4
(36)	2.1	(61)	1.7	(61)	1.6	% Depr., Dep., Amort./Sales	(11)	.8		2.3		2.6
	2.9		3.3		2.8			2.5		2.9		3.2
	1.8		2.4		2.7	% Officers', Directors',						
(12)	4.3	(23)	4.1	(30)	4.5	Owners' Comp/Sales						
	6.7		9.5		7.8							
	1537661M		1883457M		1840680M	Net Sales ($)	3293M	27202M	36782M	116678M	115773M	1540952M
	1092333M		1169085M		1136958M	Total Assets ($)	1948M	13736M	20946M	72757M	52973M	974598M

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M = $thousand MM = $million

See Pages 1 through 15 for Explanation of Ratios and Data

Exhibit 3-7

XYZ, INC.
CONSOLIDATED BALANCE SHEETS
SEPTEMBER 30, 1988 AND 1987

		1988	1987
ASSETS	**Current Assets:**		
	Cash and cash equivalents	**$ 2,944,964**	$ 1,459,475
	Cash investments	**2,244,061**	3,369,289
	Trade receivables - less allowance for doubtful accounts: 1988, $85,352; 1987, $135,353	**5,025,964**	4,171,421
	Inventories	**4,109,264**	3,335,251
	prepaid expenses and other	**725,964**	122,370
	Total current assets	**15,050,217**	12,457,806
	Property, Plant and Equipment:		
	Land	**356,217**	296,217
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	Machinery and equipment	**2,160,671**	1,546,476
	Transportation equipment	**1,866,005**	1,705,107
	Office furniture and equipment	**463,750**	483,769
	Total	**10,322,798**	8,868,961
	Less accumulated depreciation	**4,705,580**	4,207,598
	Property - net	**5,617,218**	4,661,363
	Other Assets:		
	Intangible assets - less accumulated amortization: 1988, $197,437; 1987, $239,281	**226,728**	252,884
	Insurance trust	**1,122,796**	1,066,964
	Other	**89,287**	77,778
	Total other assets	**1,438,811**	1,397,626
	Total	**$22,106,246**	$18,516,795
LIABILITIES AND SHAREHOLDERS' EQUITY	**Current Liabilities:**		
	Current portion of long-term debt	**$ 17,902**	$ 32,405
	Accounts payable - trade	**5,049,234**	2,686,669
	Accrued income taxes		21,400
	Accrued payroll and employee benefits	**681,369**	678,752
	Container deposits	**1,054,373**	1,199,263
	Other accruals	**198,477**	178,736
	Total current liabilities	**7,001,355**	4,797,225
	Long-term debt	**53,706**	71,608
	Deferred income taxes	**249,900**	242,200
	Shareholders' Equity:		
	Common stock - authorized 4,000,000 shares of $.05 par value, issued: 1988, 3,592,673; 1987, 3,268,337		
	Additional paid-in capital	**179,634**	163,417
	Retained earnings (deficit)	**14,671,885**	12,084,817
	Total shareholders' equity	**(50,234)**	1,157,528
		14,801,285	13,405,762
	Total	**$22,106,246**	$18,516,795

See accompanying Notes to Financial Statements

4. DETERMINATION OF WIDESPREAD IMPACTS

The financial impacts of undertaking pollution controls could potentially cause far-reaching and serious socioeconomic impacts. If the financial tests outlined in Chapter 2 and 3 suggest that a discharger (public or private) or group of dischargers will have difficulty paying for pollution controls, then an additional analysis must be performed to demonstrate that there will be widespread adverse impacts on the community or surrounding area. There are no economic ratios per se that evaluate socioeconomic impacts. Instead, the relative magnitudes of indicators such as increases in unemployment, losses to the local economy, changes in household income, decreases in tax revenues, indirect effects on other businesses, and increases in sewer fees for remaining private entities should be taken into account when deciding whether impacts could be considered widespread. Since EPA does not have standardized tests and benchmarks with which to measure these impacts, the following guidance is provided as an example of the types of information that should be considered when reviewing impacts on the surrounding community.

In certain circumstances, the information presented here may not adequately address all potential impacts. At a minimum, however, the analysis must define the affected community (the geographic area where project costs pass through to the local economy), consider the baseline economic health of the community, and finally evaluate how the proposed project will affect the socioeconomic well-being of the community. Applicants should feel free to consider additional measures not mentioned here if they judge them to be relevant. Likewise, applicants should not view this guidance as a check list. In all cases, socioeconomic impacts should not be evaluated incrementally, rather, their cumulative effect on the community should be assessed. More detailed guidance on the factors that should be considered when evaluating the socioeconomic impacts to communities of meeting water quality standards is given below.

4.1 Define Relevant Geographical Area

One important factor in determining the magnitude of these impacts is defining the geographical area in which they occur. In some cases, one community's loss may be another community's gain, as in the case of a plant moving to another community. In the case of municipal pollution control projects, the affected community is most often the immediate municipality. There are, however, exceptions where the affected community includes individuals and areas outside the immediate community. For example, if business activity in the region is concentrated in a nearby community and not in the immediate community, then the nearby community may also be affected by loss of income in the immediate community and should be included in the analysis. If business activity of the region is concentrated in the immediate community, then outlying communities dependent upon the immediate municipality for employment, goods, and services should also be included in the analysis. Similarly, if a large number of workers

commute to an industrial facility that is significantly affected by the costs, then the affected community should include the home communities of commuters as well as the immediate community.

The relevant geographic area for evaluating the socioeconomic effects of compliance by private entities varies with each situation. For impacts from actions by a private entity, the area will typically be determined by the area in which the majority of its workers live and where most of the businesses that depend on it are located. There are no simple rules for defining the relevant area or community; the decision is based on the judgement of the discharger and state, subject to EPA review.

4.2 Determine Whether Impacts are Widespread: Public-Sector Entities

In demonstrating that impacts will be substantial, the applicant will have shown that compliance with water quality standards would be burdensome to the community. To demonstrate that impacts will also be widespread, the applicant must examine the estimated change in socioeconomic conditions that occur as a result of compliance.

There are no explicit criteria by which to evaluate widespread impacts. It is recommended, however, that changes in the socioeconomic indicators listed below be considered. For each indicator listed, the applicant should estimate the potential change from precompliance conditions if the community were to adopt pollution controls.

- Median Household Income;
- Community Unemployment Rate;
- Overall Net Debt as a Percent of Full Market Value of Taxable Property;
- Percent of Households Below Poverty Line;
- Impact on Community Development Potential; and
- Impact on Property Values.

Precompliance estimates of the first three indicators were considered in Chapter 2 in the Secondary Test. Estimated changes should be described qualitatively in **Worksheet M**. Depending on the size and type of impacts on industrial and commercial discharges, these estimated changes may be relatively large or small. In addition to changes in income, unemployment, and debt, affected communities may be faced with impaired development opportunities if pretreatment requirements or significantly higher user fees are imposed by the POTW. The municipality should therefore assess the potential for the loss of future jobs and personal income to the community if businesses would chose not to locate in the affected community. The potential for impaired development opportunities can be judged, in part, by comparing post-compliance costs to costs in neighboring communities. The cost of pollution control may also have an adverse effect on property values. Where property taxes are used to finance the project, property values may fall in response to higher taxes. Similarly, if the project will be financed through user fees, demand for

property in the community may fall, thus decreasing the value of property in the community.

The extent to which estimated changes can be interpreted as significant, however, will depend on the health of the community before compliance. It is therefore not possible to identify acceptable or unacceptable estimated changes for each indicator. For example, if Community XYZ were determined to be in a weak condition before compliance. As defined in Chapter 2, but the evaluation of widespread impacts suggests that all of the indicators listed above will remain virtually unchanged, then widespread impacts have not been demonstrated. Alternatively, if Community XYZ were very healthy, the estimated change in the indicators listed above would have to be very large in order for widespread impacts to occur.

In addition, there may be secondary impacts (not captured by the primary and secondary tests) to the community. Secondary impacts might include depressed economic activity in a community resulting from loss of purchasing power by persons losing their jobs due to increased user fees. The next section describes secondary impacts in greater detail.

4.3 Determine Whether Impacts are Widespread: Private-Sector Entities

If the financial tests suggest that a private entity or group of entities will have difficulty paying for pollution controls, then an additional analysis must be performed to demonstrate that there will be widespread adverse impacts on the community or surrounding area. The current economic condition of the affected community and the role of the affected entities within the community should first be considered when determining whether the affected community will be able to absorb the impacts of reduced business activity or closures. Through property taxes and employment, the entity(ies) may be a key contributor to the economic base of the affected community. In this situation, reductions in employment caused by compliance with the water quality standards could be widespread if workers have no other employment opportunities nearby. Impacts may also be significant where the entity(ies) is a primary producer of a particular product or service upon which other nearby businesses or the affected community depend. The impacts of reduced business activities or closure will be far greater in this case than if the products are sold elsewhere. These two examples illustrate how the interdependence between the affected entity(ies) and the affected community is a major factor in demonstrating that the impacts are not only substantial, but also widespread.

As important as the extent of socioeconomic impacts is the type of impacts that might occur. A worksheet has been provided to assist applicants in their evaluation of socioeconomic impacts. **Worksheet N** is designed as a list of the factors applicants should consider in determining whether impacts are not only substantial but also widespread. The worksheet is organized to follow the text below. To make the most

efficient use of this worksheet, applicants should read the remainder of Section 4.3 and then collect the data suggested in the worksheet. Applicants should feel free, however, to use anecdotal information to describe any current community characteristics or anticipated impacts that are not listed in the worksheet.

Potentially, one of the most serious impacts on the affected community's economy is the loss of employment caused by a reduction in business activity or closure. The size of this impact is dependent on the number of jobs lost relative to the total number of jobs in the community, and to the job opportunities available in the community. Typically, a decline in employment leads to a decline in personal income in the affected community. The total amount of income lost by the affected community will depend, in part, on the future job prospects of those losing their jobs. If employees leave the area in search of opportunities, all of their income will be lost to the affected community. Workers who are unable to market the full range of their skills to a new employer will receive lower wages in subsequent jobs. If employees stay in the area and find lower paying jobs or receive unemployment benefits, the loss of income to the affected community would be equal to the difference between existing and future income; the cost of unemployment benefits is calculated as a government expense or an expense borne someplace else, whichever is appropriate to the situation.

To assess the net impact on employment in the affected community, the existing rate of unemployment should be considered as an indicator of worker mobility between jobs. When the unemployment rate is very high in an affected community, workers will have a difficult time finding other jobs in that community. Where possible, comparisons should be made between industry employment levels in the community and the nation as a whole. If employment levels in the industry as a whole are falling, the industry may be in decline regardless of the burden placed on them by water quality standards regulations. If it is clear that a private-sector entity will go out of business regardless of water quality standards, the impact of the pollution controls should not be viewed as substantial. If the entity is in a marginal position, however, the effect that meeting water quality standards will have on the entity and the community should be considered. Applicants should also consider whether the lack of alternative employment opportunities may lead to an increased need for social services in the affected community. If the costs of increased social services will be borne by the affected community, they should be included in the assessment of widespread and substantial impacts.

Socioeconomic impacts may also include effects on the local government(s) such as loss of property tax revenues. If the financial tests in Chapter 3 suggest that an entity or group of entities will close, then the assessed value of property and tax revenues will fall. If the entities are a major source of revenue for the affected community, this loss in tax revenue may be significant. One example might be water quality standards that affect farming practices in an agricultural region. Compliance with these standards might lower the profitability of many farms, even to the point of forcing them to cease operations. To

assess the impact, the loss in property tax revenues should be compared to total property tax revenues in the affected community to determine the relative size of the loss. In general, a drop of 1 percent in property tax revenues would be considered significant.

If compliance is evaluated in the context of a public investment for which the private entity is paying a share (e.g., a factory's share of the cost to upgrade a municipal treatment plant), then the analysis of widespread impacts is more complicated. If the financial analysis shows that the entity or group of entities cannot pay their share of the cost, then the socioeconomic and public entity analysis should include this additional burden on other users. Likewise, if the entity or group of entities are significant users of the local utilities, then a reduction in business activity or closure may lead to a lowered demand and possible decreased efficiency for local utilities. For example, a water supply system may be designed with a large industrial user in mind. If much of the demand is eliminated, the system may become excessively expensive for the remaining users.

Affected communities may also be faced with impaired development opportunities if the need to comply with water quality standards discourages other businesses from locating in the area. In situations where the affected facility has not been built, additional expenditures on water pollution controls may delay or cancel the construction. The applicant should, therefore, consider not only the loss of potential jobs and personal income to the community if the entity is not built, but the future losses in jobs, personal income and tax revenues from other businesses that would choose not to locate in the affected community.

There may be some cases in which the socioeconomic impacts of implementing pollution controls are large enough that they are felt at the state level. For example, the State may lose tax revenues from lost production and lost income if a business closes. This will be of particular importance if the business is a major employer in the State and/or the State is experiencing a period of high unemployment and fiscal distress. At the same time, the State may encounter increased expenditures for unemployment compensation and social services. In reviewing state level impacts, the applicant should consider the degree to which decreases in employment and personal income in one area of the State are offset by increases in employment and personal income in other parts of the State. In most cases, impacts at the state level will be relatively minor. If not, then impacts are widespread.

4.4 Estimate Multiplier Effect

The effects of increased unemployment, decreased personal income, and reductions in local expenditures by the entity or group of entities (public and private) will be compounded as money moves through the local economy. Some portion of the lost income would have been spent in the local economy for the purchase of other goods and services and thus for the salaries of other local employees. These local employees, in

turn, would have spent some portion of their income in the local economy. This multiplier effect means that each dollar lost to an employee results in the loss of more than one dollar to the local economy.

The U.S. Department of Commerce, Bureau of Economic Analysis (BEA) has developed several multipliers to estimate the effect of reduced economic activity on output (sales), earnings, and employment. These multipliers are available by industry sector for 39 or 531 different industry classifications, depending on the level of detail required. Applicants that are interested in using these multipliers are advised to consult a copy of *RIMS II Regional Multipliers: A User Handbook of the Regional Input-Output Modeling System*, available from the National Technical Information Service (NTIS). The NTIS document number is #PB-86-230-216 and orders can be placed by calling NTIS at (703) 487-4650. Additional information on using multipliers is available from the BEA at (202) 606-5343.

4.5 Economic Benefits of Clean Water

Benefit-cost analysis is not required to demonstrate substantial and widespread effects under the Federal Water Quality Standards regulation.

In many cases, there may be economic benefits that accrue to the affected community from cleaner water. For example, in a rural community where the primary source of employment is agriculture, the reduction of fertilizer and pesticide runoff from farms would reduce the cost of treating irrigation water to downstream users. Another example might be an industrial facility discharging its wastewater into a stream that otherwise could be used for recreational cold-water fishing. Treatment or elimination of the industrial wastewater would provide a benefit to recreational fishermen by increasing the variety of fish in the stream. In both cases, the economic benefit is the dollar value associated with the increase in beneficial use or potential use of the waterbody. The types of economic benefits that might be realized will depend on both the characteristics of the polluting entity and characteristics of the affected community, and should be considered on a case by case basis.

Since the assessment of benefits requires site-specific information, it will be up to States to determine the extent to which benefits can be considered in the economic impact analysis. This determination should be coordinated with the EPA Regional Office. A more detailed description of the types of benefits that might be considered is given in Appendix C. This appendix is not intended to provide in-depth guidance on how to estimate economic benefits; rather, it is intended to give States an idea of the types of benefits that might be relevant in a given situation.

4.6 Summary of Financial Capability and Determination of Whether Impacts are Substantial and Widespread

Using the guidance described in this document, the applicant must demonstrate that the pollution control measures needed to meet water quality standards are not affordable. In addition, the applicant will have to show that there will be widespread adverse impacts to the community if it is required to meet standards. A summary checklist of the steps required in this process is presented in Table 4-1. This checklist also presents the type of data the applicant will need to collect to support each step. Whether or not the applicant has successfully demonstrated that substantial and widespread economic and social impacts would occur, however, will depend upon the EPA Regional Administrator's review of the application.

If the EPA Regional Administrator determines that substantial and widespread economic and social impacts have not been demonstrated, then the discharger must meet the water quality standards. Alternatively, if substantial and widespread economic and social impacts have been demonstrated, then the discharger will not have to meet the water quality standards. The discharger will, however, be expected to undertake some additional pollution control. The criteria outlined in Chapters 2 and 3 should be used to determine the most protective pollution control technique that would not impose a substantial impact on the entity. In addition, the discharger should check with EPA and the State regularly to determine what else will be required of them. It is then up to the State to revise the standards in the water body to reflect the uses that would be achieved if the discharger adopts the next most protective pollution control technique. The State will also have to revise its water quality criteria to protect the newly attainable uses. The discharger's NPDES permit will then be revised to reflect the new limits associated with revised criteria. Finally, federal regulations require that water quality standards be reviewed every three years to determine if there is any new information or technology that allows attainment of the full designated use without causing substantial and widespread social and economic impacts.

Table 4-1
Demonstration of Substantial and Widespread
Economic and Social Impacts of Attainment of Designated Uses

CHECKLIST

STEPS	INFORMATION THAT WILL BE REQUIRED FROM APPLICANT
1. Demonstrate that designated use is a potential use and not an existing use.	Data from State Water Quality Assessment Documents and water quality standards regulations.
2. Demonstrate that entity will incur substantial economic impacts.	
a. Identify all reasonable pollution reduction options,	Information on end-of-pipe treatment, possible treatment upgrades, additions to existing treatment, and pollution prevention activities including the following: • change in raw materials, • substitution of process chemicals, • change in process, • water recycling, reuse and efficiency, • pretreatment requirements, and • public education.
b. Evaluate costs of all reasonable pollution reduction options,	Assumptions about water demand, treatment capacity, expansion plans, population growth, and effectiveness of control in reducing pollution for each option. Estimate of project costs from design engineers, costs of comparable projects in the State, or judgement of experienced water pollution control engineers.
c. Identify lowest cost pollution reduction option that allows entity to meet water quality standards.	Information on treatment efficiencies for alternative pollution reduction techniques. Cost estimates for all alternatives.

Table 4-1 CHECKLIST (Cont'd.)

STEPS	INFORMATION THAT WILL BE REQUIRED FROM APPLICANT
3. Evaluate entity's financial health (**Public Entities Only**):	
a. determine method of financing,	Information on user fee financing mechanisms such as Revenue Bonds. Information on tax based financing mechanisms such as General Obligation Bonds.
b. annualize pollution reduction project costs,	Information on appropriate interest rates and period of financing.
c. allocate project costs,	Information on user groups, wastewater flow by user group, and surcharges on industrial users.
d. apply Municipal Preliminary Screener test,	Information on average total annual pollution control cost per household and median household income.
e. Depending on the results of the Municipal Preliminary Screener test, apply Secondary Test.	Information on results of Municipal Preliminary Screener test, overall net debt as a percent of full market value of taxable property, median household income, bond rating, community unemployment rate, property tax collection rate, and property tax revenues as a percent of full market value of taxable property.
4. Evaluate entity's financial health (**Private Entities Only**):	
a. annualize pollution reduction project costs,	Information on appropriate interest rates and period of financing.
b. Primary Measure:	
profitability,	Information that will allow evaluation of whether an entity will remain profitable after incurring the cost of pollution reduction including: • revenues, • cost of goods sold,

Table 4-1 CHECKLIST (Cont'd.)

STEPS	INFORMATION THAT WILL BE REQUIRED FROM APPLICANT
	• portion of corporate overhead assigned to the entity, and • total annualized pollution reduction project costs.
c. Secondary measures:	
solvency,	Information that will allow evaluation of the entity's ability to meet its fixed and long-term obligations including: • long-term debt, • current debt, • net income after taxes, and • depreciation.
liquidity, and	Information that will allow evaluation of how easily an entity can pay its short-term bills such as: • current assets, • current liabilities, and • total annualized pollution reduction project costs.
leverage.	Information that will allow evaluation of the extent to which a firm already has fixed financial obligations and therefore how much money it will be able to borrow including, long-term liabilities and owner equity.
5. Determine whether impacts are widespread (**Public Entities Only**):	
a. Evaluate change in socioeconomic conditions that occur as a result of compliance.	Information on <u>changes</u> in median household income, community unemployment rate, overall net debt as a percent of full market value of taxable property, percent of households below the poverty line, impact on community development potential, and impact on community

Table 4-1 CHECKLIST (Cont'd.)

STEPS	INFORMATION THAT WILL BE REQUIRED FROM APPLICANT
6. Determine whether impacts are widespread (**Private Entities Only**):	property values resulting from compliance.
a. Define community,	Information on the geographical boundary of the area in which the majority of the entity's workers live and where most of businesses that depend on the entity are located.
b. Evaluate effect on employment,	Current unemployment, change in unemployment due to investment in pollution reduction.
c. Evaluate effect on tax revenues,	Information on the likely effect on assessed value of property tax revenues if the entity must adopt pollution reductions.
d. Assess impairment of development opportunities,	Information on the likelihood that the need to adopt pollution reductions in the affected community would discourage other businesses from locating in the area in the future.
e. Collect any relevant additional information that demonstrates widespread socioeconomic impacts.	Any additional information that suggests that there are unique conditions in the affected community that should also be considered.
7. Evaluate economic benefits of cleaner water.	Information on potential benefits of cleaner water including enhanced recreational opportunities, reduced treatment costs for downstream users and increased property values.
8. Public comment and debate period.	Be prepared to supply backup information on the application to modify

Table 4-1 CHECKLIST (Cont'd.)

STEPS	INFORMATION THAT WILL BE REQUIRED FROM APPLICANT
	or change a designated use to the public.
9. If substantial and widespread economic and social impacts are demonstrated, determine which pollution reduction option should be implemented.	Information on the cost and efficiency of affordable pollution reduction alternatives.
10. Redesignate uses.	Uses will be determined by the level of "affordable" pollution reduction.
11. Standards will be adopted to protect new uses.	Once uses are established, standards should be revised to protect those uses.
12. Effluent limits and permits will be modified.	Limits will be modified to reflect effluent concentrations associated with the "affordable" pollution reduction technique.
13. Re-evaluate water quality standards in three years.	Per federal regulations, water quality standards must be revised every three years to determine if there is any new information or technology that allows attainment of the full designated uses without causing a substantial and widespread economic and social impact.

5. ANTIDEGRADATION: ROLE OF ECONOMIC ANALYSIS

Under the Water Quality Standards program, each State must develop, adopt and retain a statewide antidegradation policy and establish procedures for its implementation. The antidegradation policy is intended to protect current water quality; in only a limited set of cases can economic grounds be used to allow for a lowering of water quality. In particular, if the quality of the water exceeds levels necessary to support the propagation of fish, shellfish, and wildlife and recreation in and on the water (i.e. "high-quality water"), then economic considerations can be taken into account. Before any lowering of water quality in high-quality waters, however, an antidegradation review must determine that the lowering is necessary in order to accommodate important economic or social development in the area in which the waters are located.

Antidegradation is not a "no growth" rule and was never designed nor intended to be one. It is a policy that allows the public to make decisions about important environmental actions. Where the State intends to provide for development, it may decide that some lowering of water quality in "high-quality waters" is necessary to accommodate important economic or social development. Any such reduction in water quality, however, must protect existing uses fully and must satisfy the requirements for intergovernmental coordination and public participation.

While the terminology is different, the tests to determine substantial and widespread economic impacts (used when removing a use or granting a variance) are basically the same as those used to determine if there might be interference with an important social and economic development (antidegradation). As such, antidegradation analysis is the mirror image of the analyses described in Chapters 2, 3 and 4. Variances and downgrades refer to situations where additional treatment needed to meet standards may result in worsening economic conditions; while antidegradation refers to situations where lowering water quality may result in improved social and economic conditions.

When performing an antidegradation review, the first question is whether the pollution controls needed to maintain the high-quality water will interfere with the proposed development. If not, then the lowering of water quality is not warranted. If, on the other hand, the pollution controls will interfere with development, then the review must show that the development would be an important economic and social one. These two steps rely on the same tests as the determination of substantial and widespread impacts. It should be stressed at the outset that substantial economic impacts does not mean driving profits to zero, nor precluding all other municipal expenditures.

The following sections describe the steps involved in performing an economic impact analysis as part of an antidegradation review. These steps are outlined in Figure 5-1. The analytic approach presented here can be used for a variety of public-sector and private-sector entities, including POTWs, commercial, industrial, residential and recreational land

uses, and for point and nonpoint sources of pollution. The guidance provided in this chapter, however, is not meant to be exhaustive. The State and/or EPA may require additional information or tests. In addition, the applicant should feel free to include any additional information they feel is relevant. The steps described in further detail in the rest of the chapter are:

- **Verify Project Costs and Calculate the Annual Cost of the Pollution Control Project** - This section describes the factors considered when verifying that the proposed pollution control project is the most appropriate solution and the type of information that should be provided about the proposed project. It discusses how to annualize capital costs of the project and calculate total annual costs of the pollution control project.

- **Determine if Requirements would Interfere with Development (i.e., lower water quality is "necessary")** - This section describes the types of financial tests that should be used to determine if maintaining the high-quality water would interfere with the development.

- **Determine if Economic and Social Development would be Important** - This section presents factors to be considered in determining whether the development would be important from an economic and social point of view.

These steps closely parallel the analytic techniques presented in Chapters 2, 3, and 4. These chapters should be read for more detail.

5.1 Verify Project Costs and Calculate The Annual Cost of the Pollution Control Project

Before the impact analysis can be performed, the project costs should be verified and the annual costs calculated. Both private-sector and public-sector entities should consider a broad range of discharge management options including pollution prevention, end-of-pipe treatment, and upgrades or additions to existing treatment.

Whatever approach, the discharger must demonstrate that the proposed project is the most appropriate means of meeting water quality standards and must document project cost estimates. If there is at least one of the treatment alternatives that allows the applicant to maintain high-quality water without incurring substantial impacts, then they have failed to show that the requirements would interfere with the development. Cost information, and the assumptions underlying the cost estimates, should be supplied on Worksheet O.

The following two sections (5.1.a and 5.1.b) discuss analyzing public-sector projects. Section 5.1.c discusses private sector projects.

5.1.a Public-Sector Developments: Calculate the Annual Costs of the Pollution Control Project

Since capital costs typically will be paid over several years, annualized costs are used in the evaluation of economic burden to the community. The capital portion of public-sector project costs is typically financed over approximately 20 years, by issuing a municipal debt instrument such as a general obligation bond or a revenue bond.

The calculation of total annualized cost of the project is presented in **Worksheet P**. First, capital costs are summed and the portion of costs to be paid for with grant monies are deducted, as these costs will not need to be financed. Next, the annualization factor is calculated using the formula supplied on **Worksheet P**, or the annualization factor is found in Appendix B. Annualized capital cost is then calculated by multiplying the total capital costs to be financed by the annualization factor.

The interest rates used to annualize costs are dependent on the type of debt instrument used as well as the issuer's credit standing. Therefore, the interest rate used on **Worksheet P** reflects the debt instrument (i.e. municipal bond, commercial bank loan, state revolving fund loan, or other instrument) likely to be used by the municipality.

Next, annual operating and maintenance costs are added to the annualized capital cost. O&M costs should include the costs of monitoring, inspection, permitting fees, waste disposal charges, repair, administration, replacement, and any other recurring costs. All recurring costs should be stated in terms of dollars per year. The sum of the annualized capital cost and total annual operating and maintenance costs is the total annual cost of the project.

5.1.b Public-Sector Developments: Calculate Total Annualized Pollution Control Costs Per Household

To assess the burden that total pollution control costs are expected to have on households, an average annualized pollution control cost per household should be calculated for all households in the community that would bear project costs. In order to evaluate substantial impacts, therefore, the analysis must establish which households will actually pay for pollution control and what proportion of the costs will be borne by households. Then, these apportioned project costs are added to existing pollution control costs paid by the households.

It is important to define the affected community. The "community" is the governmental jurisdiction or jurisdictions responsible for paying compliance costs.

If project costs were estimated for some prior year, these costs should be adjusted upward to reflect current year prices using the average annual national Consumer Price

Index (CPI) inflation rate for the period. The CPI inflation rate is available from the Bureau of Labor Statistics. An additional source reporting the CPI inflation rate is the *CPI Detailed Report*, which is published monthly by the U.S. Department of Labor, Bureau of Labor Statistics.

In calculating the total annual cost of pollution control per household, current costs of pollution control must be considered along with the projected annual costs of the proposed pollution control project. The existing cost per household usually can be obtained from the most recent municipal records. For example, use the most recent operating revenues of the sewer enterprise fund, divided by the number of households served. If the portion of proposed project costs that households are expected to pay is known or is expected to remain unchanged, then use **Worksheet Q** to calculate the total annual cost of pollution control per household. If the portion paid by households is based on flow, then should refer to **Worksheet Q: Option A** as well.

5.1.c Private-Sector Entities: Calculate the Annual Costs of the Pollution Control Project

As with public-sector investments, the total capital costs are usually spread out over several years. Annualization calculates the amount that will be paid each year, including the financing costs. In order to allow for comparisons across cases, the analysis should assume that the applicant will borrow the capital and repay the loan in even annual installments over a 10 year period. The assumption of ten years is based on the likely life of the equipment. The assumption of even annual installments is made for convenience. The interest rate on the loan should be equivalent to the rate the applicant pays when it borrows money.

The financial tests discussed below compare the costs of compliance to other costs and revenues of the applicant. Compliance costs and other costs and revenues must, therefore, be calculated for the same year. See discussion in Section 2.2, and Appendix A for references to inflation/deflation indices. The Annualized Cost of Pollution Control for a private-sector entity can be calculated using **Worksheet R**.

5.2 Financial Analysis to Determine if Lower Water Quality is "Necessary"

The purpose of the financial impact analysis is to assess the extent to which planned development will be reduced as a result of maintaining water quality. There are two sets of tests presented in this section: one set for publicly owned developments, such as POTWs, and another for privately owned developments, such as new manufacturing facilities. The tests are not designed to determine the exact impact of pollution control costs on an entity. They merely provide indicators of whether pollution control costs would result in a substantial impact.

5.2.a Public-Sector Developments: Calculate and Evaluate the Municipal Preliminary Screener Value

Whether or not maintaining high-quality water is likely to interfere with a development due to additional public-sector costs is determined by jointly considering the results of two tests. The first test is a "screener" to establish whether the community can clearly pay for the project. The Municipal Preliminary Screener estimates the total per household annual pollution control costs to be borne by households (existing costs plus those attributable to the proposed project) as a percentage of median household income. The screener is written as follows:

$$Municipal\,Preliminary\,Screener = \frac{Average\,Total\,Pollution\,Control\,Cost\,per\,Household}{Median\,Household\,Income}$$

Median household income information for many municipalities is available from the 1990 Census of Population. To estimate median household income for the current year, use the CPI inflation rate for the period between the year that median household income is available and the current year.

Depending on the results of the screener, the community is expected to incur small, mid-range, or large economic impacts (see **Worksheet S**). If the total annual cost per household (existing annual cost per household plus the incremental cost related to the proposed project) is less than 1.0 percent of median household income, then the requirements are not expected to impose a substantial economic hardship on households and would not interfere with the development.

Communities are expected to incur mid-range impacts when the ratio of total annual compliance costs to median household income is between 1.0 and 2.0 percent. If the average annual cost per household exceeds 2.0 percent of median household income, then the project may place a large financial burden on many of the households within the community and the requirements may interfere with the development. In either case, communities move on to the Secondary Test to demonstrate substantial impacts.

5.2.b Public-Sector Developments: Secondary Test

The Secondary Test is designed to build upon the characterization of community identified in the Municipal Preliminary Screener. The Secondary Test indicates the community's ability to obtain financing and describes the socioeconomic health of the community. Indicators describe precompliance debt, socioeconomic, and financial management conditions in the community. Using these indicators and the scoring system

described below, the impact of the cost of pollution control is estimated. Specifically, applicants are required to present the following six indicators for the community:

Debt Indicators

- Bond Rating (if available) - a measure of credit worthiness of the community;

- Overall Net Debt as a Percent of Full Market Value of Taxable Property - a measure of debt burden on residents within the community;

Socioeconomic Indicators

- Unemployment Rate - a measure of the general economic health of the community;

- Median Household Income - a measure of the wealth of the community;

Financial Management Indicators

- Property Tax Revenue as a Percent of Full Market Value of Taxable Property - a measure of the funding capacity available to support debt based on the wealth of the community; and

- Property Tax Collection Rate - a measure of how well the local government is administered.

A more detailed description of the six indicators is presented in Section 2.4, including a discussion of alternative measures to use in States with property tax caps and limitations on assessed values. **Worksheet T** can be used to estimate each of the indicators. Table 5-1 summarizes the indicators and what is considered to be a strong, mid-range, or weak rating.

The Secondary Score is calculated for the community by weighting each indicator equally and assigning a value of 1 to each indicator judged to be weak, a 2 to each indicator judged to be mid-range, and a 3 to each strong indicator. A cumulative assessment score is arrived at by summing the individual scores and dividing by the number of factors used. **Worksheet U** guides the reader through this calculation. The cumulative assessment score is evaluated as follows:

- less than 1.5 is considered weak
- between 1.5 and 2.5 is considered mid-range
- greater than 2.5 is considered strong

If the applicant is not able to develop one or more of the six indicators, they must provide an explanation as to why the indicator is not appropriate or not available. Since the point of the analysis is to measure the overall burden to the community, the debt and socioeconomic indicators are assumed to be better measures of burden than the financial management indicators. Consequently, if one of the debt or socioeconomic indicators is not available, the applicant should average the two financial management indicators and use this averaged value as a single indicator with the remaining indicators. This averaging is necessary so that undue weight is not given to the financial management indicators.

5.2.d Public-Sector Developments: Assess Whether the Requirements Would Interfere With the Development

The results of the two tests are considered jointly in determining whether the community is expected to incur substantial impacts that would interfere with the development. As shown in Table 5-2, the cumulative assessment score for the community is combined with the estimated household burden. The combination of factors establishes whether impacts can be expected to be substantial.

In the matrix, "X" indicates that the impact is likely to interfere with the development. The closer the community is to the upper right hand corner of the matrix, the greater the likelihood. Similarly, "✓" indicates that the impact is not likely to interfere with development. The closer to the lower left hand corner of the matrix, the smaller the likelihood. Finally, the "?" indicates that the impact is unclear.

5.2.e Private-Sector Developments: Financial Measures

Four general categories of financial tests are used to determine if maintaining high-quality water will interfere with privately owned development. The four categories are divided into a primary measure of financial impacts and three secondary measures of financial impacts:

Primary Measure

- Profit -- how much would profits decline due to pollution control expenditures?

Secondary Measures

- Liquidity -- how easily can an entity pay its short-term bills?
- Solvency -- how easily can an entity pay its fixed and long-term bills?
- Leverage -- how much money can the entity borrow?

Profit and solvency ratios are calculated both with and without the additional compliance costs (taking into consideration the entity's ability, if any, to increase its prices to cover

part or all of the costs). Comparing these ratios to each other and to industry benchmarks provides a measure of the impact on the entity. Since antidegradation reviews involve new or expanded operations, the ratios often will be calculated using estimated values from pro-forma income statements and balance sheets prepared for the development.

For all of the tests, it is important to look beyond the individual test results and evaluate the total situation of the entity. While each test addresses a single aspect of financial health, the results of the four tests should be considered jointly to obtain an overall picture. The results should be compared with the ratios for other entities in the same industry or activity.

The primary and secondary measures are described below, along with an example of specific tests to be used. While there are several ratios that could be used for each test, to simplify the presentation only one ratio per test is described. In most cases, interpreting the results requires comparisons with typical values for the industry. Among the sources that provide comparative information are: Robert Morris Associates' *Annual Statement Studies*, *Moody's Industrial Manual*, Dun and Bradstreet's *Dun's Industry Norms*, and Standard & Poor's *Industry Surveys*. The *Annual Statement Studies*, *Dun's Industry Norms* , and Standard & Poor's *Industry Surveys* provide composite statistics for firms grouped into various manufacturing and service industries. The *Moody's Industrial Manual* provides detailed financial information on individual firms that can be used for comparison purposes. Each of the tests is discussed in more detail in Chapter 3.

5.2.f Private-Sector Developments: Primary Measure

Primary measure is the Profit Test, which measures the development's earnings if it is required to provide pollution control necessary to maintain the high-quality waters and if it is not required to do so. If maintaining high-quality water would result in considerably lower profits, then the development might not take place.

Two pieces of information are needed for the Profit Test. The first piece is the total annual cost of the required pollution control from **Worksheet R**. The second piece is the earnings information from the entity's income statement (**Worksheet V**).

$$Profit\ Test = \frac{Earnings\ Before\ Taxes}{Revenues}$$

The Profit Test should be calculated with and without the cost of the pollution control. In the former case, the annualized cost of pollution control (including O&M) is subtracted from the discharger's estimated earnings before taxes (revenues minus costs excluding income taxes). The Profit Test can be calculated using **Worksheets V, and W**. These profit rates should be

compared to those for facilities in similar lines of business, using data in *Moody's Industrial Manual*, *Dun & Bradstreet's Industry Norms and Key Business Ratios*, *Standard & Poor's Industry Surveys*, or Robert Morris's *Annual Statement Studies*.

The degree to which the discharger is able to raise prices is difficult to predict, and depends on many factors. Considerations should include the level of competition in the industry, the likelihood of competitors' facilities facing similar project costs, and the willingness of consumers to pay more for the product.

5.2.g Private-Sector Developments: Secondary Measures

The following secondary measures provide additional important information about the financial health of the development. All primary and secondary measures should be included in the analysis.

Liquidity

Liquidity is a measure of how easily a discharger can pay its short-term bills. One measure of liquidity is the Current Ratio, which compares current assets with current liabilities. Current assets include cash and other assets that are or could reasonably be converted into cash during the current year. Likewise, current liabilities are items that must be paid within the current year.

The Current Ratio is calculated by dividing current assets by current liabilities.

$$\textit{Current Ratio} = \frac{\textit{Current Assets}}{\textit{Current Liabilities}}$$

The Current Ratio can be calculated using **Worksheet X**. The general rule is that if the Current Ratio is greater than 2, the entity should be able to cover its short-term obligations. Frequently, lenders require this level of liquidity as a prerequisite for lending. This rule (Current Ratio > 2) may not, however, be appropriate for all types of private entities. The Current Ratio of the discharger in question should be compared with ratios for other dischargers in the same line of business.

Solvency

Solvency is a measure of an entity's ability to meet its fixed and long-term obligations. These obligations are bills and debts that are owed on a regular basis for periods longer than one year. Solvency tests are commonly used to predict financial problems that could lead to bankruptcy within the next few years.

As with liquidity, there are several possible tests for solvency. One solvency test, the Beaver's Ratio, compares cash flow to total debt. This test has been shown to be a good indicator of the likelihood of bankruptcy.

$$Beaver's\ Ratio = \frac{Cash\ Flow}{Total\ Debt}$$

The Beaver's Ratio can be calculated using **Worksheet Y**. Cash Flow is a measure of the cash the entity has available to it in a given year. Since depreciation is an accounting cost -- a cost that does not use any currently available revenues -- it is added back to reported net income after taxes to get cash flow. Total debt is equal to the current debt for the current year plus the long term debt, since current debt includes that part of long-term debt that is due in the current year.

If the Beaver's Ratio is greater than 0.20 the development is considered to be solvent (i.e., can pay its long-term debts). If the ratio is less than 0.15 the development may be insolvent (i.e., go bankrupt). If the ratio is between 0.15 and 0.20, then future solvency is uncertain.

Leverage

Leverage tests measure the extent to which a firm has fixed financial obligations and thus indicates how much more money a firm is capable of borrowing. Firms that rely heavily on debt may find it difficult and expensive to borrow additional funds. One commonly used measure of leverage is the Debt to Equity Ratio.

$$Debt/Equity\ Ratio = \frac{Long\text{-}Term\ Liabilities}{Owners'\ Equity}$$

The Debt to Equity Ratio can be calculated using **Worksheet Z**. Since there are no generally accepted Debt/Equity Ratio values that apply to all types of economic activity, the ratio should be compared with the ratio of firms in similar businesses. If the entity's ratio compares favorably with the median or upper quartile ratio for similar businesses, it should be able to borrow additional funds. These ratios can be calculated using data in Robert Morris Associates' *Annual Statement Studies*, *Moody's Industrial Manual*, and Dun & Bradstreet's *Dun's Industry Norms*.

For entities with special sources of funding, leverage is not an appropriate measure of their ability to raise capital. Examples are agriculture and affordable housing, where special loan programs may be available. In these cases, an analysis of the probability that the project would receive this money is appropriate.

5.2.g Private-Sector Developments: Assess Whether the Requirements Will Interfere With the Development: Interpreting the Results

The financial analysis should be used to determine if there will be a substantial adverse impact such as to interfere with the development. If the four tests taken together indicate that the requirements would interfere with the development, then proceed to Section 5.3 to determine if the development would be considered important in social and economic terms.

5.3 Determine If Economic and Social Development Would Be Important

There are no economic ratios per se that determine whether a development would be considered important. Instead, the relative magnitudes of indicators such as increases in unemployment, losses to the local economy, changes in household income, decreases in tax revenues, indirect effects on other businesses, and increases in sewer fees should be taken into account. The term important is intended to convey a general concept regarding the level of social and economic development used to justify a change in high-quality waters.

5.3.a Define Relevant Geographical Area

One important factor is defining the geographical area in which the impacts will occur. In the case of municipal pollution control projects, the affected community is most often the immediate municipality. The relevant geographic area for evaluating the importance of a private-sector development varies with each situation. The area will typically be determined by the area in which the majority of its workers live and where most of the businesses that depend on it are located. In either case, the geographical area considered must include "...the area in which the waters are located." (40 CFR 131.12 (a)(2)) There are no simple rules for defining the relevant area or community; the decision is based on the judgement of the applicant and state, subject to EPA review.

5.3.b Public-Sector Developments: Determine Whether Important

While there are no explicit criteria, it is recommended that <u>changes</u> in the socioeconomic indicators listed below be considered. For each indicator listed, the applicant should estimate the potential change that would result from the development.

- Median Household Income;
- Community Unemployment Rate;
- Overall Net Debt as a Percent of Full Market Value of Taxable Property;
- Percent of Households Below Poverty Line;
- Impact on Community Development Potential; and
- Impact on Property Values.

Estimated changes should be provided, along with supporting discussions, on **Worksheet AA**.

5.3.c Private-Sector Developments: Determine Whether Important

Determination of whether or not a private-sector development will be important to a community requires exploring more factors than is the case with public-sector developments. **Worksheet AB** has been provided to assist applicants in their evaluation of socioeconomic impacts. It is designed as a list of the factors applicants should consider in determining whether the development is important. Applicants should feel free, however, to add anecdotal information to describe any current community characteristics or anticipated impacts that are not listed in the worksheet.

Potentially, one of the most important impacts on the affected community's economy is the employment to be gained. The size of this impact is dependent on the number of new jobs relative to the total number of jobs in the community, and to the other job opportunities available in the community. Typically, an increase in employment leads to an increase in personal income in the affected community. The total amount of income gained by the affected community will depend, in part, on the other job prospects of those hired. To assess the net impact on employment in the affected community, the existing rate of unemployment should be considered as an indicator of worker mobility between jobs.

The analysis should also consider whether the increase in employment opportunities may lead to a decreased need for social services in the affected community. If the cost of savings for decreased social services will be borne by the affected community, they should be included in the assessment.

The effects of increased employment and personal income will be compounded as the money moves through the economy. This multiplier effect means that each dollar gained to an employee results in the gain of more than a dollar to the local economy. Multiplier effects are discussed in more detail in Section 4.4.

Socioeconomic impacts may also include effects on the local government(s) such as property tax revenues and the demand for other public services. For example, if the development would be paying a share of the cost to upgrade a municipal treatment plant, then the analysis of community impacts is more complicated. If the development is eliminated, the system may become excessively expensive for the remaining users.

5.4 Summary

Using the guidance described in this document, the applicant must demonstrate that the pollution control measures needed to maintain the high-quality waters will interfere

with the development. In addition, the applicant will have to show that the development is important to the community.

The tests used to demonstrate interference and importance are the same as those used to demonstrate substantial and widespread. The difference is, however, that an antidegradation review considers situations that would improve the economic condition.

Figure 5-1:
Antidegradation Review

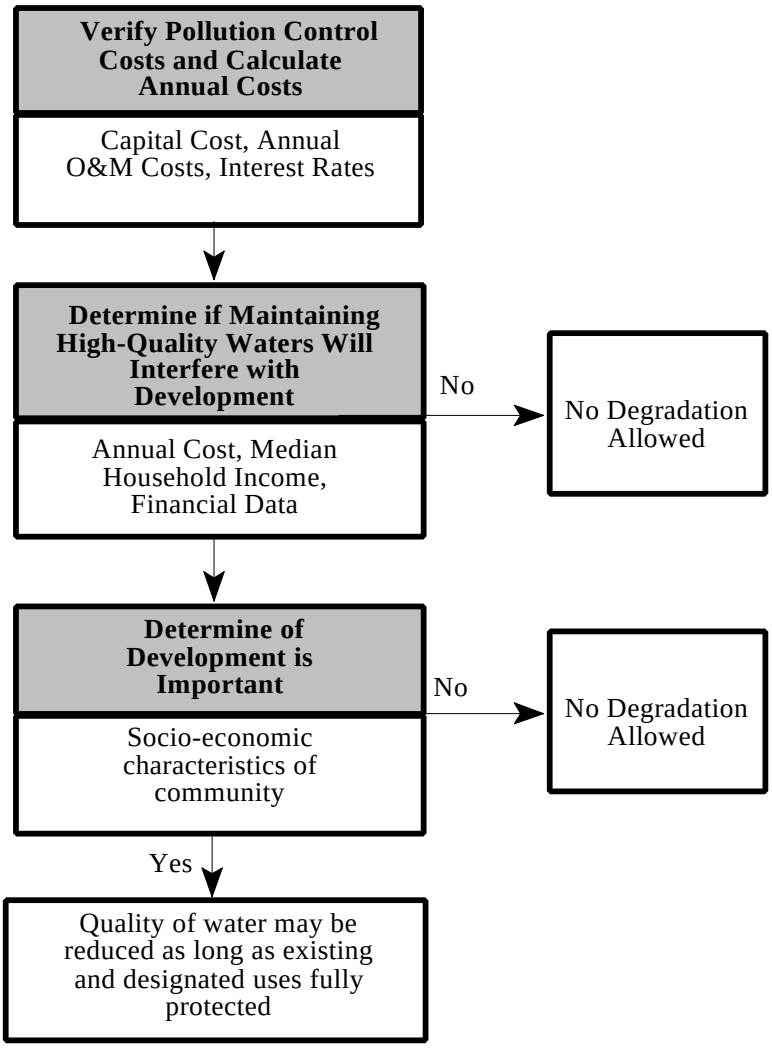

TABLE 5-1

SECONDARY INDICATORS

	Secondary Indicators		
Indicator	**Weak**	**Mid-Range**	**Strong**
Bond Rating	Below BBB (S&P) Below Baa (Moody's)	BBB (S&P) Baa (Moody's)	Above BBB (S&P) or Baa (Moody's)
Overall Net Debt as Percent of Full Market Value of Taxable Property	Above 5%	2%-5%	Below 2%
Unemployment	More than 1% above National Average	National Average	More than 1% below National Average
Median Household Income	More than 10% below State Median	State Median	More than 10% above State Median
Property Tax Revenues as a Percent of Full Market Value of Taxable Property	Above 4%	2%-4%	Below 2%
Property Tax Collection Rate	< 94%	94% - 98%	> 98%

TABLE 5-2

ASSESSMENT OF SUBSTANTIAL IMPACTS MATRIX

Secondary Score	Municipal Preliminary Screener		
	Less than 1.0 Percent	**Between 1.0 and 2.0 Percent**	**Greater than 2.0 Percent**
Less than 1.5	?	X	X
Between 1.5 and 2.5	✓	?	X
Greater than 2.5	✓	✓	?

APPENDIX A

DATA RESOURCES AND REFERENCE MATERIALS

APPENDIX A

Cost Estimation Resources:

U.S. EPA, *Construction Costs for Municipal Wastewater Treatment Plants: 1973-1978*, EPA/430/9-80-003, April, 1980.

U.S. EPA, *Technical Report: Operation and Maintenance Costs for Municipal Wastewater Facilities*, EPA/430/9-81-004, September, 1981.

U.S. EPA, *Construction Costs for Municipal Wastewater Conveyance Systems: 1973-1979*, EPA/430/9-81-003, January, 1981.

U.S. EPA, *Quarterly Indices of Direct Costs for Operation, Maintenance and Repair: (a) Waste Pumping Stations, (b) Gravity Sewers*, Office of Municipal Pollution Control, Municipal Facilities Division, Current.

Municipal Statistics Resources:

Bureau of the Census, U.S. Department of Commerce, *County and City Data Book*, published annually.

Financial and Ratio Analysis Resources:

Leopold A. Bernstein, *The Analysis of Financial Statements*, Dow Jones-Irwin, 1978.

Dun & Bradstreet, *Dun's Industry Norms*, annual.

J. Fred Weston and Eugene F. Brigham, *Managerial Finance*, The Dryden Press, several editions.

Robert Morris Associates, *Annual Statement Studies*, annual.

Moody's Financial Services, *Moody's Industrial Manual*, annual.

U.S. Department of Labor, Bureau of Labor Statistics, *CPI Detailed Report.*

U.S. EPA, *EPA Financial Capability Guidebook*, Office of Water Programs Operations, 1984.

U.S. EPA, *The Municipal Sector Study: Impacts of Environmental Regulations on Municipalities*, EPA 230-09-038, Office of Policy, Planning and Evaluation, September 1988.

				Interest Rate					
Year	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%	4.5%
1	1.0050	1.0100	1.0150	1.0200	1.0250	1.0300	1.0350	1.0400	1.0450
2	0.5038	0.5075	0.5113	0.5150	0.5188	0.5226	0.5264	0.5302	0.5340
3	0.3367	0.3400	0.3434	0.3468	0.3501	0.3535	0.3569	0.3603	0.3638
4	0.2531	0.2563	0.2594	0.2626	0.2658	0.2690	0.2723	0.2755	0.2787
5	0.2030	0.2060	0.2091	0.2122	0.2152	0.2184	0.2215	0.2246	0.2278
6	0.1696	0.1725	0.1755	0.1785	0.1815	0.1846	0.1877	0.1908	0.1939
7	0.1457	0.1486	0.1516	0.1545	0.1575	0.1605	0.1635	0.1666	0.1697
8	0.1278	0.1307	0.1336	0.1365	0.1395	0.1425	0.1455	0.1485	0.1516
9	0.1139	0.1167	0.1196	0.1225	0.1255	0.1284	0.1314	0.1345	0.1376
10	0.1028	0.1056	0.1084	0.1113	0.1143	0.1172	0.1202	0.1233	0.1264
11	0.0937	0.0965	0.0993	0.1022	0.1051	0.1081	0.1111	0.1141	0.1172
12	0.0861	0.0888	0.0917	0.0946	0.0975	0.1005	0.1035	0.1066	0.1097
13	0.0796	0.0824	0.0852	0.0881	0.0910	0.0940	0.0971	0.1001	0.1033
14	0.0741	0.0769	0.0797	0.0826	0.0855	0.0885	0.0916	0.0947	0.0978
15	0.0694	0.0721	0.0749	0.0778	0.0808	0.0838	0.0868	0.0899	0.0931
16	0.0652	0.0679	0.0708	0.0737	0.0766	0.0796	0.0827	0.0858	0.0890
17	0.0615	0.0643	0.0671	0.0700	0.0729	0.0760	0.0790	0.0822	0.0854
18	0.0582	0.0610	0.0638	0.0667	0.0697	0.0727	0.0758	0.0790	0.0822
19	0.0553	0.0581	0.0609	0.0638	0.0668	0.0698	0.0729	0.0761	0.0794
20	0.0527	0.0554	0.0582	0.0612	0.0641	0.0672	0.0704	0.0736	0.0769

APPENDIX C

CONCEPTUAL MEASURES OF ECONOMIC BENEFITS

APPENDIX C

CONCEPTUAL MEASURES OF ECONOMIC BENEFITS

In valuing benefits associated with an ecological resource such as clean water, a basic distinction is made between the intrinsic value of the existence of the resource and its value in use by the human population. Use values are further subdivided into direct or indirect uses. Other valuation concepts arise from the uncertainty surrounding future uses and availability of the resource. A classification of these valuation concepts, along with examples, is presented in Table C-1.

C.1 Use Benefits

Estimating the benefits of clean water will depend upon several variables that describe the attributes of the resource and its uses. A waterbody might be used for recreational activities (such as fishing, boating, swimming, hunting, bird watching), for commercial purposes (such as industrial water supply, irrigation, municipal drinking water, and fish harvesting), or for both. Where recreational activities are created or enhanced due to water quality improvements, the public will benefit in the form of increased recreational opportunities. Similarly, the cost of treating irrigation and drinking water to down stream users could be reduced if pollutant discharges were reduced or eliminated in a particular stretch of river.

Direct use includes both consumptive and non-consumptive uses. Consumptive uses can be distinguished from non-consumptive uses in that the former excludes other uses of the same resource while the latter does not. For example, water is consumed when it is diverted from a waterbody for irrigation purposes. With non-consumptive uses, however, the resource base remains in the same state before and after use (e.g., swimming). Human health benefits associated with cleaner water could be consumptive (reduced illness from eating finfish or shellfish) or non-consumptive (reduced exposure to infectious diseases while recreating).

When estimating benefits, it is important to determine whether or not the resource and its uses (in this case clean water) can be considered market or non-market resources and uses (i.e., does a market exist for the resource or its use). For example, commercial fisheries have a market value reflected by the financial value of landings of a particular species. By contrast, no market exists to describe the value individuals receive from swimming. Where market values are available, they should be used to estimate benefits. In the case of water supply, there may or may not be a market for clean water. Some water users may be required to pay for that use as in the case of a farmer paying a regional

water board to divert water for irrigation purposes. This will be particularly true in the arid west. By contrast, a manufacturing facility using water for cooling or process water may not pay anything for the right to pump and use water from an adjacent river. For resources with no market value, a number of estimation techniques including the travel cost, estimation from similar markets, and contingent valuation methods have been developed.

While they are conceptually distinct attributes, consumptive use is frequently associated with markets and non-consumptive use is frequently associated with non-market situations. Some resources that are considered market resources, however, may be used non-consumptively. The converse is also true. As an example of the first, a fee may be charged (other than parking) to gain entrance to a state park, however, while a swimmer's use of a lake in the park is not consuming any part of the lake.

Commercial activities that are dependent on clean water which is not directly owned are said to benefit from indirect use. Examples would be a fishing equipment manufacturer's dependence on healthy fish stocks to induce demand for its products or the dependence of property values on the pristine condition of an adjacent water body. Indirect use is also characterized by the scenic views and water enhanced recreational opportunities (camping, picnicking, birdwatching) associated with the quality of water in a water body. Indirect use benefits such as enhanced property values can be estimated using the hedonic price technique. Care should be taken, however, to not double-count benefits. If property values reflect the proximity to and thus use of water, then the value of the use should not be included separately.

C.2 Intrinsic Benefits

Intrinsic benefits include all benefits associated with a resource that are not directly related to the current use of the resource. Intrinsic benefits are represented by the sum of existence and option values. Existence value indicates an individual's (and society's) willingness to pay to maintain an ecological resource such as clean water for its own sake, regardless of any perceived or potential opportunity for that individual to use the water body now or in the future. Contributions of money to save endangered species such as the snail darter demonstrate a willingness to pay for the existence of an environmental amenity despite the fact that the contributors may never use it or even experience it directly.

Option value is the willingness to pay for having a future opportunity to use resources such as clean water in known or as yet unknown ways. In a sense it is a combination of insurance and speculative value. Individuals routinely pay to store or transport something they are not sure they will use in the future because they recognize it would be more costly to recreate the item than to preserve it. In an ecological sense, pristine habitats and wildlife refuges are often preserved under the assumption that plant or animal species

which may yield pharmaceutical, genetic, or ecosystem benefits are yet to be discovered. Option value takes on particular importance when proposed development or environmental perturbations are largely irreversible or pollutants are persistent. Intrinsic benefits are difficult to measure due to the level of uncertainty associated with these benefits. The most common approach to estimating intrinsic benefits, however, is the contingent valuation method, which cannot be described in detail within this short overview.

C.3 Summary

Total valuation of clean water benefits includes all use and existence values as well as option value. The proper framework for estimating the economic benefits associated with clean water consists of 1) determining when damage first occurs or would occur; 2) identifying and quantifying the potential physical/biological damages relative to an appropriate baseline; 3) identifying all affected individuals both due to potential loss of direct or indirect services or uses, and to potential losses attributable to existence values (may include projections for growth in participation rates); 4) estimating the value affected individuals place on clean water prior to potential degradation; and 5) determining the time horizon over which the waterbody would be degraded or restored to some maximum reduced state of service (if ever), and appropriately discounting the stream of potential lost services. If evaluating an improvement in water quality, the procedures are the same except that benefits gained are measured.

TABLE C-1

CATEGORIES OF BENEFITS

<u>Use Benefits</u>

Direct

Consumptive:*Market Benefits*

Industrial Water Supply
Agricultural Water Supply
Municipal Water Supply
Commercial Fishing

Non-Market Benefits

Recreational Fishing
Hunting
Industrial Water Supply
Agricultural Water Supply
Municipal Water Supply

Non-Consumptive:Swimming
Boating
Human Health

Indirect

Fishing Equipment Manufacturer
Property Values
Aesthetics (scenic views, water enhanced recreation)

<u>Intrinsic Benefits</u>

Option Value (access to resource in future)

Existence Value (knowledge that services of resource exist)

Worksheet A

Pollution Control Project Summary Information

Current Capacity of the Pollution Control System	_____
Design Capacity of the Pollution Control System	_____
Current Excess Capacity	_____ %
Expected Excess Capacity after Completion of Project	_____ %
Projected Groundbreaking Date	_____
Projected Date of Completion	_____

Please describe the pollution control project being proposed below. (Attach additional page if necessary).

Please describe the other pollution control options considered, explaining why each option was rejected. (Attach additional page if necessary).

Worksheet AA

Public-Sector Development
Qualitative Description of Estimated Change
in Socioeconomic Indicators
due to Pollution Control Costs

Estimated change in Median Household Income (MHI)

Estimated change in the unemployment rate

Estimated change in overall net debt as a percent of full market value of taxable property

Estimated change in % of households below the poverty line

Impact on commercial development potential

Impact on Property Values

Worksheet AB

Private-Sector Development
Factors to Consider in Making a Determination of Widespread Social and Economic Impacts

Define the affected community in this case; what areas are included.	_____	(1)
Current unemployment rate in affected community (if available).	_____	(2)
Current national unemployment rate.	_____	(3)
Additional number of persons expected to collect unemployment in affected community due to compliance with water quality standards.	_____	(4)
Expected unemployment rate in the affected community after compliance with water quality standards (Current # of persons collecting unemployment in affected community + (4)/labor force in affected community.	_____	(5)
Median household income in affected community.	_____	(6)
Total number of households in affected community.	_____	(7)
Percent of population below the poverty line in affected community.	_____	(8)
Current expenditures on social services in affected community.	_____	(9)
Expected expenditures on social services due to job losses in the affected community.	_____	(10)
Current total tax revenues in the affected community.	_____	(11)
Tax revenues paid by the private entity to the affected community.	_____	(12)

Worksheet AB, continued

Tax revenues paid by the private entity as a percentage of the affected community's total tax revenues. *	_____	(13)
Current statewide unemployment rates.	_____	(14)
Additional number of persons expected to collect unemployment in the State due to compliance with water quality standards.	_____	(15)
Expected statewide unemployment rate, after compliance with water quality standards (Current # of persons collecting unemployment in State + (15)/labor force in State.	_____	(16)
Current expenditures on social services in State.	_____	(17)
Expected statewide expenditures on social services due to job losses.	_____	(18)

* In some cases, the affected community will include more than just the municipality in which the private entity is located. If so, the analysis should consider the private entity's tax revenues as a percentage of the tax revenues for only the municipality in which the entity is located.

Worksheet B

Calculation of Total Annualized Project Costs

A. Capital Costs

Capital Cost of Project	$
Other One-Time Costs of Project (Please List, if any):	
_____	$
_____	$
_____	$
Total Capital Costs (Sum column)	$ (1)
Portion of Capital Costs to be Paid for with Grant Monies	$ (2)
Capital Costs to be Financed [Calculate: (1) - (2)]	$ (3)
Type of financing (e.g., G.O. bond, revenue bond, bank loan)	
Interest Rate for Financing (expressed as decimal)	(i)
Time Period of Financing (in years)	(n)
Annualization Factor = $\frac{i}{[(1+i)^n-1]+i}$ + (or see Appendix B)	(4)
Annualized Capital Cost [Calculate: (3) x (4)]	(5)

B. Operating and Maintenance Costs

Annual Costs of Operation and Maintenance (including but not limited to: monitoring, inspection, permitting fees, waste disposal charges, repair, administration and replacement.) (Please list below)

_____	$
_____	$
_____	$
_____	$
_____	$
Total Annual O & M Costs (Sum column)	$ (6)

C. Total Annual Cost of Pollution Control Project

Total Annual Cost of Pollution Control Project [(5) + (6)]	$ (7)

Worksheet C

Calculation of Total Annual Pollution Control Costs Per Household

A. Current Pollution Control Costs:

Total Annual Cost of Existing Pollution Control	$	(1)
Amount of Existing Costs Paid By Households	$	(2)
Percent of Existing Costs Paid By Households		%(3)
Number of Households*		(4)
Annual Cost Per Household [Calculate: (2)/(4)]	$	(5)

* Do not use number of hook-ups.

B. New Pollution Control Costs

Are households expected to provide revenues for the new pollution control project in the same proportion that they support existing pollution control? (Check a, b **or** c and continue as directed.)

☐ a) Yes [fill in percent from (3)] _____ percent.(6a)

☐ b) No, they are expected to pay _____ percent.(6b)

☐ c) No, they are expected to pay based on flow. (Continue on Worksheet C, Option A)

Total Annual Cost of Pollution Control Project [Line (7), Worksheet B]	$	(7)
Proportion of Costs Households Are Expected to Pay [(6a) or (6b)]		(8)
Amount to Be Paid By Households [Calculate: (9) x (10)]	$	(9)
Annual Cost per Household [Calculate: (11)/(4)]	$	(10)

C. Total Annual Pollution Control Cost Per Household

Total Annual Cost of Pollution Control Per Household (5) + (10)	$	(11)

Worksheet C: Option A

Calculation of Total Annual Pollution Control Costs Per Household Based on Flow

A. Calculating Project Costs Incurred By Households Based on Flow

Expected Total Usage of Project (eg. MGD for Wastewater Treatment)		(1)
Usage due to Household Use (MGD of Household Wastewater)		(2)
Percent of Usage due to Household Use [Calculate: (2)/(1)]		%(3)
Total Annual Cost of Pollution Control Project	$	(4)
Industrial Surcharges, if any	$	(5)
Costs to be Allocated [Calculate: (4) - (5)]	$	(6)
Amount to Be Paid By Households [Calculate: (3) x (6)]	$	(7)
Annual Project Cost per Household [Calculate: (7)/Worksheet C, (4)]	$	(8)

C. Total Annual Pollution Control Cost Per Household

Annual Existing Costs Per Household [Worksheet C, (5)]	$	(9)
Total Annual Cost of Pollution Control Per Household [(8) + (9)]	$	(10)

Worksheet D

Municipal Preliminary Screener

The Municipal Preliminary Screener indicates quickly whether a public entity will not incur any substantial economic impacts as a result of the proposed pollution control project. The formula is as follows:

$$\frac{\textit{Total Annual Pollution Control Cost per Household}}{\textit{Median Household Income}^{*}} \times 100$$

A. Calculation of The Municipal Preliminary Screener

Total Annual Pollution Control Cost Per Household [Worksheet C, (11) or Worksheet C, Option A (10)]	$	(1)
Median Household Income *	$	(2)
Municipal Preliminary Screener (Calculate: [(1)/(2)] x 100)		%(3)

B. Evaluation of The Municipal Preliminary Screener

If the Municipal Preliminary Screener is clearly less than 1.0%, then it is assumed that the cost will not impose an undue financial burden. In this case, it is not necessary to continue with the Secondary Test. Otherwise, it is necessary to continue.

Benchmark Comparison:

Little Impact	**Mid-Range Impact**	**Large Impact**
Less than 1.0%	1.0% - 2.0%	Greater than 2.0%
Indication of no substantial economic impacts	) Proceed to Secondary Test	

* 1990 Census adjusted by CPI inflation rate if necessary.

Worksheet E

Data Used in the Secondary Test

Please list the following values used in deter mining the Secondary Score. Potential sources of the data are indicated.

A. Data Collection

Data	Potential Source	Value
Direct Net Debt	Community Financial Statements Town, County or State Assessor's Office	$ _____ (1)
Overlapping Debt	Community Financial Statements Town, County or State Assesor's Office	$ _____ (2)
Market Value of Property	Community Financial Statements Town, County or State Assessor's Office	$ _____ (3)
Bond Rating	Standard and Poors or Moody's	_____ (4)
Community Unemployment Rate	1990 Census of Population Regional Data Centers	%(5)
National Unemployment Rate	Bureau of Labor Statistics (202) 606-6392	%(6)
Community Median Household Income	1990 Census of Population	$ _____ (7)
State Median Household Income	1990 Census of Population	$ _____ (8)
Property Tax Collection Rate	Community Financial Statements Town, County or State Assessor's Office	%(9)
Property Tax Revenues	Community Financial Statements Town, County or State Assessor's Office	$ _____ (10)

Worksheet E, Continued

B. Calculation of Indicators

1. Overall Net Debt as a Percent of Full Market Value of Taxable Property

Overall Net Debt (Calculate: (1) + (2))	$ (11)
Overall Net Debt as a Percent of Full Market Value of Taxable Property (Calculate: [(11)/(3)] x 100)	%(12)

2. Property Tax Revenues as a Percent of Full Market Value of Taxable Property

Property Tax Revenues as a Percent of Full Market Value of Taxable Property (Calculate: [(10)/(3)] x 100)	%(13)

Worksheet F

Calculating The Secondary Score

Please check the appropriate box in each row, and record the corresponding score in the final column. Then, sum the scores and compute the average. Remember, if one of the debt or socioeconomic indicators is not available, average the two financial management indicators and use this averaged value as a single indicator with the remaining indicators.

	Secondary Indicators			Score
Indicator	Weak*	Mid-Range**	Strong***	
Bond Rating Worsksheet E, (4)	Below BBB (S&P) Below Baa (Moody's) ☐	BBB (S&P) Baa (Moody's) ☐	Above BBB (S&P) or Baa (Moody's) ☐	
Overall Net Debt as Percent of Full Market Value of Taxable Property Worksheet E, (12)	Above 5% ☐	2%-5% ☐	Below 2% ☐	
Unemployment Worksheet E, (5)& (6)	Above National Average ☐	National Average ☐	Below National Average ☐	
Median Household Income Worksheet E, (7) & (8)	Below State Median ☐	State Median ☐	Above State Median ☐	
Property Tax Revenues as a Percent of Full Market Value of Taxable Property Worksheet E, (13)	Above 4% ☐	2%-4% ☐	Below 2% ☐	
Property Tax Collection Rate Worksheet E, (9)	< 94% ☐	94% - 98% ☐	> 98% ☐	

* Weak is a score of 1 point

** Mid-Range is a score of 2 points

*** Strong is a score of 3 points

SUM ☐

AVERAGE ☐

Worksheet G

Calculation of Total Annualized Project Costs

Capital Costs to be financed (Supplied by applicant)	$	(1)
Interest Rate for Financing (Expressed as a decimal)		(i)
Time Period of Financing (Assume 10 years *)	10 years	(n)
Annualization Factor** = $\frac{i}{[(1+i)^n-1]+i}$		(2)
Annualized Capital Cost [Calculate: (1) x (2)]	$	(3)
Annual Cost of Operation and Maintenance (including but not limited to monitoring, inspection, permitting fees, waste disposal charges, repair, administration and replacement) ***	$	(4)
Total Annual Cost of Pollution Control Project [(3) + (4)]	$	(5)

* While actual payback schedules may differ across projects and companies, assume equal annual payments over a 10-year period for consistency in comparing projects.

** Or see Appendix B for calculated annualization factors

*** For recurring costs that occur less frequently than once a year, pro rate the cost over the relevant number of years (e.g., for pumps replac ed once every three years, include one-third of the cost in each year).

Worksheet H

Calculation of Earnings Before Taxes
With and Without Pollution Control Project Costs

A. Earnings Without Pollution Control Project Costs

$$EBT = R - CGS - CO$$

Where: EBT = Earnings Before Taxes
R = Revenues
CGS = Cost of Goods Sold (including the cost of materials, direct labor, indirect labor , rent and heat)
CO = Portion of Corporate Overhead Assigned to the Discharger (selling, general , administrative, interest, R&D expenses, and depreciation on common property)

	Three Most Recently Completed Fiscal Years			
	19____	19____	19____	
R	$ _____	$ _____	$ _____	(1)
CGS	$ _____	$ _____	$ _____	(2)
CO	$ _____	$ _____	$ _____	(3)
EBT [(1) - (2) -(3)]	$ _____	$ _____	$ _____	(4)

Considerations: Have earnings before taxes changed over the three year period? If so, what would a "typical" year's EBT be? Please explain below.

_____
_____
_____
_____

Worksheet H, Continued

B. Earnings With Pollution Control Project Costs

EWPR = EBT - ACPR

Where: EWPR = Earnings with Pollution Control Project Costs
EBT = Earnings Before Taxes (4)
ACPR = Total Annual Costs of Pollution Control Project [Worksheet G, (5)]

	19___*
EBT (4)	$ (5)
ACPR [Worksheet G, (5)]	$ (6)
EWPR [(5) - (6)]	$ (7)

* The most recently completed fiscal year

Considerations: Is the discharger expected to have positive earnings after paying the annual cost o f pollution control? ☐ Yes ☐ No

Additional Comments:

Worksheet I

Calculation of Profit Rates
With and Without Pollution Control Project Costs

A. Profit Rate Without Project Costs

PRT = EBT ÷ R

Where: PRT = Profit Rate Before Taxes
EBT = Earnings Before Taxes
R = Reveneus

Three Most Recently Completed Fiscal Years

	19___	19___	19___	
EBT [Worksheet H, (4)]	_____	_____	_____	(1)
R [Worksheet H, (1)]	_____	_____	_____	(2)
PRT = Calculate: [(1)/(2)]				(3)

Considerations: How have profit rates changed over the three years?

_____

_____

Is the most recent year typical of the three years? ☐ Yes ☐ No
(If not, you might want to use an earlier year or years for the analysis)

How do these profit rates compare with the profit rates for this line of business"? Please discuss below.

_____

_____

_____

_____

Worksheet I, Continued

B. Profit Rate With Pollution Control Costs

PRPR = EWPR ÷ R

Where: PRPR = Profit Rate With Pollution Control Costs
EWPR = Before-Tax Earnings With Pollution Control Costs
R = Reveneus

	The Most Recently Completed Fiscal Year 19___
EWPR [Worksheet H, (7)]	$ (4)
R [Worksheet H, (1)]	$ (5)
PRPR [Calculate: (4)/(5)]	(6)

Considerations:

What is the percentage change in the profit rate due to pollution control costs ? Calculate as follows: (PRPR - PR)/PR x 100

How does the profit rate with pollution control compare to the profit rate of this line of business?

Worksheet J

Calculation of The Current Ratio

CR = CA ÷ CL

Where: CR = Current Ratio
CA = Current Assets (the sum of inventories, prepaid expen ses, and accounts receivable)
CL = Current Liabilities (the sum of a ccounts payable, accrued expenses, taxes, and the current portion of long-term debt)

	Three Most Recently Completed Fiscal Years			
	19___	19___	19___	
CA	$ _____	$ _____	$ _____	(1)
CL	$ _____	$ _____	$ _____	(2)
CR [Calculate: (1)/(2)]				(3)

Considerations:

Is the most recent year typical of the three years? ☐ Yes ☐ No
(If not, you might want to use an earlier year or years for the analysis)

Is the Current Ratio (3) greater than 2.0? ☐ Yes ☐ No

How does the Current Ratio (3) compare with the Current Ratios for other firms in this line of business?

_____

_____

_____

Worksheet K

Calculation of Beaver's Ratio

BR = CF ÷ TD

Where: BR = Beaver's Ratio
CF = Cash Flow
TD = Total Debt

	Three Most Recently Completed Fiscal Years			
	19___	19___	19___	
Cash Flow:				
Net Income After Taxes	$	$	$	(1)
Depreciation	$	$	$	(2)
CF [Calculate: (1) + (2)]	$	$	$	(3)
Total Debt:				
Current Debt	$	$	$	(4)
Long-Term Debt	$	$	$	(5)
Total Debt	$	$	$	(6)
Beaver's Ratio:				
BR [(3) /(6)]				(7)

Considerations:

Is the most recent year typical of the three years? ☐ Yes ☐ No
(If not, you might want to use an earlier year or years for the analysis)

Is the Beaver's Ratio for this discharger greater than 0.2? ☐ Yes ☐ No
Is the Beaver's Ratio for this discharger less than 0.15? ☐ Yes ☐ No
Is the Beaver's Ratio for this discharger between 0.2 and 0.15? ☐ Yes ☐ No

How does this ratio compare with the Beaver's Ratio for other firms in the same business?

_____

_____

Worksheet L

Debt to Equity Ratio

DER = LTL ÷ OE

Where: DER = Debt/Equity Ratio
LTL = Long-Term Liabilities (long-term debt such as bonds, debentures, and bank debt, and all other noncurrent liabilities such as deferred income taxes)
OE = Owner Equity (the difference between total assets and total liabilities, including contributed or paid in capital and retained earnings)

Three Most Recently Completed Fiscal Years

	19___	19___	19___	
LTL	$	$	$	(1)
OE	$	$	$	(2)
DER [(1)/(2)]				(3)

Considerations:

Is the most recent year typical of the three years? ☐ Yes ☐ No
(If not, you might want to use an earlier year or years for the analysis)

How does the Debt to Equity Ratio compare with the ratio for firms in the same business?

Worksheet M

Qualitative Description of Estimated change in Socioeconomic Indicators due to Pollution Control Costs

Estimated change in Median Household Income (MHI)

Estimated change in the unemployment rate

Estimated change in overall net debt as a percent of full market value of taxable property

Estimated change in % of households below the poverty line

Impact on commercial development potential

Impact on Property Values

Worksheet N

Factors to Consider in Making a Determination of Widespread Social and Economic Impacts

Define the affected community in this case; what areas are included.	_____	(1)
Current unemployment rate in affected community (if available).	_____	(2)
Current national unemployment rate.	_____	(3)
Additional number of persons expected to collect unemployment in affected community due to compliance with water quality standards.	_____	(4)
Expected unemployment rate in the affected community after compliance with water quality standards (Current # of persons collecting unemployment in affected community + (4)/labor force in affected community.	_____	(5)
Median household income in affected community.	_____	(6)
Total number of households in affected community.	_____	(7)
Percent of population below the poverty line in affected community.	_____	(8)
Current expenditures on social services in affected community.	_____	(9)
Expected expenditures on social services due to job losses in the affected community.	_____	(10)
Current total tax revenues in the affected community.	_____	(11)
Tax revenues paid by the private entity to the affected community.	_____	(12)

Worksheet N, continued

Tax revenues paid by the private entity as a percentage of the affected community's total tax revenues. *	_____	(13)
Current statewide unemployment rates.	_____	(14)
Additional number of persons expected to collect unemployment in the State due to compliance with water quality standards.	_____	(15)
Expected statewide unemployment rate, after compliance with water quality standards (Current # of persons collecting unemployment in State + (15)/labor force in State.	_____	(16)
Current expenditures on social services in State.	_____	(17)
Expected statewide expenditures on social services due to job losses.	_____	(18)

* In some cases, the affected community will include more than just the municip ality in which the private entity is located. If so, the analysis should consider the private entity's tax revenues as a percentage of the tax revenues for only the municipality in which the entity is located.

Worksheet O

Pollution Control Project
Summary Information

Design Capacity of the Pollution Control System _____

Expected Excess Capacity after Completion of Project _____ %

Projected Groundbreaking Date _____

Projected Date of Completion _____

Please describe the pollution control project being proposed. I nclude description of all pollution prevention activities included in the project. (Attach additional page if necessary).

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Please describe the other pollution control options considered, including pollution prevention activities . Explain why each option was rejected. (Attach additional page if necessary).

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Worksheet P

Public-Sector Pollution Control
Calculation of Total Annualized Project Costs

A. Capital Costs

Capital Cost of Project	$
Other One-Time Costs of Project (Please List, if any):	
_____	$
_____	$
_____	$
Total Capital Costs (Sum column)	$ (1)
Portion of Capital Costs to be Paid for with Grant Monies	$ (2)
Capital Costs to be Financed [Calculate: (1) - (2)]	$ (3)
Type of financing (e.g., G.O. bond, revenue bond, bank loan)	
Interest Rate for Financing (expressed as decimal)	(i)
Time Period of Financing (in years)	(n)
Annualization Factor = $\frac{i}{[(1+i)^n-1]+i}$ + (or see Appendix B)	(4)
Annualized Capital Cost [Calculate: (3) x (4)]	(5)

B. Operating and Maintenance Costs

Annual Costs of Operation and Maintenance (including but not limited to: monitoring, inspection, permitting fees, waste disposal charges, repair, administration and replacement.) (Please list below)

_____	$
_____	$
_____	$
_____	$
Total Annual O & M Costs (Sum column)	$ (6)

C. Total Annual Cost of Pollution Control Project

Total Annual Cost of Pollution Control Project [(5) + (6)]	$ (7)

Worksheet Q

Calculation of Total Annual Pollution Control Costs Per Household

A. Current Pollution Control Costs:

Total Annual Cost of Existing Pollution Control	$	(1)
Amount of Existing Costs Paid By Households	$	(2)
Percent of Existing Costs Paid By Households		%(3)
Number of Households*		(4)
Annual Cost Per Household [Calculate: (2)/(4)]	$	(5)

* Do not use number of hook-ups.

B. New Pollution Control Costs

Are households expected to provide revenues for the new pollution control project in the same proportion that they support existing pollution control? (Check a, b **or** c and continue as directed.)

☐ a) Yes [fill in percent from (3)] _____ percent.(6a)

☐ b) No, they are expected to pay _____ percent.(6b)

☐ c) No, they are expected to pay based on flow. (Continue on Worksheet Q, Option A)

Total Annual Cost of Pollution Control Project [Line (7), Worksheet P]	$	(7)
Proportion of Costs Households Are Expected to Pay [(6a) or (6b)]		(8)
Amount to Be Paid By Households [Calculate: (9) x (10)]	$	(9)
Annual Cost per Household [Calculate: (11)/(4)]	$	(10)

C. Total Annual Pollution Control Cost Per Household

Total Annual Cost of Pollution Control Per Household (5) + (10)	$	(11)

Worksheet Q: Option A

Calculation of Total Annual Pollution Control Costs Per Household Based on Flow

A. Calculating Project Costs Incurred By Households Based on Flow

Expected Total Usage of Project (eg. MGD for Wastewater Treatment)		(1)
Usage due to Household Use (MGD of Household Wastewater)		(2)
Percent of Usage due to Household Use [Calculate: (2)/(1)]		%(3)
Total Annual Cost of Pollution Control Project	$	(4)
Industrial Surcharges, if any	$	(5)
Costs to be Allocated [Calculate: (4) - (5)]	$	(6)
Amount to Be Paid By Households [Calculate: (3) x (6)]	$	(7)
Annual Project Cost per Household [Calculate: (7)/Worksheet Q, (4)]	$	(8)

C. Total Annual Pollution Control Cost Per Household

Annual Existing Costs Per Household [Worksheet Q, (5)]	$	(9)
Total Annual Cost of Pollution Control Per Household [(8) + (9)]	$	(10)

Worksheet R

Private-Sector Development
Calculation of Total Annualized Project Costs

Capital Costs to be financed (Supplied by applicant)	$ (1)
Interest Rate for Financing (Expressed as a decimal)	(i)
Time Period of Financing (Assume 10 years *)	10 years (n)
Annualization Factor** = $\frac{i}{[(1+i)^n-1]+i}$	(2)
Annualized Capital Cost [Calculate: (1) x (2)]	$ (3)
Annual Cost of Operation and Maintenance (including but not limited to monitoring, inspection, permitting fees, waste disposal charges, repair, administration and replacement) ***	$ (4)
Total Annual Cost of Pollution Control Project [(3) + (4)]	$ (5)

* While actual payback schedules may differ across projects and companies, assume equal annual payments over a 10-year period for consistency in comparing projects.

** Or see Appendix B for calculated annualization factors

*** For recurring costs that occur less frequently than once a year, pro rate the cost over the relevant number of years (e.g., for pumps replac ed once every three years, include one-third of the cost in each year).

Worksheet S

Municipal Preliminary Screener

The Municipal Preliminary Screener indicates quickly whether a public entity will not incur any substantial economic impacts as a result of the proposed pollution control project. The formula is as follows:

$$\frac{\textit{Total Annual Pollution Control Cost per Household}}{\textit{Median Household Income}^{*}} \times 100$$

A. Calculation of The Municipal Preliminary Screener

Total Annual Pollution Control Cost Per Household [Worksheet C, (11) or Worksheet C, Option A (10)]	$	(1)
Median Household Income *	$	(2)
Municipal Preliminary Screener (Calculate: [(1)/(2)] x 100)		%(3)

B. Evaluation of The Municipal Preliminary Screener

If the Municipal Preliminary Screener is clearly less than 1.0%, then it is assumed that the cost will not impose an undue financial burden. In this case, it is not necessary to continue with the Secondary Test. Otherwise, it is necessary to continue.

Benchmark Comparison:

Little Impact	**Mid-Range Impact**	**Large Impact**
Less than 1.0%	1.0% - 2.0%	Greater than 2.0%
Indication of no substantial economic impacts	) Proceed to Secondary Test	

* 1990 Census adjusted by CPI inflation rate if necessary.

Worksheet T

Data Used in the Secondary Test

Please list the following values used in deter mining the Secondary Score. Potential sources of the data are indicated.

A. Data Collection

Data	Potential Source	Value
Direct Net Debt	Community Financial Statements Town, County or State Assessor's Office	$ _____ (1)
Overlapping Debt	Community Financial Statements Town, County or State Assesor's Office	$ _____ (2)
Market Value of Property	Community Financial Statements Town, County or State Assessor's Office	$ _____ (3)
Bond Rating	Standard and Poors or Moody's	_____ (4)
Community Unemployment Rate	1990 Census of Population Regional Data Centers	%(5)
National Unemployment Rate	Bureau of Labor Statistics (202) 606-6392	%(6)
Community Median Household Income	1990 Census of Population	$ _____ (7)
State Median Household Income	1990 Census of Population	$ _____ (8)
Property Tax Collection Rate	Community Financial Statements Town, County or State Assessor's Office	%(9)
Property Tax Revenues	Community Financial Statements Town, County or State Assessor's Office	$ _____ (10)

Worksheet T, Continued

B. Calculation of Indicators

1. Overall Net Debt as a Percent of Full Market Value of Taxable Property

Overall Net Debt (Calculate: (1) + (2))	$ (11)
Overall Net Debt as a Percent of Full Market Value of Taxable Property (Calculate: [(11)/(3)] x 100)	%(12)

2. Property Tax Revenues as a Percent of Full Market Value of Taxable Property

Property Tax Revenues as a Percent of Full Market Value of Taxable Property (Calculate: [(10)/(3)] x 100)	%(13)

Worksheet U

Calculating The Secondary Score

Please check the appropriate box in each row, and record the corresponding score in the final column. Then, sum the scores and compute the average. Remember, if one of the debt or socioeconomic indicators is not available, average the two financial management indicators and use this averaged value as a single indicator with the remaining indicators.

	Secondary Indicators			Score
Indicator	Weak*	Mid-Range**	Strong***	
Bond Rating Worsksheet T, (4)	Below BBB (S&P) Below Baa (Moody's) ☐	BBB (S&P) Baa (Moody's) ☐	Above BBB (S&P) or Baa (Moody's) ☐	
Overall Net Debt as Percent of Full Market Value of Taxable Property Worksheet T, (12)	Above 5% ☐	2%-5% ☐	Below 2% ☐	
Unemployment Worksheet T, (5)& (6)	Above National Average ☐	National Average ☐	Below National Average ☐	
Median Household Income Worksheet T, (7) & (8)	Below State Median ☐	State Median ☐	Above State Median ☐	
Property Tax Revenues as a Percent of Full Market Value of Taxable Property Worksheet T, (13)	Above 4% ☐	2%-4% ☐	Below 2% ☐	
Property Tax Collection Rate Worksheet T, (9)	< 94% ☐	94% - 98% ☐	> 98% ☐	

* Weak is a score of 1 point

** Mid-Range is a score of 2 points

*** Strong is a score of 3 points

SUM

AVERAGE

Worksheet V

Calculation of Earnings Before Taxes

A. Earnings Without Pollution Control Project Costs

$$\mathbf{EBT = R - CGS - CO}$$

B. Earnings With Pollution Control Project Costs

$$\mathbf{EWPR = EBT - ACPR}$$

Where: EBT = Earnings Before Taxes
EWPR = Earnings with Pollution Project Costs
R = Revenues
CGS = Cost of Goods Sold (including the cost of materials, direct labor, indirect labor , rent and heat)
CO = Portion of Corporate Overhead Assigned to the Discharger (selling, general , administrative, interest, R&D expenses, and depreciation on common property)
ACPR = Total Annual Costs of Pollution Control Project [Worksheet R (5)]

R	$ _____	(1)
CGS	$ _____	(2)
CO	$ _____	(3)
EBT [(1) - (2) -(3)]	$	(4)
ACPR [Worksheet R (5)]	$ _____	(5)
EWPR [(4) - (5)]	$	(6)

Worksheet W

Calculation of Profit Rates

A. Profit Rate Without Project Costs

PRT = EBT ÷ R

B. Profit Rate With Pollution Control Costs

PRPR = EWPR ÷ R

Where: PRT = Profit Rate Before Taxes
PRPR = Profit Rate with Pollution Control Costs
EBT = Earnings Before Taxes
EWPR = Before-Tax Earnings with Pollution Control Costs
R = Revenues

EBT [Worksheet V, (4)]	_____	(1)
R [Worksheet V, (1)]	_____	(2)
PRT = Calculate: [(1)/(2)]		(3)
EWPR [Worksheet V, (6)]	$ _____	(4)
R [Worksheet V, (1)]	$ _____	(5)
PRPR [Calculate: (4)/(5)]		(6)

Worksheet X

Calculation of The Current Ratio

CR = CA ÷ CL

Where: CR = Current Ratio
CA = Current Assets (the sum of inventories, prepaid expen ses, and accounts receivable)
CL = Current Liabilities (the sum of a ccounts payable, accrued expenses, taxes, and the current portion of long-term debt)

CA	$ _____	(1)
CL	$ _____	(2)
CR [Calculate: (1)/(2)]		(3)

Worksheet Y

Calculation of Beaver's Ratio

BR = CF ÷ TD

Where: BR = Beaver's Ratio
CF = Cash Flow
TD = Total Debt

Cash Flow:

Net Income After Taxes	$ _____	(1)
Depreciation	$ _____	(2)
CF [Calculate: (1) + (2)]	$ _____	(3)

Total Debt:

Current Debt	$ _____	(4)
Long-Term Debt	$ _____	(5)
Total Debt	$ _____	(6)

Beaver's Ratio:

BR [(3) /(6)]		(7)

Worksheet Z

Debt to Equity Ratio

DER = LTL ÷ OE

Where: DER = Debt/Equity Ratio
LTL = Long-Term Liabilities (long-term debt such as bonds, debentures, and bank debt, and all other noncurrent liabilities such as deferred income taxes)
OE = Owner Equity (the difference between total assets and total liabilities, including contributed or paid in capital and retained earnings)

LTL	$ _____	(1)
OE	$ _____	(2)
DER [(1)/(2)]	[ ]	(3)