APPENDIX A
MEASURES USED IN FINANCIAL IMPACT ANALYSIS FOR WATER QUALITY STANDARDS

The Financial Impact Analysis (FIA) described in U.S. EPA's *Interim Economic Guidance for Water Quality Standards: Workbook* (*Interim Economic Guidance*) uses select financial measures to determine whether or not the water quality standards may have a substantial economic impact on a discharger or other entity. U.S. EPA specifies different measures to identify substantial impacts for public-sector and private-sector entities.

A.1. MEASURES USED TO ASSESS FINANCIAL IMPACTS FOR PRIVATE-SECTOR ENTITIES

Before discussing the ratios, the components of the ratios must be understood. Table A-1 succinctly lists all financial data needed about the entity to calculate the ratios as well as a description of each. Data for multiple years should be gathered on each component. If possible, data should be gathered on the entity level. In cases where this data is not available, a common way to estimate the entity's share of company data is to use the proportion of sales for which the entity contributes to overall company sales to determine the proportion of earnings, debt, etc., at the company level attributable to the entity. Additionally, pollution control costs should be estimated for the entity.

Profitability is the primary measure the FIA uses to determine the impact that the costs of attaining the specified pollution control will have on the entity. Liquidity, solvency, and leverage are secondary measures to determine the financial impact on the entity. The ratios specified in the *Interim Economic Guidance* for each of these measures and their components are listed in Table A-2.

A.1.1. Primary

A.1.1.1. *Profitability*

Profitability measures the profit (revenue minus costs) of the entity with respect to its revenue. In other words, it shows the percentage of sales that the entity keeps after paying its bills. The profit rate should be calculated using earnings before pollution control costs have been

TABLE A-1 Data Needs to Calculate Ratios	
Component	Description
Revenue	Sales
Earnings Before Taxes	Revenue minus all costs except taxes
Cash Flow	Cash entity has available in a given year
Current Assets	Assets that are or could easily be converted into cash, such as inventories, prepaid expenses, short-term investments, accounts receivable, marketable securities, and cash
Current (or Short-Term) Liabilities	Liabilities that must be paid within the year, such as accounts payable, wages payable, short-term notes payable, accrued expenses, taxes payable, and current portion of long-term debt
Long-Term Liabilities	Liabilities that must be paid in a year or more, such as bonds, debentures, and bank debt and other noncurrent liabilities
Total Debt	Current debt for current year plus long-term debt
Interest	Current financing charges (interest expense) due on debt
Owner's Equity	Difference between total assets and total liabilities, including contributed capital and retained earnings (net stockholder's equity for publicly held entities)

TABLE A-2 Ratios Used in the *Interim Economic Guidance*		
Financial Measure	Main Ratio	Supplemental Ratio
Profitability	Profit Rate = Earnings Before Taxes (EBT) ÷ Revenue	NA
Liquidity	Current Ratio (CR) = Current Assets (CA) ÷ Current Liabilities (CL)	Quick Ratio (Acid Test) = [CA—Inventories] ÷ CL
Solvency	Beaver's Ratio = Cash Flow (CF) ÷ Total Debt (TD)	Times Interest Earned (TIE) = Earnings before Interest and Taxes (EBIT) ÷ Interest
Leverage	Debt to Equity Ratio (DER) = Long-Term Liabilities (LTL) ÷ Owner's Equity (OE)	NA

NA = Not Applicable

subtracted and earnings after pollution control costs have been taken into consideration. A substantial change between these two measures may indicate substantial financial impacts on the entity (see Table A-3).

TABLE A-3 Rules of Thumb for Interpreting Ratios	
Ratio	*Interim Economic Guidance* Rule of Thumb
Profit Rate	No rule of thumb, compare with other firms in similar lines of business
Current Ratio	Greater than 2—Entity should be able to cover short-term debt
Beaver's Ratio	Greater than 0.20—Entity should be able to pay long-term debt (solvent) Between 0.15 and 0.20—Uncertain Less than 0.15—Entity may go bankrupt (insolvent)
Debt to Equity Ratio	No rule of thumb, compare with other firms in similar lines of business

A.1.2. Secondary

A.1.2.1. *Liquidity*

The capacity of an entity to turn its assets into cash and then use those assets to retire debt is known as liquidity. The current ratio, a common measure of liquidity, gauges the ability of the entity to pay its short-term debt. Care should be taken in interpreting this ratio by analyzing the components that make up the current assets and current liabilities. For instance, an entity with a higher proportion of cash to other current assets may have an easier time paying short-term debt than an entity with a higher proportion of inventories to cash with the same Current Ratio value.

Use of other ratios, such as the Quick Ratio (also called the Acid Test), can be used to distinguish between the two situations described above. The ambiguity associated with the Current Ratio makes it important to concurrently use other financial measures.

A.1.2.2. *Solvency*

The ability of an entity to pay its long-term debt and avoid bankruptcy is referred to as solvency. A solvent entity can pay its long-term debt while an insolvent entity is likely to go bankrupt. Beaver's Ratio determines the solvency of an entity by calculating the amount of cash generated by the entity per dollar of debt. The greater the amount of cash produced to the amount of debt owed by the entity, the more likely the entity will be able to repay that debt and thus, the more the solvent it is.

Another measure, the Times Interest Earned Ratio, demonstrates the ability of the entity's earnings to cover the financing costs of its long-term debt. Literally, the ratio determines the number of times the interest expense could be paid using the entity's current earnings. Unlike the Beaver's Ratio, the Times Interest Earned Ratio uses only the interest expense and not the entire amount of the debt.

A.1.2.3. *Leverage*

Leverage involves acquiring assets through borrowed funds. This tool can be used to determine the entity's ability to secure the debt it needs to grow. The Debt to Equity Ratio measures the entity's balance between the portion of assets that have been funded by debt and the portion of assets funded by the owners (stockholders, if the entity is publicly owned).

A.1.3. Interpretation

Each of these ratios needs to be analyzed in context. Multiple years (*Interim Economic Guidance* recommends at least three years of data) should be used to calculate an accurate estimate of the ratios. If the ratio differs significantly between years, further investigation should be used to determine the reason for the divergence. In many cases, the ratios should be compared to those of similar entities (ideally other dischargers) or industry averages. A large variation between the benchmark ratio and the calculated ratio also warrants further investigation. The *Interim Economic Guidance* suggests some rules of thumb for interpreting the ratios. These general rules are listed in Table A-3.

A.2. MEASURES USED TO ASSESS FINANCIAL IMPACTS FOR PUBLIC-SECTOR ENTITIES

The *Interim Economic Guidance* provides primary and secondary measures to assess whether impacts imposed on public-sector entities are substantial.

A.2.1. Primary

U.S. EPA's primary screening indicator for public-sector impacts is

$$\frac{\text{Average Total Pollution Control Cost per Household}}{\text{Median Household Income}} \qquad \text{(Eq. A-1)}$$

U.S. EPA provides detailed instructions on adjusting dollar values from various years to current year dollars and provides a set of criteria for determining if the primary screener indicates substantial impacts.

- If the ratio is less than 1%, impacts are assumed not substantial
- If the ratio is between 1 and 2%, it indicates mid-range impacts
- If the ratio is greater than 2%, there may be substantial impacts.

Unless the primary screener indicates insubstantial impacts,[1] the analyst should examine secondary screening indicators:

Debt Indicators

- bond rating
- overall net debt as a percent of full market value of taxable property

Socioeconomic indicators

- unemployment rate
- median household income

[1] The *Interim Economic Guidance* (1995: 2-15) states, "Communities with screening results of less than 1.0 but still fairly close to 1.0, however, may still want to proceed to the secondary test."

Financial management indicators

- property tax revenue as a percent of full market value of taxable property
- property tax collection rate.

A secondary screener score is calculated for the community by weighting each indicator equally and assigning a score of 1 to each indicator of weakness, 2 to each indicator that is mid-range, and 3 to each indicator that suggests financial strength, then computing an average (see Chapter 5 of *Interim Economic Guidance* for calculation of secondary screener). The average score is then interpreted to determine if the entity is weak, mid-range, or strong. If the average score is less than 1.5, the secondary screening suggests weakness. If the average score is between 1.5 and 2.5, the secondary screener suggests mid-range conditions. If the average score exceeds 2.5, the secondary screener suggests strength.

The analyst can then use the matrix shown in Table A-4 to combine the results of the primary and secondary screeners to determine if the project will have substantial impacts.

TABLE A-4

Assessment of Substantial Impacts

	Municipal Preliminary Screening Ratio		
Secondary Score	Less than 1.0 Percent	Between 1.0 and 2.0 Percent	Greater Than 2.0 Percent
Less than 1.5	Impact is unclear	Substantial impacts expected	Substantial impacts expected
Between 1.5 and 2.5	Substantial impacts not expected	Impact is unclear	Substantial impacts expected
Greater than 2.5	Substantial impacts not expected	Substantial impacts not expected	Impact is unclear