# GUIDANCE MANUAL

for

Estimating the Economic Effects of Pollution Control Costs

by

Office of Analysis and Evaluation U.S. Environmental Protection Agency Washington, D.C. 20460

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#### PREFACE

These two documents -- the <u>Guidance Manual</u> and <u>Workbook for Estimating the Economic Effects of Pollution Control Costs</u> -- were prepared by EPA for writers of NPDES permits in state agencies and EPA Regional Offices. The <u>Workbook contains step-by-step</u> instructions and worksheets for performing analyses of a firm's or plant's ability to pay for pollution control. The <u>Guidance Manual</u> contains background information, more detailed instructions, and examples for each test; it is designed for use by those who find the Workbook too brief.

The <u>Guidance Manual</u> and <u>Workbook for Estimating the Economic Effects of Pollution Control Costs</u> were prepared for EPA by Pope-Reid Associates, Inc. They were based on the <u>Work Book for Determining Economic Achievability for National Pollutant Discharge Elimination System Permits (Putnam, Hayes & Bartlett, Inc., August 1982).</u>

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### CHAPTER 1

#### INTRODUCTION

## 1.1 BACKGROUND

The Clean Water Act requires the U.S. Environmental Protection Agency (EPA) to regulate wastewater discharges. This is done through the National Pollutant Discharge Elimination System (NPDES), which is administered by either the EPA Regional Offices or individual states. To date, 33 states have approved NPDES programs for wastewater discharges.

EPA has promulgated effluent guidelines for many industries. These guidelines include a requirement that permits must be based on the "Best Available Technology Economically Achievable" (BAT) by 1984. Thus, as permits come up for renewal they must be based on economic considerations as well as engineering analyses.

BAT effluent guidelines will be promulgated by 1984 for several major industries. However, the process by which permits are reviewed and renewed will begin before then. Thus, some industries may not have promulgated effluent guidelines for some or all of their process wastewaters by the time permits are to be renewed.

For certain facilities, permit writers will be required to develop permits on a plant-by-plant basis using best professional judgement. The industries for which plant-by-plant permits will need to be written include those:

- for which no BAT effluent guidelines have been promulgated; or
- which generate and discharge process wastewaters not covered by effluent guidelines.

These permits must also be based on both engineering and economic considerations.

### 1.2 PROBLEM

The engineering analysis portion of preparing a permit is usually based on existing technologies and guidelines. Therefore, while it may not be easy to perform, it is usually fairly straightforward and is often related to the permit writer's primary area of expertise and experience. On the other hand, the economic evaluation could be performed in several ways or levels of complexity. If a permit writer does not have a background in financial analysis, evaluating the ability to pay for pollution control expenditures will be difficult.

The concept of "economic achievability" has many dimensions and is not consistently defined or evaluated. As used in the development of effluent guidelines, it includes an assessment of different effects such as: price and production effects; current and future supply and demand; competition by other industries; effects on sales; and product substitution. This manual does not address these aspects of economic achievability because it is not intended for use in developing permits for only one industry. Rather, this procedure is designed to assist the permit writer in determining the economic effects of pollution control expenditures in terms of "ability to pay" at the firm or plant level.

#### 1.3 PURPOSE

This manual is designed to give someone with no formal background in financial analysis a structured, step-by-step approach to estimating the ability of a firm or plant to pay for pollution control technology. The methodology involves two types of analyses. The <u>firm-level analysis</u> uses publicly available data to evaluate the present financial conditon of the <u>firm</u> and to predict the financial effects of pollution control investments that may be required to comply with permit requirements. The <u>plant-level analysis</u> uses data provided by the firm to evaluate the profitability of the <u>plant</u> and to predict the effects of pollution control investments.

Firm-level analysis is performed for all permit evaluations. Plant-level analysis is performed only if required. Two conditions would indicate a need for plant-level analysis:

- 1. the firm contends that pollution control investment would make the plant unprofitable to operate; or
- 2. the firm-level analysis indicates that pollution control investment would have a serious detrimental effect on the firm's financial health.

### 1.4 OVERVIEW

To accomplish this purpose as effectively as possible, EPA has divided the manual into two documents (the <u>Guidance Manual for Estimating the Economic Effects of Pollution Control Costs</u> and the <u>Workbook for Estimating the Effects of Pollution Control Costs</u>). The <u>Guidance Manual</u> describes the firm-level and plant-level tests in detail, the data needed to perform the tests, and sources for these data. It also contains example data and calculations for each test. The <u>Workbook</u> contains blank worksheets and step-by-step instructions for completing them.

Chapter 2 of this text provides an introduction to the financial analysis method used to assess a firm or plant's ability to pay for pollution control. The types of data needed to conduct the analysis and sources for these data are presented. Chapter 2 also contains a general discussion of engineering cost estimation and the types and sources of data needed.

Chapter 3 presents the procedure for the firm-level analysis. The firm-level methodology has two components. The financial statement component analyzes a firm's reported values by calculating ratios from data in annual reports. This is essentially a historic perspective on the company's operating performance and asset values. The second component of the firm-level methodology, the market value approach, uses stock market data as a proxy for the future performance of the firm to evaluate a firm's ability to pay for pollution control.

Chapter 4 describes the plant-level methodology. The plant-level test uses confidential, plant-specific financial data provided by the company to evaluate how the costs of pollution control equipment would impact the plant's earnings. The plant-level methodology has three tests from which the permit writer must choose. The choice is based on which plant-level data are available.

Chapter 5 provides direction for interpreting the combined results of the firm-level analysis. The methodology does not provide a "cookbook" format for interpreting all possible combinations of test results. However, Chapter 5 describes several common sets of conflicting results and provides general guidelines for interpreting them. It also provides guidance on how to incorporate the results of the plant-level analysis with those of the firm-level analysis.

The <u>Workbook</u> contains blank worksheets for all calculations and tests; summaries of the data needed and sources for these data; and step-by-step instructions for performing the calculations and tests. If the permit writer has no need for the detailed information contained in the the <u>Guidance Manual</u>, or she can use the <u>Workbook</u> to do the firm-level and plant-level analyses.

#### CHAPTER 2

#### THEORY AND DATA

### 2.1 INTRODUCTION

Financial analysis assesses the position of a firm or plant at any point in time up to the present and to predict and interpret future financial changes resulting from decisions by the firm or plant. Financial analysis measures the ability of a firm or a plant within a firm to pay for pollution control. The measures of financial position are calculated to determine the current performance of the company and estimate the impacts of pollution control requirements on these various measures.

In order to perform a financial analysis, two types of data are needed. One obviously is financial data on the firm and plant which are being evaluated. The other is engineering cost data for the pollution control technology that is being considered.

This chapter contains a brief discussion of the theory behind financial and cost engineering analyses. It also describes the two types of data as they are used in this document and sources of these data.

### 2.2 ENGINEERING ANALYSIS AND COST DATA

The permit writer may either need to do an engineering cost estimate for the pollution control technology or review an estimate that has been provided by a firm or plant. This section contains a brief discussion of engineering cost estimates and data, because the choice of cost estimates will affect the outcome of the financial analysis.

There are two different costs associated with pollution control treatment. The costs of purchasing and installing the equipment and building the facilities to house the equipment are called capital costs or capital investment. These are one-time costs which are incurred at the beginning of the life cycle of the use a piece of equipment or a process. The costs incurred on a continuing basis to operate and maintain the equipment or process are called operating and maintenance (0&M) costs and are calculated on an annual basis. There are other recurring charges specifically to recover the capital investment in a process or facility which are added to 0&M costs to obtain total annual costs.

# 2.2.1 Capital Costs

Capital costs are all of the costs to purchase and install the equipment and to provide necessary auxiliaries and appurtenances for the operation and use of equipment or process facilities. Capital costs include buildings, piping, foundations, instrumentation, spare parts, utilities such as water, electricity, and natural gas, and all costs for engineering, permitting, and construction. Five types of capital cost estimates are summarized in Exhibit 2-1.

The most accurate type of capital cost estimate is based on bids received from suppliers and contractors who propose to provide the equipment and/or build the facility at the bid price. This type of cost information is available only if specifications and working drawings have been prepared for the project. This cost estimate would have a reliability of  $\pm$  5% percent. Most projects at the permit applications stage will not be developed to this extent.

A slightly less accurate type of capital cost estimate is based on detailed engineering design but without the preparation of specifications and working drawings. The reliability of this cost estimate would be  $\pm$  10 percent. The permit applicant is also unlikely to have a cost estimate of this type.

Exhibit 2-1
FIVE TYPES OF CAPITAL COST ESTIMATES

Type of Estimate		Characteristics	Purpose	Usual Reliability About + 30% -60%	
1.	Order-of-Magnitude Rapid. Very rough. Ratio		Preliminary indication. Result should be checked by more detailed method.		
2.	Study (commonly called a factored estimate)	Requires flow diagram, material and energy balance, type and size of equipment.	For generalized evaluations. Guidance for further investigation. Basis for process selection. R&D guidance.	<u>+</u> 30%	
3.	Preliminary Budget Authorization	In addition to above, includes surveys and some engineering of foundations, transportation facilities, buildings, structures, lighting, etc.	Basis for decision to undertake detailed engineering. Sometimes basis for budget authorization. Can be for generalized evaluation, but usually for site-specific installation.	<u>+</u> 20%	
4.	Definitive Project More detailed engineering, but usually short of complete specifications and working drawings.  Requires experienced estimating organization and substantial outlay.		Sometimes the basis for budget authorization. Provides improved estimate of project to be built. For site-specific installations.	<u>+</u> 10%	
5.	Detailed Firm Contractor's	Complete site surveys, specifications, working drawings.	Made to control cost of project being built for site-specific installations.	<u>+</u> 5%	

Source: U.S. Environmental Protection Agency, <u>A Standard Procedure for Cost Analysis of Pollution Control Operations</u>, Volume I. <u>EPA-600/8-79-018a</u>, June 1979.

The next most accurate type of capital cost estimate is based on estimates obtained from suppliers of the equipment and auxiliaries. Installation costs and other design and construction costs may be estimated by identifying materials and labor hour requirements and multiplying each by an appropriate unit cost. Some of these items may be estimated as a percentage or multiplier of a known cost, as a percentage of the total equipment and installation cost, for example. There are generally accepted multipliers which vary with the type of equipment, materials handled, and scale of facility. The multipliers used should be documented by the applicant and should be consistent and appropriate. Estimates prepared in this manner, sometimes called "conceptual estimates," would have a typical reliability of + 20 percent.

A fourth type of capital cost estimate (another conceptual estimate) is very similar to the third, but uses generalized published cost data for the equipment costs instead of supplier price estimates. The installation and other design and construction costs are usually estimated using multipliers or percentages as described above. This is a less accurate method, with a reliability of  $\pm$  30 percent, but it is frequently used to obtain estimates early in capital spending and similar resource allocation decision processes.

Where a capital cost is required in the financial analysis, this cost should be based on one of the latter two types of estimates described above (the conceptual estimates). This will ensure that the cost estimate is sufficiently accurate without being costly or time-consuming to prepare. Costs used in EPA Development Documents are these types of conceptual estimates.

The least accurate type of capital cost estimate is an order-of-magnitude ratio. It is done by estimating average fixed price per unit of plant capacity; scaling a known cost for a facility of a different size; or calculating a price based on a plant's turnover ratio (annual revenue divided by total investment). The reliability of this type of estimate ranges from +30 percent to -60 percent. The permit writer should not use a capital cost of this type because it would not be accurate enough to make the results of the financial tests meaningful.

An excellent guide for preparing cost estimates, including sources of equipment costs, is the EPA publication A Standard Procedure for Cost Analysis of

Pollution Control Operations, Volumes I and II (EPA-600/8-79-018a and -018b). Other literature sources for cost estimating methods and cost data are listed in Exhibit 2-2. Information on the multipliers and percentages to be used for various equipment items and process applications can be obtained from many of these same literature sources.

# 2.2.2 Operating and Maintenance Costs

Operating and maintenance (0&M) costs are most likely to be estimated as specific requirements for each equipment item or processing unit. O&M costs include labor, supervision, utilities, chemicals and supplies, maintenance, labor and supplies, waste management and disposal, insurance, taxes, and other recurring items. In preparing the O&M costs, all significant cost items must be considered and the unit costs of each must be reasonable estimates. Unit requirements may be estimated from literature data on the specific equipment or process or by using engineering judgment. Unit costs for labor, chemicals, and materials may be obtained from various published sources. Other costs such as insurance and property taxes are usually estimated as percentages of the capital or operating costs. The data sources listed in Exhibit 2-2 can also be used for preparing O&M cost estimates.

A working knowledge of both the technology and typical costs is very helpful in preparing or assessing capital and O&M cost estimates. A number of options are available to the permit writer who lacks this knowledge of familiarity. A comparison can be made with costs for similar technologies and capacities. The reasonableness of capital or O&M costs estimates can also be assessed by calculating the relative contribution of each cost component to the capital or O&M total. Some of the publications listed in Exhibit 2-2 contain information on what the relative perpertions the various components of a total cost should be.

# 2.2.3 Total Annual Costs

The total annual costs of a pollution control system include the O&M costs and charges to recover the capital investment—the latter are called capital recovery costs. The capital recovery costs are the charges a corporation will assess on any investment of capital, both to recover the original investment and to cover the costs incurred by the firm to raise the capital through all means

Exhibit 2-2
SOURCES OF COST ESTIMATING METHODOLOGIES AND DATA

SOURCES	TYPES OF CO	OST_DATA
<del></del> .	Capital	<u>0&amp;M</u>
Development Documents for Water Pollution Control RegulationsEPA	X	X
Permit Writers Guidance Manual/Technical Resource DocumentsEPA's Office of Research and Development	X	
Richardson's Process Plant Construction Estimating Standards	X	
R. S. Means Building Construction Cost Data	X	
R. S. Means Site Work Cost Data	X	
Chemical Engineering Costs by Charles Dryden and Richard Furlow	X	X
Cost Engineering Analysis by William R. Park	X	X
Process Plant Estimating Evaluation and Control by Kenneth M. Guthrie	X	X
Plant Design and Economics for Chemical Engineers by Max Peters and Klaus Timmerhaus	X	X
Chemical Engineers Handbook by Robert Perry and Cecil Chilton	X	X
Treatment Alternatives for Hazardous Waste  Management in Nine Industry GroupsLilia A.  Abron-Robinson (Peer Consultants, Inc.) and Edward J. Martin (Environmental Quality Systems, Inc.) for EPA Office of Solid Waste	<b>X</b>	X
A Standard Procedure for Cost Analysis of Pollution Control Operations EPA-600/8-79-018a and -018b	X	X
Cost Comparisons of Treatment and Disposal Alternatives for Hazardous WastesWarren G. Hansen and Howard L. Rishel (SCS Engineers) for EPA-MERL	X	X
Estimating Water Treatment CostsEPA-600/2-79-162a through -162d	X	<b>X</b> .
Trade Publications and Technical Journals	X	X
Manufacturers' Literature	X	X

employed. These costs are usually not current "out-of-pocket" expenditures, but are charges assessed against the installation to recover the capital involved in the initial expenditure to purchase and build a facility.

The capital used to purchase and build a system can either come from within the firm through its own financial resources such as retained earnings or stock sales or it can be borrowed by the firm from various outside sources. In either case, the firm must recover the capital investment plus the interest paid on that investment, in order to pay back the loan or to return the money to the firm for future use on other projects. In the latter case, the investment by the firm can be viewed essentially as a loan by the firm to itself for the specific project.

## 2.2.3.1 Cost of Capital

The assumption used in estimating capital recovery costs is that a firm uses a mixture of debt funds (loans or bonds) and internally generated funds—called equity funds—to finance capital investments in plant and equipment. On the basis of this assumption—or as given for a specific firm—regarding the mix of debt and equity funds used to finance the investment, the appropriate cost of those funds can be determined and assigned to a project. This cost is called the cost of capital and it is expressed in the form of an interest rate, i.e. a percentage of the funds or capital invested.

The cost of capital is determined for any specific firm as the weighted average of the cost of debt funds and return on equity funds for that firm. Debt funds come from long-term loans and bonds. The interest rate for each loan and bond issue is combined in a weighted average to obtain an overall interest rate that would be the cost of debt for the firm. The cost of debt itself or data needed to calculate this is available in annual reports or directly from the firm. The return on equity is calculated as the annual dividend divided by the stock price plus an expected or projected growth rate of dividends. The overall cost of capital is then calculated for the firm assuming that the funds are used for all projects without regard to the specific source—debt or equity—and hence without discriminating as to the cost of the funds, except as an overall average.

In the absence of data on the actual cost of debt and/or the return on equity for a firm, the former can be estimated as some increment above the prime interest rate charged by banks. The percentage above the interest rate depends on the size and financial condition of the firm. Smaller and less sound firms firms will incur higher increments—perhaps up to three to six points above the prime rate. Average return on equity for the industry may be the best estimate of return on equity for the firm when data are lacking. Otherwise, an estimated interest rate based on the prime bank lending rate may be the only cost of capital estimate available.

## 2.2.3.2 Capital Recovery Cost

With the cost of capital or interest rate established, the capital recovery costs can be estimated. A length of time is selected for which the capital recovery charges are to be applied to the annual cost of a project to achieve the recovery of the invested capital with interest. The time period is usually less than the expected operating life of the facility or system. A frequent choice is ten years unless the operating life of the system is less than that. The interest rate to be used is the cost of capital. The calculation of the capital recovery cost factor and total annual cost is described in Chapter 4. It is performed using Worksheet 9.

Interest tables are used to obtain the capital recovery cost factor. The interest tables are included in most books of standard math tables, in many cost engineering and corporate finance texts, and in some EPA publication. The capital recovery cost factor is used as a multiplier, which is applied to the capital investment to obtain the annual cost of capital recovery. This cost, plus the O&M costs, constitute the total annual costs. The capital recovery cost can be a very substantial percentage of the total annual costs.

The capital recovery cost factor is function of the interest rate and the length of time for capital recovery. Both have significant effect on the value of the capital recovery cost factor. If information on the interest rate and/or the length of time are uncertain or essentially unavailable to the permit writer, these items could be varied in a sensitivity analysis to assess the impact on the total annual costs. The importance of the capital recovery factor could thereby be assessed and considered in the decision process.

## 2.3 FINANCIAL ANALYSIS AND DATA

The financial analysis presented in this manual is designed to address the ability of a firm or plant to pay for pollution control. Two levels of financial analysis are included--firm-level and plant-level. The purpose of this section is to briefly describe these types of financial analyses, the data needed to perform them, and the sources of these data.

## 2.3.1 Firm-Level Analysis

The firm-level analysis consists of tests that are designed to measure the financial health of a firm using publicly available data. The analysis has two components--financial statement analysis and market value analysis. The financial statement component analyzes a firm's reported financial condition by calculating ratios from available data. This provides a historical perspective on the firm's operating performance and asset values. The market value analysis uses stock market data as a proxy for the future performance of a firm to evaluate the firm's ability to pay for pollution control.

# 2.3.1.1 Financial Statement Analysis

Financial statement analysis focuses on three primary measures of financial position and capability of a firm:

- liquidity;
- solvency; and
- leverage.

All three measures indicate the ability of a firm to meet its financial obligations, i.e. to pay its bills and long-term debts, and the relative level of its long-term indebtedness. The purpose of measuring the liquidity, solvency, and leverage of a firm is to assess its ability to pay for pollution control investments.

Liquidity is a measure of ability to meet short-term obligations, i.e. current bills and debts that are to be paid in less than one year. Two ratios are used to measure the liquidity of a firm-the Current Ratio and the Quick Ratio. These ratios and their use are described in more detail in Chapter 3.

Solvency is the ability of a firm to meet its fixed and long-term obligations from current revenues. Two ratios are used to measure solvency. They are the Fixed-Charge Coverage Ratio and Beaver's Ratio. Both of these measures are discussed in detail in Chapter 3.

Leverage is a measure of the extent of the use of bonds and/or long-term loans by a firm as a source of money or capital. There are two basic sources of capital for a firm--debt, which is incurred via long-term loans or bonds, and equity, which is generated through the sale of corporate stock and by retaining earnings within the firm. The Debt/Equity Ratio is a measure of the degree of leverage of a firm.

Each of these ratios is evaluated against at least two of the following three criteria:

- A rule-of-thumb target that is commonly used by analysts to determine what constitutes acceptable performance in general. These targets can be considered the empirical "laws" of financial management.
- A cross-sectional analysis in which a firm's ratios are compared to the range of ratios for many of the firms in the same industry. This provides an estimate of how the firm compares with average or exceptional competitors.
- Comparisons of the movement of a firm's own ratios over time, to indicate how performance is changing over time.

These indicators are calculated for the most current year and for preceding years to obtain trends and current values. The economic effects of pollution control requirements are then assessed directly as changes in the value of these ratios and interpreted in terms of the quantitative changes in the ratios.

Financial statements provide the data needed to calculate the measures described above. These statements are prepared by all firms to report their financial status and operating results to all parties with an interest and a right to that information. The statements are prepared and distributed periodically; however, only the annual statements are of interest as data sources for this manual. There are two different statements used to communicate the financial information. The first—the balance sheet—provides a summary of the firm's financial condition at a specific point in time, typically the end of the firm's

fiscal year. Although the financial data presented can and will change from day to day, the balance sheet presents the information as if all activities of the firm were at a momentary standstill. This is standard accounting practice, and all such statements will reflect a similar approach.

The balance sheet is divided into two sections. On the left or upper section are shown the assets, and on the right or lower section are shown liabilities and stockholders' equity. Assets include all goods and property owned by the firm as well as money owed to the firm by others which has not yet been collected. Liabilities include all debts and payments which are owed by the firm. The stockholders' equity is the amount of money that would theoretically be divided among the stockholders if the firm were sold at its balance sheet value. It includes the investment of stockholders in purchasing shares in the firm and earnings from current and past years retained within the firm.

The income statement is the second of the financial statements. It shows how much money a firm has earned or lost during the fiscal year. The income statement is also called the "earnings report" or "statement of profit and loss." The income statement contains information on the revenue received from selling the firm's products or services and from other sources of income, and the costs and outlays incurred in order to operate the company. The costs incurred usually consist of cost of goods sold (raw materials, wages and salaries, rent and supplies), depreciation, interest paid on borrowed money, and taxes. Expenses are subtracted from income to obtain the net profit or net loss for the year.

Financial data on a firm are available from a variety of sources. Publicly held firms commonly report the current and preceding years' financial results in their annual reports to stockholders. Publicly held firms are those whose corporate shares are traded on stock markets and are owned by the general public. Publicly-held firms are also required to file a 10K form with the U.S. Securities and Exchange Commission. The 10K form is very similar to an annual report to the stockholders. All 10K forms and some annual reports to stockholders are available in public business libraries or university libraries. Stock brokerage firms may also have copies of annual reports.

In addition to these sources, the firm may be listed in <u>Moody's Industrial</u> <u>Manual</u>. This source provides balance sheet and income statement data for firms that trade stocks on the New York and American Stock Exchanges. Moody's provides most of the information required to perform the firm-level tests in a concise and readily available format.

Financial ratios for various industries are available from a variety of sources as well. The ratios required for the firm-level analysis are available from Robert Morris Associates' <u>Annual Statement Studies</u>. This source lists financial ratios for a large number of SIC codes. The information is compiled from data submitted voluntarily by Robert Morris Associates member banks and is for firms with total assets less tha \$100 million.

# 2.3.1.2 Market Value Analysis

The financial statement analysis provides a review of recent historic performance and a point-in-time picture of a firm's financial status. What is not discernible from this vantage is how pollution control costs would affect expectations of the future performance of the firm. To predict the future effects one needs a prospective look based on expected financial performance of the firm with and without pollution control expenses.

One way of doing this would be to project <u>pro forma</u> (predicted) financial statements into future years by extrapolating past behavior and performance trends. Certain items such as inventory value, accounts receivable, and accounts payable could be estimated from past performance of the management of the firm in terms of ratios to total sales or average length of collection or payment time, for example. Other items like sales and operating costs could be extended along recent trend lines. These would allow a permit writer to estimate what future balance sheets and income statements might look like. Unfortunately, this would require a detailed understanding of the firm's industry and market, including how sales and costs vary with inflation, who the competitors are, what new technologies are influencing the supply and demand for the product, and how production assets are tied to sales volume and costs. Collecting this information would be a formidable task beyond the scope of the permit writer's interests or capabilities. Instead a proxy for this forward-looking approach is

used--analysis of stock prices. This is the purpose of the second component of the firm-level analysis--the market value analysis.

Stock prices reflect the opinions of many analysts and participants in the stock market who set the price of a stock by their buying and selling behavior. In theory, the price of a corporate stock is a measure of the net present value (NPV) of the future cash flows (profitability) of the firm. The value of money over time is considered in net present value by reducing—or discounting—the estimated future cash flow to a lesser amount based on the length of time involved and an assumed or effective interest rate. Thus stock prices are indicators of investors' expectations of the future profitability of a firm. They constitute a single—number substitute for a series of projected future financial statements. Because there are many security analysts who conduct detailed financial evaluations of firms for investors who value such information very highly, and many investors who act on that information, it can be assumed that the market price of a firm's stock is a good substitute for the more rigorous and time—consuming analysis.

Any cost associated with pollution control will have only negative value as an investment for a firm, because the costs will not produce any revenue and will only result in reductions in net income. However, some waste treatment technologies, e.g., recycling, flow reduction, or solvent recovery, can partially offset the gross cost of compliance. This reduction in income would reduce the stock value. Assuming the stock price represents the per-share amount of profits available now and in the future, it thus provides an indication of the upper limit on the after-tax cost of pollution control that could be incurred by a firm before deficit operation.

The impact of the present value of the pollution control costs on stock values is roughly half the cost of the capital and operating cost of the pollution control technology because the costs are tax-deductible and the stock price is an indicator of the present value of after-tax profits. The market value analysis used the ratio of stock market value to "book value" (stockholders' equity or net worth) of the firm, with and without the stock price reduced by the cost of pollution control. Book value is typically reported in financial statements as stockholder's equity or net worth.

Stock market data include two types of information. Stock prices are recorded daily in the Wall Street Journal and many other newspapers. Stock listings typically indicate current prices as well as high and low prices for the current year. Other information concerning stock performance is available from <u>Value Line Investment Survey</u>. This is an independent advisory service for professional analysts, corporate financial managers, and private investors. <u>Value Line</u> provides periodic news reports on companies' performance and predictions of future performance.

# 2.3.2 Plant-Level Analysis

The firm-level tests are relatively straightforward and depend on readily available data. However, these tests may not be sufficient to determine if an individual plant can maintain operations when faced with additional pollution control expenditures. Two conditions would indicate a need for plant-level analysis:

- the firm contends that pollution control investment would make the plant unprofitable to operate; or
- the firm-level analysis indicates that pollution control investment would have a serious detrimental effect on the firm's financial health.

The plant-level analysis used in this manual is based on plant-specific costs and revenues and is designed to focus on potential plant shutdowns rather than total corporate ability to pay. This type of analysis can be very complex because:

- plant-level financial data are usually confidential;
- the necessary data, particularly concerning the allocation of corporate overhead expenses, are not always collected by firms at the plant level; and
- the non-standardized accounting procedures used internally by firms do not facilitate easy verification of reported cost and revenue items.

The plant-level tests are intended and designed as screening tests rather than rigorous and definitive evaluations of a plant's ability to afford pollution control costs. If the test results indicate that pollution controls would impose severe economic impacts, then a more detailed plant closure analysis

would be necessary. This would entail working closely with the plant and corporate accountants to gather information on a variety of costs, revenues, and accounting procedures. Mathematical modelling of the plant's profitability may be necessary. Information on salvage values of plant equipment as well as projections of future economic conditions may be desirable or required. A methodology for plant closure analysis is not presented in this document.

Three tests are presented in the plant-level analysis: the Earnings Test, the Gross Margin Test and the Revenue Test. The Earnings Test measures the impact of pollution control costs on the plant's earnings before taxes. Earnings are computed as revenues minus the cost of goods sold (raw materials, wages and salaries, rent, and supplies) and the corporate overhead expenses assigned to the plant. The results of this test would provide the most clear-cut indication of a plant's ability to pay for pollution control. The cost of pollution control would directly reduce earnings to the level indicated by the results of this test.

The Gross Margin Test should be used if corporate overhead data are not available. This test measures the impact of pollution control costs as a fraction of the plant's gross margin. Gross margin is computed as revenues minus cost of goods sold. The test result is a fraction which may require more skill to interpret than the absolute number obtained from the Earnings Test.

The Revenue Test is the simplest. Pollution control costs are considered as a fraction of total revenues for the plant. No other plant-specific costs are required to perform this test.

The Earnings Test is probably the most useful to the permit writer and the Revenue Test is probably the least useful. However, the former requires the most data, and the latter requires the least. Whichever test is used, significant data problems can be expected, including a lack of specific data; misallocated, biased, or inappropriate cost data; or incomplete information. The plant-level analysis will be constrained by such problems but reasonable estimates and informed use of the available data may be sufficient. The calculation and interpretation of these tests are discussed in more detail in Chapter 4.

Data needed for the plant-level tests must be obtained from the permit applicant for the plant in question. If there are not sufficient data to perform the

Earnings Test and one of the other two tests is used, industry ratios for comparison are available from Morris' <u>Annual Statement Studies</u>. Data concerning the cost of pollution control can be obtained from the firm-level analysis worksheets.

#### CHAPTER 3

#### FIRM-LEVEL ANALYSIS

### 3.1 INTRODUCTION

The first stage in the economic analysis of pollution control expenditures is the firm-level analysis. This analysis uses publicly available financial data to determine whether a firm can afford the pollution control technology for a particular plant.

All of the firm-level tests can be performed using three years of data from publicly available sources, such as annual reports or stock market data. Evaluation of privately-held firms will be difficult, because the above data sources are not available for such companies. Dun and Bradstreet reports some information on privately held firms that will enable the permit writer to perform a limited evaluation. If sufficient data are not available or if conclusions are difficult to reach, the permit writer may need to ask the firm to provide confidential financial information.

The firm-level analysis has two components--financial statement analysis and market value analysis. The financial statement component analyzes a firm's reported financial condition by calculating ratios from available data. This provides a historic perspective on the firm's operating performance and asset values. The market value analysis uses stock market data as a proxy for the future performance of a firm to evaluate the firm's ability to pay for pollution control.

# 3.2 FINANCIAL STATEMENT ANALYSIS

The methodology presented in this section concentrates on three accounting indicators of financial strength:

- Liquidity -- ability to meet short-term financial obligations;
- Solvency -- ability to meet long-term financial obligations; and
- Leverage -- indebtedness as a percentage of total capital.

Five ratios will be calculated to measure these indicators, using data from balance sheets and income statements. The ratios should be calculated using three years of financial data to smooth fluctuations in reported earnings and asset values over time. They will first be calculated with the firm's reported revenues and expenses. Then the ratios for the most recent year will be adjusted for the cost of the pollution control technology to determine how the control option will impact the firm's financial health. Each ratio will be evaluated against at least two of the following three criteria:

- A rule-of-thumb target that is commonly used by analysts to determine what constitutes acceptable performance in general. These targets can be considered the empirical "laws" of financial management.
- A cross-sectional analysis in which a firm's ratios are compared to the range of ratios for many of the firms in the same industry. This provides an estimate of how the firm compares with average or exceptional competitors. Although it is impossible to identify precisely the industry in which a firm competes, it can often be usefully approximated by the SIC code of the firm. Financial statements of other firms with the same SIC code provide a distribution of the financial conditions for firms in the industry. The statements of the firm in question can then be compared to those of other firms to assess relative liquidity, solvency, and leverage.
- Intertemporal or longitudinal comparisons of the movement of a firm's own ratios over over time, to indicate how performance is changing over time.

In Chapter 5 the results of the firm-level evaluations are assessed as a whole, and in combination with the results of the plant-level tests. Chapter 5 also contains guidance for evaluating conflicting test results.

The data needed to perform the financial statement analyses can be found in the balance sheet and income statement for a firm. The balance sheet shows a financial picture of a firm at a given point in time, as if all financial activities of the firm were momentarily at a standstill. Because the balance sheet reflects a point in time, the data presented on it can change from day to day.

The balance sheet is divided into two sections. On the left or upper section are shown the assets, and on the right or lower section are shown liabilities and stockholders' equity. Assets include all goods and property owned by the firm as well as claims against others (unpaid bills owed to the firm) which have not yet been collected. Liabilities include all debts and payments which are owed by the firm. Stockholders' equity is the difference between the value of the firm's assets and the value of its liabilities. This is the amount of money that would theoretically be divided among the stockholders if the firm were liquidated at its balance sheet value. It includes the investment of stockholders in purchasing shares in the firm and earnings from current and past years retained within the firm.

The income statement shows how much money a firm makes or loses during its fiscal year. It can also be called the "earnings report" or "statement of profit and loss." The income statement contains information on the amounts received from selling the firm's products and from other sources of income, and the costs and outlays incurred in order to operate the company. The costs incurred usually consist of cost of goods sold (raw materials, wages and salaries, rent, and supplies); depreciation; interest on borrowed money; and taxes. When the expenses are subtracted from the income, the result is a net profit or a net loss for the year.

The three sets of tests that comprise the financial statement analysis are the:

- liquidity ratios;
  - solvency ratios; and
  - leverage ratios.

These are discussed in the next sections.

# 3.2.1 Liquidity Ratios

Liquidity ratios indicate a firm's ability to obtain cash to meet short-term financial obligations, i.e. current bills and debts which must be paid within one year. They measure the extent to which current assets exceed current liabilities. Ratios are used to relate the excess of current assets to the financial scale of the company.

The assets considered in liquidity ratios are cash and near-cash items such as marketable securities, accounts receivable (bills owed to the firm that have not yet been paid), and inventories. They are described as <u>current</u> assets because a firm can reasonably expect to convert them to cash within the current business year, if necessary, to meet its financial obligations.

Current liabilities are those items that a firm can be obligated to pay for within the current year. These typically include accounts payable (unpaid bills owed by the firm), short-term notes payable, the current portion of long-term debt, and a variety of other accrued expenses.

Liquidity ratios are comparatively easy to calculate because both current assets and current liabilities are routinely presented as subtotals on balance sheets. They provide a concise measure of the short-term financial status of the firm. However, liquidity ratios can significantly understate a firm's ability to meet its short-term obligations because the firm may have potential sources of cash that are not considered current assets. These include:

- borrowing from readily-available credit sources;
- sale of fixed assets such as land, buildings, equipment; and
- reduction of planned expenditures.

The two most commonly used liquidity ratios, the Current Ratio and the Quick Ratio, are included in this methodology.

## 3.2.1.1 Current Ratio

### Theory

The Current Ratio is a measure of a firm's excess current assets. It is expressed as:

 $CR = \frac{CA}{CL}$ 

where: CR = Current Ratio
CA = Current assets
CL = Current liabilities

The Current Ratio is a rather gross measure of liquidity in that all current assets are assumed to be equally convertable to cash.

### Calculation

Data for both current assets and current liabilities can be found on the Comparative Consolidated Balance Sheet in Moody's Industrial Manual, as shown in Exhibit 3-1. It should be noted that there may be line items that are not listed in Moody's. For example, information for the current portion of longterm debt is not shown as a line item in Moody's for the sample firm. The permit writer should discuss any such uncertain or missing data with the firm to obtain the necessary clarification and/or data. The Current Ratio is calculated lated using Worksheets la and 1b on pages 6 and 7 of the Workbook. The calculation should be done using data for the three most recent years for which data The trend in the Current Ratio values over the three years is are available. examined, and it is also compared to Current Ratio values for the industry. Industry averages for the Current Ratio are presented by SIC code in Robert Morris Associates' Annual Statement Studies (see Exhibit 3-2). These industry averages reflect data for firms whose fiscal years end between the dates indi-For example, the most right-hand column in Exhibit 3-2 is labelled cated. "6/30/81-3/31/82": the Current Ratios reflect data for firms whose fiscal years ended between 6/30/81 and 3/31/82. The permit writer should use the Current Ratios from the column that corresponds to the end of the firm's most recent fiscal year. To assess the three-year trend in industry Current Ratios, the

* [7]1979 includes \$28.0 million sale of pigment and methal			Exhib	it 3-1		Reduction	ns	(199,684)	(150,444)
[]1980 includes \$5.8 m charge for termination of oper	illion ( <b>80</b> .13	per sh.) Cani ioin	aleriu		147 160		i= ====	(22,437)	96,426
ture terephthalate plant at Mi	ddleburg.	DATA	FROM MOODY	<u>'S</u> – CUR	RENT RAT	10 y.	in notes	(15,125)	(75,243)
Consolidated Statement ( sial Position (in thousands)	);	m		1,35,950	134,846		of com. stk. for .p. accu	debt; 38,845	
Funds Provided From Oper Sources:	ations:		see in invest	42,978	14.754	Extraord	inary gain dends	11,55.5	
	\$80,861	\$136.481 C	hge. in work. Ip	(109,217)	70,689			(36,874)	(53,567)
Deprec. & smort	120,487 (15,193)	118,839 15,092		69,711	220,289		in. trans Ígn. curr.	(44.03%)	(J1,964)
Eq. in net inc, of affil.		. 1	Net (ds. prov. fr.			trans.	adj Irces (uses) .	(\$4,054)	(44,956)
divs ( Writedown of facil	12,972) 3,544	2,704 3,880 Fir	oper	113,016 :a:	\$6,707			(8:1:8)	11,084
	182,727-	Chge	in igtm. debt: borrowings	177,247	247,270		ncr. (decr.) ds	6,606	(9,149)
Record of Earnings, year	s ended Dec	·	nds of dollars):	•			_		
Year Net Sales	Cost and Expenses	Balance	Deb. (Net)	nc. Bef. Taxes	Income Taxes	Net Income	Common	Dom. Shs. Outstand.	(A)Farn. Per Com. Sh.
1963 476,462 3)1964 576,085	410,627 499,041	65.835 77,044	631 4895	66,466 76,149	34,532 38,382	31,935 □37,767	13,643 18,523	36,543,422 38,703,611	0,86 []1.04
31965 578,649 3141966 661,319	502,348 560,023	76,301 101,296	5.731 3.456	82,033 104,752	35,986 48,706	□46,040 55,986	19,121 21,372	39,395,937 40,247,710	(1.09 1.39
114 1967 670,292 114 1968 751,055	579,956 642,915	90,336 106,140	d1,013 d6,423	89,323 101,717	40,309 46,117	49,014 55,600	23,567 23,753	40,483,104 40,856,052	1.19 1.36
779,687 2141970 8J2,761	681,611 724,027	98,076 108,734	d11,269 d10,988	86,807 97,746	39,675 45,159	47,132 52,587	23,741 23,642	41,054,192 40,753,376	1.15 1.29
914 1971 848.444 114 1972 972,267	743,096 832,866	103,J48 139,401	d9,826 d11,644	95.522 127,757	41,986 59,224	153,516 68.5.13	23.812 25.143	40,319,984 40,319,984	D) (.37 1.70
1,154,775 1,154,775 1,525,489	992,20J 1,355,316	162,572 170,173	d4,931 d25,574	157,641 144,599	66,01 <b>8</b> 52,57\$	91,623 92,024	29,056 JJ,426	41,732,194 41,812,649	2.21 2.20
975	1,335,932	77,179	d36,529	40,650 200 911	8,191 94 130	32,459	33,579 15 087	42,193,700	0.77
[]After special items: 1971 973 pooling of interests. []Re	cris 1,289,000	: 1965, cr\$2,900.0	00: 1964, dr\$3,615,8	42. [7]Belore si	ecial items; af	ter: 1971. \$	1.41; 1965, \$1.1: reflect 2-for-1	6; 1964, \$0.95. (	Restated for
BALANCE SHEETS								, span ripri v	, ,,,,,,,
			DISOLIDATED						
	. (Ta	-		de of dollar	4)				
ASSETS Cash & time deposits		1982 28,855	26,700	1980 28,941	52.	979 793	1978 47,87 l	1977 26,538	1976 17,092
Cash & time deposits U.S. Govt, & other securities, o INotes & accounts receivable,	Det	5,307 • 3 <b>5</b> 0,524	856	7,750 417.80	3, 407,	532 07 i	10,058 332,347	2,524 273,102	13,579 <b>267</b> ,912
Linventories, net		368,284	406,907	417.80: 337,210	jži.	089	332,347 316,779	297,330	269,123
Total current sesets		782,974	854,210 100,001	791,72.		485 087	707,055 107,780	599,494 88,273	56; Jul 70,32
dvances to affiliates Other investments		960 21,933	8.524	8,96; 5,90	2.	472 266	2,463 9,522	856 9,147	5,390 25,710
Property, plant & equipment		2,079,668 1,155,992	2,018,580	1,882,341 1,009,692	1,703,	481	1,615,368 901,082	1,5J7,050 815,758	1,432,23 732, <b>85</b>
		923,676	907,733	872,656			714,286	721,292	699.383
Net property account		1,821 55,599	1,167	4,197		517 461	6,292	8,267 50,214	7,158 54,507
Deferred charges, etc		2,001,354		5J,852 1,869,671			49,200 1,596,598	1,477,543	1,430,283
Total LIABILITIES		•			-		50,382	72,100	19,915
Notes payable		\$7,943 161,226 42,910	151,047	148,311 153,294 42,220	166	268 657	126,817 107,567	99,759 27,506	81,158 89,684
Locard expenses		89,488	14.314 96,888	61,240	<b>&amp;</b> ;	529 61 <b>8</b>	89,634	72,548	63,35
Total current lightities oug-term debt Deferred U.S. & fgm. income ta		351.567		405.0o!		072	374,400	271,973	254,541 326,361
Deferred U.S. & fgn. income ta	K <b>es</b>	119,254	454,350 134,447	334,330 116,700	) (04,	457	295,969 80,201	329,443 89,011	75,837
Pension liability		19,703 23,240	22,146	23,638 22,111	22,	607 076	27,577 22,076	29,546 22,076	31.510 22,076
aid-in surplus  III ranslation adjustment		129,806 dr96,744	90,834 dr42,690	89,482		225	88,225	88,225	88,22
letained earnings		1,022,727	961,187	898,27	#35,	144	706,217	647,336	631 769
Total stockholders' equity DLess: Treasury stock at cost.		1,079,031	1,051,477	1,009,866	945,	<b>489</b> 67	\$18,518 67	757,637 67	742,067 67
Net stockholders' equity.		1,078,911	1,051,357	1,009,746	945,	422 -	818,451	757,570	742,030
Total	<b></b>	2.001.354	1.997.144	1,889,679	1,761,	177	1,596,59A	1,477,543	1.430./8
PROPERTY ACCT.—ANAL	esis.	431,407		386,650			332,635	327,521	313,267
Additions at rost Retirements or sales		171,219 48,296	37,648	229,163 50,296	195. 107.	573	121,330 <b>43,012</b>	129,716 24,900	150,779 1.43 <b>1.4</b> 6
Retirements or sales.  [FOther additions—deductions—EPREC. RESERVE—ANA]	Ysis	cr61,641	cr15,224	******	•••	• • •	• • • • • •	*****	• •
Additions charged to profit & Retire, renewals charged to :	t loss	121,841 51,103	21,903	114,472 35,372		517 007	106,683 26,882	93,839 12,140	89,221 59,100
Other additions	• • • • • • • • • • • • • • • • • • • •	@dr25.597	<b>(E)</b> 4,225		•••	•••	<b>(£)5.523</b>	( <u>4</u> )1,208	(4;10)
Land \$20.	181,000	insu:	diaries with the cance aubaidiarie	s, and Co.	s pro rate	stated. I	or thuse ye	urs, account	s of foreign
Transportation eq SJ.	117,000 \$1,11 268,000 3	7,874,000 shar	of the Hercofina vestments in affili	Joint ventur	es,	compani	es were tra	nslated at :	cattent ex.
discellaneous 13, Construction in		6,465,000 20%	or more, are accod, as are wholl	ounted for o	n the equity	ty, piani	and equipm	ient, depresa	rtion, kood:
	222,000	····· ante	nce subsidiaries	(due to thei	r dissimilar		achange rate		

aurance subsidiaries (due to their dissimilar business activities). Accordingly consolidated net income includes Co.'s share of their net in-

27

torical exchange rates. Revenues, expenses, gains and losses (other than inventory costs, depreciation, and amortization of goodwill) were translated at rates prevailing during the

year.

(c) Inventories: Inventories are stated at the lower of cost or market. Substantially all domestic inventories are valued on the last-in, first-out (LIFO) method, and foreign inventories are valued principally on the average cost method.

(d) Commitments and Contingent Liabili-

Co. has certain operating leases, including office space, and transportation and data processing equipment, expiring at various dates. Rental expense relating to these leases

# DATA FROM MORRIS - CURRENT RATIO

### MANUFACTURERS - PLASTIC MATERIALS & SYNTHETIC RESINS 8IC# 2821

	c	arrent Deta		}	1	Compera	tive Historical D	a to	
g. SMM	0-9/30/81) 1-10MM	10-500M	1/81-3/31/82} 80-1000MM AL		6/30/77 3/31/78 ALL	6/30, /g. 3/31/78 AU	8/30/79 3/31/80 ALL	8,30,80. 3/31 81 ALL	8/30 81- 8/31/82 ALL
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1 7 65 5	1 2 58 2	1 <b>9</b> 5 9 2	- 1 c		2 ti	14 601	2 2 82.3	14 585	1 4 59 6
25.2	33 6 1.8	32.6	311	Fixed Assets (net)	330	333	316 13	32 6	318
100.0	1000	1000	100.0	All Other Non Current	100 0	1 4 6 2 100 0	1000	1000 80 8	1 1 7 8 106 U
70	8.8	9.7	8 4	LIABILITIES Notes Payable Short Term	10 1	8.0	6.7	8 3	
4.1	3.2	2.7	3.3	Cur Mat 4/T/D	3 7	3.3	4.3	34	8 4 3 2
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27.9 24.9	22.2 16 9	22.3 18 8	23.2 18.2		243	. 23 B	24 2 14 4	23.7 16.8	23 2 18 2
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10	13	2.8 2.6	3	All Other Expenses (net) Profit Before Taxes	32	10	1 1 3 7	13	36
	2 1			RATIOS	:		_ <del></del> _		~
2.1 1.6 1.0	3.4 1.1	2.5 1.5 1.1	2.5 1.6 1.1		21 15 12	2.2 1 6 1 2	2 1 15	2.1 15	2.2 1.6
1.5	1.2	1.2	1.3	Quick	1.3	13	13	13	1.3
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29 16.1 Z	12.7	<b>37</b> 10.0 ·	29 12.4	1	42 87	28 12 6		13 112	29 12 4
	12 8.6 17 <u>6 4</u> 7.6	60 73 66 4.3	43 19		54 8 8 _ 70 _ 5 2	60 73 68 54		13 84 16 56	43 45
7.2 118 ±INF	13.5 32.7	6.0 10.7 31.1	7.0 12: 32:	Sales/Working Capital	8 8 10 7 22 9	6 1 9 0 29 5	9 5 11 6 33 9	69 115 273	7 0 12 J 32 3
		3.7 (17) 2.0	7.( [101] 2.6	EBIT/Interest			7 B	8.7	7 6 101) 2 8
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10	<u>_10</u>	<u>21</u>			1 14		<u>.) 5</u>	14	<u>1</u> 7
2.2	1. <b>6</b> 3.2	2.2 4.3	1.i 	Debt/Worth	15	1,5 2 8	1 6 2 9	14	1 <b>8</b> 3 <b>5</b>
39 6	36.0	38 0	35	% Profit Before Texas/Tengible	35 7	410	39 4	322	35.7
5.7	10.8	16 5 - 2 5	{110} 23 6.		[118] 225 (1 43	12 9	138) 240 (1:	7.7.	110) 23 4
13 8 8 3 1 2	15 6 8 8 3.0	11.3 5 0 6	13.6 7. 1.1	Assets	14 8 8 1 1.8	16 4 10 2	15.3 8 2 2 7	13 8 8 0 2 1	13 0 7 3 1 6
17.4	13 2	D 1	13		104	10.2	127	113	13 4
13.2	7.2 4 0	6 1 4.0	7. 4:		63	6.8 4.2	7 9 . 4 6	66	74 43
3.3 2 7	2.0 2.2	2 4 2.0	2.1	Sales/Total Assets	2.4 2.1	2.7 2.1	2 7 2.2	2 8 2 1	2 9 2 2
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65	26) 29 43		(43) 3.	) <u> </u>	5.8	4.3	1.6	43) 3 6 6 5	[43] 3.5
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pRobert Merris As	eociales 191			M = 6thouse 20 8 - 6milio	i				
			See Free	1 Merana 17 L GO	<u>-</u>				

28

permit writer should use industry ratios for the two years prior to the most recent year. The data used for the sample firm are indicated in Exhibit 3-2.

The steps for calculating the Current Ratio are as follows:

- 1. Find current assets on the line labelled "Total current assets" on the Comparative Consolidated Balance Sheet. One component of current assets may be marketable securities, which are carried on the balance sheet at either cost or market value. If marketable securities are a large portion of current assets, look at the footnotes to the balance sheet to determine if the securities are carried at cost and whether the market values are very different from the cost. If this is the case, use market value in determining current assets because the market value is a better indication of economic value. Record values for the three most recent years on Line 1 of Worksheet 1a (page 6 of the Workbook).
- 2. Find current liabilities on the line labelled "Total current liabilities". This usually includes a line item for the current portion of long-term debt. If there is a footnote which indicates that this is to be refinanced, do not include the current portion of long-term debt with current liabilities. Record the values for the three most recent years on Line 2.
- 3. For each of the three years, divide Line 1 (current assets) by Line 2 (current liabilities) to get the Current Ratio. Record the Current Ratios on Line 3 and on Worksheet 14 (page 57 of the Workbook).
- 4. Determine whether the Current Ratio increased, decreased, or remained the same over the three-year period. Record the direction and magnitude of the trend on Summary Line 1 at the bottom of Worksheet 1a (page 6 of the Workbook) and on Worksheet 14 (page 57 of the Workbook).
- 5. Locate Current Ratios for the appropriate industry SIC code in Morris. Current Ratios for the three most recent years can be found in the three columns on the right of the page. Record Current Ratio values for the upper quartile, median, and lower quartile on Lines 4a through 4c.
- 6. Evaluate the firm's performance relative to that of the industry for the three years, and record the evaluation on Summary Line 2 (page 6 of the Workbook) and on Worksheet 14 (page 57 of the Workbook). An example evaluation is:

\*Firm's performance was between the median and upper quartile for the industry for the past three years. Current Ratio declined relative to industry median over the three years but was still above industry median.

Exhibit 3-3 shows the calculation of the Current Ratio using the sample firm data.

Exhibit 3-3
WORKSHEET 1a
CURRENT RATIO WITHOUT COST OF POLLUTION CONTROL
(\$1000)

		e Most Recent of Company Da	
	Year <u>1982</u>	Year <u>. 1981</u>	Year <u>1980</u>
1. Current Assets	782,974	854,210	791,723
2. Current Liabilities	351,567	335,317	405,065
3. Current Ratio Line (1) divided by Line (2)	2.2	2.5	2.0
4a. Industry Current Ratio - Upper Quartile	2.2	2.1	2.2
4b. Industry Current Ratio - Median	1.6	1.5	1.5
4c. Industry Current Ratio - Lower Quartile	1.1	1.1	1.1

#### SUMMARY

1. Evaluation of three-year trend for firm: <u>Current Ratio has increased over</u>

1980; however, it has decreased during the latest fiscal year.

2. Comparison of firm's Current Ratio values with Current Ratios for industry:

Firm's Current Ratio was close to industry's ratios for first and last

years. For middle year it was significantly better. Ratios are at or

above 2.0. Closer look at balance sheet indicates significant increase

in inventories between first and second year, and then a decrease in in
ventories between second and third year.

In order to determine the effect of purchasing and installing pollution control equipment, the firm's Current Ratio is also calculated after the current assets value has been adjusted to reflect the cost of pollution control. The Current Ratio will be affected by the capital investment only and not by operating and maintenance (O&M) expenses associated with the control equipment. This is because the O&M expenses reduce net income, not the balance sheet items which are used to calculate the Current Ratio.

The Federal tax laws allow a reduction in tax payments equivalent to 15% of the capital investment in pollution control technology. This reduction in tax liability is called an "investment tax credit". The investment tax credit (ITC) reduces the real cost to the firm of the pollution control technology to 85% of the investment. The benefit of this ITC is accounted for by multiplying the capital cost of pollution control by 0.85. This is a short-cut method of including the benefit of the tax credit that essentially reduces the capital cost of the control technology by 15 percent. There are other factors that affect Federal tax liability when the pollution control ITC is used. However, to determine these effects could be a complex and time-consuming process and the net effect is negligible.

Because the pollution control ITC is dependent on legislation, the use and value of the ITC can change when new Federal tax legislation is passed. Therefore, when new tax legislation becomes law the permit writer should contact the Internal Revenue Service for clarification on the use of the pollution control ITC. Even if the pollution control ITC is repealed, a firm may still be eligible for other types of ITC.

The Current Ratio adjusted for the cost of pollution control is calculated on Worksheet 1b on page 7 of the Workbook. The steps in the calculation are as follows:

- 1. Find current assets on the line labelled "Total current assets" on Moody's Comparative Consolidated Balance Sheet (or on Line 1 of Worksheet la). Record the value for the most recent year on Line 1 of Worksheet 1b (page 7 of the Workbook).
- 2. Enter the capital cost of the pollution control equipment (as estimated by the permit writer or provided by the firm) on Line 2a.

- 3. Enter the investment tax credit factor on Line 2b.
- 4. Subtract Line 2b from 1; enter the result on Line 2c.
- 5. Multiply Line 2a (capital cost of pollution control equipment) by Line 2c (investment tax credit factor) to obtain the adjusted capital cost. Enter this value of Line 2d.
- 6. Subtract Line 2d (adjusted capital cost) from Line 1 (current assets) to obtain adjusted current assets. Enter this value on Line 3.
- 7. Find current liabilities on the line labelled "Total current liabilities" on the Comparative Consolidated Balance Sheet (or on Line 2 of Worksheet la). Record the value for the most recent year (the same year as was used for current assets on Line 1) on Line 4.
- 8. Divide Line 3 (adjusted current assets) by Line 4 (current liabilities) to obtain the Current Ratio adjusted for the cost of pollution control. Enter this value on Line 5 and on Worksheet 15 (page 58 of the Workbook).
- 9. Enter the industry Current Ratio values for upper quartile, median, and lower quartile on Lines 6a through 6c. These should be the values for the most recent year and may be found in Morris or on Lines 4a through 4c of Worksheet 1a.
- 10. Compare the firm's Current Ratio adjusted for the cost of pollution control with the industry Current Ratio values. Record the evaluation on Summary Line 1 at the bottom of Worksheet 1b (page 7 of the Workbook) and on Worksheet 15 (page 58 of the Workbook). An example evaluation is:

"Current Ratio with pollution control ranks between the lower quartile and median for the industry."

Exhibit 3-4 shows the calculation of the Current Ratio adjusted for the cost of pollution control using the sample firm data.

#### Interpretation

Four analyses are used to evaluate the Current Ratio. These are:

- 1. rule of thumb;
- 2. three-year trend:
- 3. industry average; and
- 4. adjusted ratio.

These analyses are described below. The results and interpretation should be entered on Worksheets 14 and 15 on pages 57 and 58 of the Workbook. Examples are provided in Chapter 5.

#### Exhibit 3-4

#### WORKSHEET 1b

### CURRENT RATIO ADJUSTED FOR COST OF POLLUTION CONTROL (\$1000)

	Most Recent Year of Company Data
	Year 1982
1. Current Assets Worksheet 1a, Line 1	782,975
2a. Capital Cost of Pollution Control Equipment	10,000
2b. Investment Tax Credit Factor	0.15
2c. 1 - Line (2b)	0.85
2d. Adjusted Capital Cost Line (2a) x Line (2c)	8,500
<ol> <li>Adjusted Current Assets</li> <li>Line (1) - Line (2d)</li> </ol>	774,475
4. Current Liabilities Worksheet la, Line 2	351,567
<ol> <li>Current Ratio</li> <li>Line (3) divided by Line (4)</li> </ol>	2.2
6a. Industry Current Ratio - Upper Quartile Worksheet la, Line 4a	2.2
6b. Industry Current Ratio - Median Worksheet la, Line 4b	1.6
6c. Industry Current Ratio - Lower Quartile Worksheet la, Line 4c	1.1
SUMMARY	

1. Comparison of firm's Current Ratio with Current Ratios for industry:

Adjusted Current Ratio is equal to upper quartile for the industry for

the most recent fiscal year.

The financial rule of thumb indicates that a firm with a Current Ratio greater than 2.0 should not have trouble meeting its short-term obligations. A ratio of less than 2.0 could imply liquidity problems, but other factors must be considered before drawing any conclusions. A very high ratio may also be undesirable because it could imply a lack of good investment opportunities or mismanagement of resources.

The three-year trend for the firm indicates whether the firm's Current Ratio has recently increased, decreased, or remained the same. Generally, a decline is a negative indicator and an increase is a positive indicator of the firm's ability to meet its short-term obligations. However, the initial Current Ratio for the three-year period must be considered. For example a decline from a very high Current Ratio might indicate that the firm has shifted excessive cash holdings into more profitable long-term investment opportunities.

Industry averages indicate the range of Current Ratios for the SIC group most closely associated with the firm. Operating characteristics vary among industries, causing optimal industry-specific Current Ratios to be greater or less than the general rule of 2.0. Therefore, comparison with industry norms and historic ratios is necessary for a more complete understanding of a firm's Current Ratio values.

Current Ratios for the firm for each of the three most recent years are compared with upper quartile, median, and lower quartile Current Ratios for the industry over the same time period. These comparisons indicate whether the firm has improved or declined relative to the industry in its ability to meet short-term financial obligations. A Current Ratio below the lower quartile value for the industry indicates that the firm may have difficulty meeting its short-term obligations.

The adjusted ratio indicates the effect of the proposed pollution control expenditures on the firm's Current Ratio. The adjusted Current Ratio is calculated by subtracting the capital cost of the pollution control device from current assets. This is not because the firm would always pay for the device out of current assets, but because this provides a conservative estimate of the firm's ability to pay. If the capital cost of the control equipment can be paid for

from current assets without the Current Ratio going below the target level, liquidity should not constrain the firm's ability to afford pollution control equipment. If, on the other hand, the company cannot pay for the control device with current assets and remain above target Current Ratio levels, it cannot be concluded that the pollution control requirement would be excessive. This is because the firm would probably not have to pay for the device with cash or other short-term assets on hand. Instead, loans or installment payments could be used to spread the cost over time.

These four analyses may produce conflicting results. In general, the industry average and the adjusted ratio are the most important criteria for evaluating the Current Ratio. If the adjusted current ratio is at least equal to the lower quartile for the industry, the proposed pollution control expenditures will probably not cause liquidity problems for the firm.

#### 3.2.1.1 Quick Ratio

#### Theory

The Quick Ratio compares current assets, excluding inventories, with current liabilities. Inventories are classified as current assets, but they cannot be converted to cash as readily as other assets such as accounts receivable. In a forced liquidation, inventory may only be salable at a great discount from book value, which may make the Current Ratio misleading as a measure of liquidity. This is particularly important in evaluating firms in which inventories represent a large portion of the current assets.

The Quick Ratio is therefore a more conservative measure of liquidity. The formula for the Quick Ratio is expressed as:

$$QR = \frac{CA-I}{CL}$$

where: QR = Quick Ratio

CA = Current assets

I = Inventories

CL = Current liabilities

#### Calculation

The Quick Ratio is also a ratio of assets to liabilities. However, the value used for assets is that for quick assets, which is current assets minus inventories. Thus, the Quick Ratio is the ratio of quick assets to current liabilities. As with the Current Ratio, data needed to calculate the Quick Ratio can be found in Moody's Comparative Consolidated Balance Sheet and Morris' Annual Statement Studies (see Exhibits 3-5 and 3-6). A firm's Quick Ratio without the cost of pollution control is calculated for the three most recent years using Worksheet 2a on page 10 of the Workbook and the Quick Ratio values are compared to those for the industry. The Quick Ratio with pollution control costs is calculated for the most recent year on Worksheet 2b (page 11 of the Workbook).

The steps for calculating the Quick Ratio (without adjustment for pollution control costs) are as follows:

- 1. Find current assets on the line labelled "Total current assets" on the Comparative Consolidated Balance Sheet (or on Line 1 of Worksheet la). Record values for the three most recent years on Line 1 of Worksheet 2a (page 10 of the Workbook).
- 2. Find inventory data on the line labelled "Inventories" in the assets section of the Comparative Consolidated Balance Sheet. Record values for the three most recent years on Line 2.
- 3. For each of the three years, subtract Line 2 (inventory) from Line 1 (current assets) to obtain quick assets. Enter the results on Line 3.
- 4. Find current liabilities on the line labelled "Total current liabilities" on the Comparative Consolidated Balance Sheet (or on Line 2 of Worksheet la) and record the values for the three most recent years on Line 4.
- 5. Divide Line 3 (quick assets) by Line 4 (current liabilities) to obtain the Quick Ratio for each of the three years. Record the Quick Ratios on Line 5 (page 10 of the Workbook) and on Worksheet 14 (page 57 of the Workbook).
- 6. Locate Quick Ratios for the appropriate industry SIC Code in Morris, immediately below the Current Ratio data. Quick Ratios for the three most recent years should be taken from the same three columns as the Current Ratio data were taken. Record Quick Ratio values for the upper quartile, median, and lower quartile on Lines 6a through 6c.

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. [7]1979 includes 828.0 mill on eale of pigment and methal	ion (\$0,62 per	rah.) gain	Uses: Prop., plt.	Exhibi	it 3-5			Reduction	C.S	(199,684)	(150,44
(1) 1980 includes \$5.8 m charge for termination of oper	illion (\$0.1J	per sh.)	Canital	7				e ches	. in notes	(22,437)	96,8
ure terephthalate plant at Mi Consolidated Statement	ddieburg. of Changes	DAT	A FROM	1400DY	<u>'S</u> - QUI	CK F	RATIO	pay.	of com, stk. for	(15,125) debi;	(75,24
let Poettion (in thousands) Funds Provided From Oper	ations:		Todonos in i		135.950		134,846		ap. accts linary gain	3 <b>8,</b> #45 11,553	•
Sources: ac. bel. extraord.	1982	1.00	Increase in i Net chge. in	wark.	(109,217)		70,689		idends	(56,874)	(53,56
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iq. in net inc. of alfil.	(15,193)	15,092			69,711	*******	220,289	Chges, in	ign. curr. . adj	(\$4.054)	(44,95
	(12,972)	4,704	oper.	. prov. (r.	11J,014		56,707		urces (uses) .	(4.514)	11,0
Vritedows of facil	3,544	276,996	Chge, in lg	Transaction tm. debt:	177,247		247,270		incr. (decr.) (ds	6,606	40.14
Record of Earnings, year	• •		New borrov ousands o	f dollars):	•		241,210				(9,14
ear Net Sales	Cost and Expenses 410,627	Balanc	Oth. I e Deb. (	nc. & . (Net)	inc. Bef. Taxes	Incon Tax	CS.	Net Income	Common	DCom. Shs. Quistand.	DEarn. F
963 476,462 ]1964 576,085	499,041	65,83 77,04	15 . 14	631 d895	66,466 76,149	34,5 38,3	32 82	31,935 (1)7,767	13,643 (8,523	36,543,422 38,703,611	0.8 [2] . 0 [2] . 0
1965 578,649 121966 661,319	502,348 560,023	76,30 101,29	16	5,731 3,456	82,033 104,752	35,9 48,7	<b>3</b> 6	1146,046 55,986	19,121 21, <b>3</b> 72	39,395,937 40,247,710	E)1.01
[4]1967 670,292	579,956 642,915	90,33 108,14	lo a	/i,013 <b>6,423</b>	<b>89,323</b> 101,717	40,3 46,1		49,014 55,600	23,567 23,753	40,483,104 40,856,052	1.19
751,055 0 969	681,611 734,027	98,07 108,73	'6 di	1,269 0,988	86,807 97,746	39,6 45,1	75	47 137	2J,741 2J,642	41,054,192 40,753,376	_1.2
<b>₫1971 848,444</b>	743,096 832,866	105,34 139,40	18 g	9,826 1,644	95,522 127,757	41,9 59,2	86	\$2,587 133,536 68,533	23,812 25,143	40,956,636	בּוֹם הוֹים
<b>■1973 1,154,775</b>	992,203	162.57	'2 d	4,931 5,574	157,641 144,599	66.0	18	91,623	29,056	40,319,984 41,732,194	2.2
1.525.489 75	1,355,316 1,335,932	170,17 77,17	·	A (20	40.650	52,5 6.1	01	32.450	33,426 1J.579	41,812,649 42,193,700	2.2 0.7
1,595,936  13Aftar special items: 1971  173 pooling of interests. (TRe	1,435,916 , cr\$1,289,000	1965, cr <b>6</b> 2,	500'000' 1 de	0,841 14. <i>dr</i> 83,615,1	200,931 42. [2]Belore :	Pecial	itema; af	ter: 1971,	1.41; 1965, 81.1	6; 1904, <b>8</b> 0.95. [	Restated
773 pooling of interests. Wike	stated for Sta	rements of 1	LINENCIAL V	cconnute w	DE. 3 EE 7 EGOS	ced fit	(A12° (F)K	escrited to	Lienect 3-iol-1	HE, Sput Apr. o	, 1973.
ALANCE SHEETS					BALANC						
	(Ta	ken irom		(in thouse,	ecurities an	rs)				1977	
ASSETS ash & time deposits		2	1982 8,855	1981 26,700	191 28,9	17	\$2,		1978 47,871	26,538	17, 13,
.S. Govt. & other securities, c	OSI		5,307	856 410 747	7,7.	22_	407	532 071	10,058 332,347	2,524 273,102	1J. 267,
Inventories, net		<u> خوج بر </u>	8,288	406,907	337,2	₩.	321,	189 — —	316,779	297,330	260
Total current sesets			2,974	854,210	791,7		784. 137.	185 087	707,055 1 <b>07,78</b> 0	599,494 <b>68,</b> 273	<b>56</b> 1.
dvances to affiliates			960 1,933	8,524 4,809	8,9 5,9	52	2,4	172 266	2,463 9,522	856 9,147	5 25
Property, plant & equipment Less: Depreciation reserves	t	2.07	9,668 5,992	2,018,386 1,110,853	1,882.3 1,009,66	48	1,703, 930,	181	1,615,368 \$01,062	1,537,030 815,758	1,432, 732,
					***************************************		772.			721,202	699,
Net property account			1,821 1,821	907,733	872,6 4,1	97	5. 52.	17	714,286 6,292	8,267	\$4,
eferred charges, etc			5,599	52,700	\$3,8				49,200	50,214	
Total LIABILITIES	•••••••		1,354	1,997,144	1,889,63		1,761,		1,596,598	1,477,543	1,430.
lotes payable		16	7,943 1,226 2,910	73,068 151,047 14,314	148,3 153,2	H	86. 166.	557	50,382 126,817	72.100 99.750	19,1 81,1
.S., for a state inc. taxes			2,910 9,4 <b>88</b>	14,314 96,888	42,2 61,2	20 10	63,	18 18	107,567 <b>89,6</b> 34	27,506 72,548	81, 89, 63,
Total current liabilities .		35	1.567	335,317	403.0	3	405,		374.400	271,973	254.
ong-term deur. eferred U.S. & ign. income ta	TEA	11	9,254	134,447	334;3. [16,7		280,0 104,0		295,969 80,201	329,443 89,011	J26 75
Driego Harville		1	9,703	21,667	23,6.	<b>18</b>	25,0 22,0	507	27,577 22,076	29,546 22,076	31. 22.
Common stock		เรื่	9, <b>506</b>	22,146 90,834	22,11 89,4		88,		88,225	88,225	ä
Translation adjustment		ar9	6,744 2,727	dr42,690 981,187	898,2	ż	<b>#35</b> ,	išš	706,217	647,336	áj i
Total stockholders' equity	·		9,031	1,051,477	1,009,8		945,	189	\$18,518	757,637	742.
Less: Tressury stock at cost Net stockholders' equity.		1.07	120 8,911	1,051,357	1,009,74	20 	945,	67 122 —	818,451	757,570	742,
Total		2,00	1,354	1,997,144	1,889,6	79	1,761,	77	1,596,598	1,477,543	1,430,
ROPERTY ACCTANAL	YSIS	43	1,407	518,893	186,68	<b>14</b>	379,	113	132,655	327,521	J1J,
Retirements or sales		4	1,219 8,296	189,110 37,648	229.16 \$0,29	<b>16</b>	195. 107.	573	121,330 43,012	129,716 24,900	150. []3
Other additions—deductions—EPREC. RESERVE—ANA	LÝSIS	cró	1,841	cr15,224	• • • • •		•••		*****		•
Retire, renewals charged to	k 1046	12 5	1,841 1,105	118,839 _21,903	114,41 35,31		106. 77.	517 207	106,683 _26,882	93,839 12,140	<b>80</b> , 59,
Other additions	• • • • • • • • • • • • • • • • • • • •	(I)dr2	5,597	<b>(8)4,225</b>		• •		• • •	<b>(1)5,523</b>	( <u>+</u> )1,208	le.
	c Value - De <sub>l</sub> 481,000	prec. Res.	subsidiarie naurunce	s with the	exception o	f finan	ce and	come co	irrently, Princ For those ye	years have	nut been
Kues., mach. & eg 1,5/0.	117,000 \$1.11	17.874.000 =	share of th	e Hercolin	a joint ventu	ires.		COMPAN	ics were tra	inslated at	current
liscellaneous 13.	268,000 1 580,000	6,465,000 a	20% or mo	re, are acc	listed comp ounted for	on the	equity	ty, pian	rates, except it and equips	inui invento: Juni, denrici	nes, prop
onstruction in progress 166,	222,000	. 1	method, a	s are wholl	y-owned fin	Suce I	and in-	will, an	d deferred ta	CER TLG (LEUP	lated at h
								WINCE!	exchange rat	en the sinut	e, waterin

gains and buses (other than inventory costs, depreciation, and amortization of goodwill) were translated at rates prevailing during the

year.

(c) Inventories: Inventories are stated at the lower of cost or market. Substantially all domestic inventories are valued on the last-in, first-out (LIFO) method, and foreign inventories are valued principally on the average cost method.

(d) Commitments and Contingent Liabili-ties:

Co. has certain operating leases, including office space, and transportation and data processing equipment, expiring at various dates. Rental expense relating to these leases

#### Exhibit 3-6

### DATA FROM MORRIS - QUICK RATIO MANUFACTURERS - PLASTIC MATERIALS & SYNTHETIC RESINS 84C# 2821

1-10MM 68	64(10/)	1/81-3/31/82			(	6/30/7: 3/31/7	•	6/30, / 3/31/7		3/31/		6. 10. 80		6. 30
44		50-100MM	ALL	ASSET SIZE	ł	ALL		ALL		ALL		2/3 L-B	1	3/31 AL
	18	6	116	NUMBER OF STATEMENTS ASSETS	¦	120 %		118			 <del></del>	127		11
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4.1	2.6		3.6	Profit Before Taxes	_	32		48		37		3.6		
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7. Compare the firm's Quick Ratio values to those for the industry for the three-year period and record the evaluation on Summary Line 1 (page 10 of the Workbook) and on Worksheet 14 (page 57 of the Workbook). An example evaluation is:

"Firm's Quick Ratio has increased over the past three years. The Quick Ratio has been between median and the lower quartile for the industry. Firm's Quick Ratio has improved slightly relative to the Quick Ratio for the industry."

Exhibit 3-7 shows the calculation of the Quick Ratio without the cost of pollution control using the example firm data.

In order to calculate the Quick Ratio with the cost of pollution control taken into account, the value for quick assets must be adjusted to reflect the capital cost of the pollution control equipment. The calculation is done using Worksheet 2b on page 11 of the Workbook. The steps are as follows:

- 1. Find current assets on the line labelled "Total current assets" on the Comparative Consolidated Balance Sheet (or on Line 1 of Worksheet 2a). Record the value for the most recent year on Line 1 of Worksheet 2b (page 11 of the Workbook).
- 2. Find inventory data for the same year on the line labelled "Inventories" in the Assets section of the Comparative Consolidated Balance Sheet (or on Line 2 of Worksheet 2a). Record the value on Line 3.
- 3. Enter the adjusted capital cost from Line 2d of Worksheet 1b (the Current Ratio calculation) on Line 3. This cost is the capital cost of the pollution control equipment multiplied by 1 minus the investment tax credit credit factor.
- 4. Subtract Line 2 (inventory) and Line 3 (adjusted capital cost) from Line 1 (current assets) to obtain the adjusted quick assets. Record this value on Line 4.
- 5. Find current liabilities on the line labelled "Total current liabilities" on the Comparative Consolidated Balance Sheet (or on Line 4 of Worksheet 2a). Record the value for the most recent year (the same year as was used for current assets on Line 1) on Line 5.
- 6. Divide Line 4 (adjusted quick assets) by Line 5 (current liabilities) to obtain the adjusted Quick Ratio. Record this value on Line 6 (page 11 of the Workbook) and on Worksheet 15 (page 58 of the Workbook).
- 7. Enter the industry Quick Ratio values for upper quartile, median, and lower quartile on Lines 7a through 7c. These should be the values for

Exhibit 3-7

### WORKSHEET 2a

### QUICK RATIO WITHOUT COST OF POLLUTION CONTROL (\$1000)

		Three Most Recent Years of Company Data		
		Year <u>1982</u>	Year <u>1981</u>	Year <u>1980</u>
1.	Current Assets Worksheet la, Line 1	782,974	854,210	791,723
2.	Inventory	368, 228	406,907	327,216
3.	Quick Assets Line (1) - Line (2)	415,746	447,303	454,507
.4.	Current Liabilities Worksheet la, Line 2	351,567	335,317	405,065
5.	Quick Ratio Line (3) divided by Line (4)	1.2	1.3	1.1
6a.	Industry Quick Ratio - Upper Quartile	1.3	1.3	1.3
6b.	Industry Quick Ratio - Median	0.9	1.0	0.9
6c.	Industry Quick Ratio - Lower Quartile	0.6	0.7	0.6

#### SUMMARY

1. Comparison of firm's Quick Ratio values with Quick Ratios for industry:

Firm's ratios are always higher than industry median and are in upper

quartile for one year. All Quick Ratios are greater than 1.0.

the most recent year and may be found in Morris or on Lines 6a through 6c of Worksheet 2a.

8. Compare the firm's Quick Ratio adjusted for the cost of pollution control with the industry Quick Ratio values. Record the evaluation on Summary Line 1 at the bottom of Worksheet 2b (page 11 of the Workbook) and on Worksheet 15 (page 58 of the Workbook). An example evaluation is:

"Adjusted Quick Ratio ranks between the median and lower quartile for the industry."

Exhibit 3-8 shows the calculation of the Quick Ratio adjusted for the cost of pollution control using the sample firm data.

#### Interpretation

The Quick Ratio is evaluated using the same types of analysis as the Current Ratio. These are:

- 1. rule of thumb;
- 2. three-year average;
- 3. industry average; and
- 4. adjusted ratio.

These analyses are described below. The results should be recorded on Worksheets 14 and 15 on pages 57 and 58 of the Workbook. Examples are provided in Chapter 5.

The financial rule of thumb indicates that a firm with a Quick Ratio greater than 1.0 should not have trouble meeting its short-term obligations. A Quick Ratio greater than 1.0 indicates that the firm could theoretically pay off all of its current liabilities from current assets without liquidating inventories.

The three-year trend for the firm indicates whether the firm's Quick Ratio has increased, decreased, or remained the same. Generally an increase reflects improving financial conditions and a decrease reflects declining conditions. However, if the Quick Ratio was initially very high a decline may indicate improved financial management.

Industry averages indicate the range of Quick Ratios for the SIC group most closely associated with the firm. Industry averages may be greater than or less than 1.0 depending on operating conditions in the industry. Quick Ratios for

the firm for each of the past three years are compared with upper quartile, median, and lower quartile Quick Ratios for the industry over the same time period. These comparisons indicate whether the firm has improved or declined relative to the industry. A Quick Ratio below the lower quartile for the industry indicates that the firm may have difficulty meeting its short-term obligations.

The adjusted Quick Ratio indicates the effect of the proposed pollution control expenditures on the firm's Quick Ratio. The adjusted Quick Ratio is based on the same conservative assumption used in the adjusted Current Ratio--that the firm would pay for the pollution control out of current assets.

These four analyses may produce conflicting results. In general, the industry average and the adjusted ratio are the most important criteria for evaluating the Quick Ratio. If the adjusted Quick Ratio is at least equal to the lower quartile for the industry, the proposed pollution control expenditures will probably not create liquidity problems for the firm.

#### 3.2.2 Solvency Ratios

Solvency Ratios measure a firm's ability to meet its fixed and long-term financial obligations. These are bills and debts that a firm owes on a regular basis for time periods longer than one year. These ratios can also be used to predict financial problems that could lead a firm to bankruptcy within the next few years.

Predicting bankruptcy is a very complex problem. Recent literature on bankruptcy has included many studies exploring the use of ratios and more complex statistical techniques. The predictive ability of individual Solvency Ratios is limited. However, they are included in this methodology because they do provide valuable insights and because they are the best simple predictive tools available.

Solvency ratios compare earnings or cash flow to fixed obligations. The two measures of solvency presented here are the Fixed-Charge Coverage Ratio and Beaver's Ratio. Earnings and cash flow are very similar terms used to describe the financial results or performance of a firm. Sometimes the terms are used

#### Exhibit 3-8

#### WORKSHEET 2b

# ADJUSTED FOR COST OF POLLUTION CONTROL (\$1000)

		Most Recent Year of Company Data					
		Year <u>1982</u>					
1.	Current Assets Worksheet 2a, Line 1	782,974					
2.	Inventory	368, 228					
3.	Adjusted Capital Cost of Pollution Control Worksheet 1b, Line 2d	8,500					
4.	Adjusted Quick Assets Line (1) - Line (2) - Line (3)	406,246					
5.	Current Liabilities Worksheet 2a, Line 4	351,567					
6.	Quick Ratio Line (4) divided by Line (5)	1.2					
7a.	Industry Quick Ratio Upper Quartile Worksheet 2a, Line 6a	1.3					
7b.	Industry Quick Ratio - Median Worksheet 2a, Line 6b	0.9					
7c.	Industry Quick Ratio - Lower Quartile Worksheet 2a, Line 6c	0.6					
	SUMMARY						
1.	Comparison of firm's Quick Ratio w	ith Quick Ratios for industry: <u>Adjusted</u>					
	Quick Ratio is between industry me	dian and upper quartile.					

interchangeably. However, each has an explicit connotation and more typical point of use.

Earnings are the residual of revenues from normal operations after all costs have been subtracted. Earnings are usually described in relation to taxes and fixed charges, e.g. gross earnings, net earnings before taxes, and after-tax earnings. The designation at each point indicates the costs and charges which have been subtracted from the operating revenues of the firm as established by accepted accounting practices and/or IRS regulations.

The cash flow of a firm is a measure of the cash generated by the normal operations of the firm and available for use at the discretion of firm. The typical definition of cash flow is after-tax earnings plus depreciation. However, it may also be used to describe the amount of cash available on a pre-tax basis for payment of interest, other fixed charges, and taxes. Nonrecurring revenues or losses should always be excluded from either earnings or cash flow.

#### 3.2.2.1 Fixed-Charge Coverage Ratio

#### Theory

The Fixed-Charge Coverage Ratio is a test which measures a firm's ability to meet its current fixed-cost obligations with cash flows from operations. The fixed-cost obligations (or fixed charges) include interest payments, rent or lease payments, pension payments, and the current portion of long-term debt. The cash flows from operations are expressed as cash earnings before interest and taxes (EBIT), which is the numerator of the Fixed-Charge Coverage Ratio. The ratio can be used to evaluate a firm's ability to incur additional medium-to long-term debt. It is expressed as:

$$FCCR = \underbrace{NE+T+IE+D+OFP}_{FC}$$

where: FCCR = Fixed-Charge Coverage Ratio

NE = Net earnings (or net income)

T = Taxes

IE = Interest expense

D = Depreciation

OFP = Other fixed payments (lease or rent payments, pension payments, etc.)

FC = Fixed charges

#### Calculation

needed to calculate the Fixed-Charge Coverage Ratio The information can be found in Moody's Comparative Consolidated Income Account and Comparative Consolidated Balance Sheet (see Exhibit 3-9). Supplemental profit-and-loss information provided by the firm would also be useful if such information is available. It should be noted that formats for income and profit-and-loss statements in Moody's Comparative Consolidated Income Account are less standardized than Moody's Comparative Consolidated Balance Sheet. The titles for similar items may vary among different firms. In addition, not all firms will show entries for extraordinary items in any given year. Specific guidance regarding terminology will be provided for each item in the calculation.

As with the Liquidity Ratios, the Fixed-Charge Coverage Ratio without pollution control investment is calculated for the most recent three years and the trend over the three years is evaluated. More than the most recent edition of <u>Moody's</u> may be needed, because in at least some cases <u>Moody's</u> provides depreciation values for only two years.

The Fixed-Charge Coverage Ratio without the cost of pollution control is calculated in two stages -- calculation of cash earnings before interest and taxes (EBIT), and calculation of the Fixed-Charge Coverage Ratio itself. EBIT is calculated using Worksheet 3a on page 16 of the Workbook. The steps for performing this calculation are as follows:

- 1. Find net earnings (also called net income) on the Comparative Consolidated Income Account. Record the values for the three most recent years on Line 1a of Worksheet 3a (page 16 of the Workbook).
- 2. Find the data for taxes (it should include U. S. and foreign income taxes, state income taxes, and property taxes, less any tax credits) and record the values for the three most recent years on Line 1b.
- 3. For each of the three years add Line la (net earnings) to Line 1b (taxes) to get net profit before taxes. Record these values on Line 1c.
- 4. Find the data labelled "Interest" (or "Interest expense") on the Comparative Consolidated Income Account. Record the values for the three most recent years on Line 2.

Lilla Edet, Sweden

Rocket Center, W.Va.

Vice-Presidents
K.A. Wagner
orth
H.A. Schowengerdt
R.O. Watson

40% interest. 3 Taiwanese investing groups hold the remaining 60% in the joint venture. In Apr. 1973 Company and Mexican investment interests formed Petrocel. S.A. Co. was a 40% shareholder and the Mexican interests owned 60%. Petrocel has built a multimillion dollar plant at Altamira, Tarnaulipas, Mexico, for the production of DMT (dimethyl terephthalate) and TPA (terephthalica acid), both products are used in the manufacture of polyester film and polyester fiber. Plant has a combined production capacity of 242,000 metric tons. In 1977 contributed interest to Hercofina joint venture.

products are used in the manufacture of polyester film and polyester fiber. Plant has a combined production capacity of 242,000 metric tons. In 1977 contributed interest to Hercofins joint venture.

In Feb. 1974 Company and a U.S. affiliate of Montedison S.p.A. (Milan. Italy) formed Adria Laboratories Inc. Adria will porform the clinical testing leading: up to U.S. Fould & Drug Administration approval for drugs already developed and being sold in Europe by Montedison's pharmaceutical affiliates. In Oct. 1977 Adria Laboratories, Inc. acquired Warren Teed Pharmaceuticals. Inc.

On Aug. 31, 1976, Co. and American Petroflas, Inc. formed two joint ventures. Hercoflina and Hercofina Europe, for production and marketing of terephthalates. Co. sold to American Petrofina a 23% interest in its terephthalate assets. Co. contributed jig remaining terephthalate assets for a 75% interest in the joint ventures. Co. interest will be reduced as American Petrofina elects to invest additional money for capital expansion.

On Jan. 1, 1974 Haveg Industries. Inc., subsidiary, and Phillips Perducts Co., subsidiary of Phillips Per-roleum Co. formed a joint venture to develop chemical means of increasing oil recovery from reservoirs that already have been tapped, called Custom Oil Recovery Technology Co.

In May 1979 Co. and American Petrofina Inc., announced that Hercofina sold its methanol plant in Plaquemine, La, to International Minerals & Chemical Corp., who will form a joint venture with Ashland Chemical Co.

In May 1979, Co., and Boots Co., Ltd. England formed a joint venture, Boots Hercules Astro-Chemical Co., to make agricultural chemical in North America.

In May 1979, Co., and Boots Co., Ltd. England formed a joint venture existing Hercules/Solvay synthetic pulp development venture, some steps 'urther implement existing Hercules/Solvay synthetic pulp development venture constructed a facility located in Deer Park. These steps 'urther implement existing Hercules/Solvay synthetic pulp development venture wenture will be locate

manufacti. France, T should sta Exhibit 3-9 .2,000,000 and ird quarter of

#### DATA FROM MOODY'S - EBIT

ucts through industry segments listed below:

PLASTICS
Polypropylene Resin
Polypropylene Film
Polypropylene Fiber
Other Plastic Products

WATER SOLUBLE PRODUCTS
Polymers, Gum and Coatings
Finvors & Fragrances
Water Management Chemicals

ORGANICS Resins
Elastomers & Specialty Chemicals
Paper Chemicals

EXPLOSIVES AND AEROSPACE Explusives Acrospace Graphite Fibers

OTHER PRODUCTS
Terephthalates
Graphic Systems
Recording Products
Synpulp

#### PRINCIPAL PLANTS & PROPERTIES

PLASTICS Middletown, Del. Oxford, Ga. Marshallton, Del. Terre Haute, Ind. Winooski, Vt. Bayport, Tex.
Union, Mo.
Calhoun, Ga.
Covington, Va.
Crowley, La.
Lake Charles, La.
International:
Beringen, Belgium
Brantham, Eng.

Varennes, Canada

WATER-SOLUBLE PRODUCTS
Brunswick, Ga.
Harbor Heach, Mich.
Hopewell, Va.
Louisiana, Mo.
International:
Sao Piulo, Brazil
Grossenbrode,
Germany

Grossenbrode, Germany Lille Skensved.

Bergamo, Italy Amersfoort, Netherlands Zwijndrecht, Netherlands Tarragona, Spain Sandarne, Sweden Denmark Perivale, England Alizay, France Bremen, Germany

ORGANICS

a. Hattiesburg, Miss.
Kalamazoo, Mich.
Louisiana, Mo.
Milwaukee, Wisc.
Portland, Ore.
Savannah, Ga.
West Elizabeth, Pa. Baton Rouge, La. Brunswick, Ga. Burlington, N.J. Chicopee, Mass. Franklin, Va. Gibbstown, N.J.

International: Traun, Austria Sao Paulo, Brasil Burlington, Canada

St. Jean, Canada Pendlebury, England

Beringen, Belgium

MANAGEMENT Officere
A.F. Giacco, Chmn., Pres. & Chief Exec. Off. Divisional Vice-Presidents
E.D. Crittenden
A.B. Engebretsen, Treasurer
R.J. Leahy F.L. Buckner D.S. Hollingsworth L.G. Maury S.M. Turk, Vice-Pres, & Gen. Counsel R.R.P. Morrow, Secretary G. MacKenzie, Controller D.F. Desmond, Asst. Treas. A.L. Searl, Ass't Treas. C.W.K. Gamble, Ass't Sec, P.M. Kendall, Asst. Controller

Carthage, Mo. Donora, Pa. Ishpeming, Mich. Kenvil, N.J.

St. Jean, Canada

Directors (Showing Principal Corporate Affiliations) Alexender F. Glecco, Chmn., Pres. and Chief Exec. Off.; Hercules Inc.

EXPLOSIVE AND ARROSPACE
Bessemer, Ala.
Carthage, Mo.
Donora, Pa.
Ishpeming, Mich.
Louisiana, Mo.
Magna, Utah
McGregor, Tex.
Port Ewen, N.Y.
Port Ewen, N.Y.

OTHER PRODUCTS
Deer Park, Tex.
Middleton, Del.
International:
Wilmington, N.C.

Eugene D. Crittenden, Jr., Divisional Vice-Pres., Hercules, Inc.

Stuert E. Eizenetet, Partner, Powell, Gold-stein, Frazer & Murphy, Atlanta law firm. Arden S. Engebretsen, Divisional Vice-Pres. and Treas., Hercules, Inc.

David S. Hollingsworth, Vice-Pres., Hercules,

Robert J. Leeby, Divisional Vice-Pres., Hercules Inc.

Guy T. McBride, Jr., Pres., Colorado School of Mines.

Arthur C. Nielson, Jr., Chairman and Chief Ex-ecutive Off., A.C. Nielsen Co.

John R. Petty, President and Chief Exec. Off., Marine Midland Bank, N.A. and President, Marine Midland Banks, Inc.

General Counset S.M. Turk. Director of Purchasing: E.J. Sheehy. Auditors: Coopers & Lybrand.

Shareholder Relations: W.W. Bewley, Jr., Director Investor Relations Tel: 1(800)441-9274. Directors Meetings: Last Wednesday of each month

Annual Meeting: Fourth Tuesday in March. No. of Stockholders: Dec. 31, 1982, 35,390. No. of Employees: Dec. 31, 1982, 21,598. General Office: Hercules Plaza, Wilmington, DE 19899, Tel.: (302)594-5000.

INCOME ACCOUNTS

#### COMPARATIVE CONSOLIDATED INCOME ACCOUNT, YEARS ENDED DEC. JI (Taken from reports filed with Securities and Exchange Commission)

Tampere, Finland Voreppe, France Sobernheim, Germany Busnago, Italy Middelburg, Netherlands Zwijndrecht, Netherlands

Net sales & oper, revenues	1982 2,466,971 2,040,966 31-1,105	(in thousand 1981 2,718,366 2,198,111 308,599	la of dollars) 1980 2,485,226 2,038,806 201,519	1979 2,345,425 1,853,120 280,786	1978 1,946,477 1,502,161 258,147	1977 1,697,787 1,346,819 226,964	1 <b>976</b> 1,395, <b>956</b> 1,226, <b>884</b> 209,032
Operating profit	113,698	· 211,656	.154.901 dr2.807	211,519 50,166 8,543	180,156 2,911	124,004 dr489	160,040 56,780 2,907
Total income Interest & slebs expense. Equity in net carn, ann. cos.	\$0.707 23,317	222 117 40.07 J	152,004 17,156 22,023	270,228 31,840 20,566	189,067 31,322 20,010	123,518 32,273 14,837	219,817 31,495 12,609
EU.S. & Ign. inc. tax cure, pay Deferred U.S. & Ign. income taxes State income taxes Invest tax credit	21,024 9,193 cr524 9,449	76,060 cri3,950 cr482 10,566	19,969 17,736 3,639 18,023	258,954 58,864 28,718 6,139 7,300	177,755 53,676 21,466 4,632 5,283	106,079 41,242 13,033 3,309 9,435	200,931 67,444 27,565 2,103 2,962
DE atraordinary gain  Net income  Ketainco carna, begin, of year	98.414 98.414	[1] 36.481 8/8.273	 Fil14.000	.172,533  [7]172,533 708,217	103,264 	\$7,930  [\$7,930 631,789	106,801 (£)106,801 560,975
Common dividends	1,022,727	981,187	898,273	45,362 835,188	42,383 708,21*	647,336	431,789

[[]Includes research expenses: 1982, \$70,697,000; 1981, \$61,410,000; 1980, 853,462,000; 1979, \$46,701,000; 1978, \$40,081,000; 1977, \$47,361,000; 1976 \$35,389,000.

[3]Nontaxable gain from exchange of 2,038,154 shares of rommon stock for \$50,000,000 principal amount of 61/2% convertible subordinated delen-

(EPrior to application of investment tax credit: share) and \$12.2 million (\$0.27 per share), respective. 1982, \$9,449,000; 1981, \$10,566,000; 1980, \$18,023,000; 19. 1979, 87,300,000; 1978, 85,283,900; 1977, 89,435,000; 1976, 82,982,000.

fourth quarters of 1976 AR million (\$0,39 jur facilities.

[3]981 Includes \$12.3 million (\$0.27 per share) write down of facilities and investments; 1978 in-cludes \$4.9 million (\$0.11 per share) and 1977 in-[Fincludes gain on sale of terephthalate assets cludes \$4.9 million (\$0.11 per share) and 1977 in-and Hercules, California, plant in the third and cludes \$6.2 million (\$0.14 per share) write-down of

(7)1979 includes \$28.0 milli		s ch.) gain	Ex	hibit 3-9	(conti	nued)		Reductio	)	(199,684)	(150,444
m sale of pigment and methan  1980 includes \$5.8 mi	ioi <b>158415.</b> illion (\$0.13	per sh.)	Ç C		,	•	IRG			(22,437)	96,8
harge for termination of opera are terephthalate plant at Mid	ttions of the	joint-ven-	Č ,		MOODATE	ED1	·Τ	_	. in notes		
Consolidated Statement of		in Finan-	" D	ATA FROM	HUUUUY S	- FB	Li		of com. stk, for	(15,125) <sub>.</sub> r debu:	(75,26
iel Position (in thousands)	:				135,950	13	4,846		ap, accis	38,845	
Funds Provided From Opera Sources:	1982	1961		in invest	42,978		4,754		linary gain	11,353	
nc, bef, extraord,	186.861	£136,481		e. in work.	(109,217)	7	983,0	CESN COV	idends	(56,874)	(\$3,56
Peprec. & amort	120,487	118,839			69,711		0,269		fin. trens	(44,038)	(31,90
Def, taxes on inc ( iq. in set inc. of affil.	15,193)	15,092							i ígn. cutt. . udj	(\$4,054)	(44,95
diva (	12,972)	4.704		ids, prov. ir. per	113,016	5	6,707		urces (uses) .	(411,4)	11,4
Vritedows of facil	3.544	3,480		cing Transaction Igum. debt:	na:			Net	incr. (decr.)		
	82,727-	276,996	New bol	mowings	177,247	24	7,270		(da	6,006	(9,10
Record of Earnings, year	s ended De	c. 31 (in ti	nousend	s of dollars):		_			_		
ear Net Sales	Cost and Expenses	Balan	ice Di	h, Inc. & I eb. (Net)	inc. Bei. Taxes	Income Taxes		Net Income	Common Dividends	©Com. Sha. Quistand.	(I)Fam. I Com. S
963 476,462 [1964 \$76,085	410,627	65.8 77.0	IJ <b>S</b> .	631 d <b>89</b> 5	66,466 76,149	34,532 38,382		J1,935 □37,767	13,643 1 <b>8,</b> 523	36,543,422 38,703,611	0.04 []].04
<b>□1965 378,649</b>	502,348 560,023	76,3 101,2	101	5.731 3.456	#2,033 104,752	35,986 48,766		146,046 \$5,986	19,121 21,372	39,395,937 40,247,710	1.09
141966 661,319 141967 670,292	579,956	90,J	36	d1,013	89.323	40,309		49.014	23,567	40,483,104	1.15
141968 751,055 141969 779,687	642,915 681,611	108,1 98,0	76	d6,423 d11,269	101,717 86,807 97,746	46,117 39,675		\$5,600 47,132	23,753 23,741	40,856,052 41,054,192	1.36
(2)1970 832,761 12)1971 848,444	724,027 743,096	106,7 105,3	34 48	d10.984 d9.826	97,746 95,522	45,159 41,986		52,587 □53,536 ⊕8,533	23,642 23,812	40,7\$3,376 40,956,636	[.3] []:J
<b>1</b> 1972 972,267	832,866	139,4 162,5	01	d11,544 d4,931	95,522 127,757	41,986 59,224 66,018		68,533 91,623	25,143 29,056	40,319,984 41,732,194	1.70
1.525,489	992,201 1,355,316	170.1	73	d25.574	157,641 144,599	\$2,575 8,191		92,024 J2,459	33,426 JJ,579	41,812,646 42,193,700	2.2 0.7
1 105 014	1,335,932	77,1 160,0	MA	436,529 40,891	40,650 200,931	94 1 10		104 401	35 087	47 (84 028	. j.
After special items: 1971, 173 pooling of interests.	cr\$1,289,000	D; 1963, AF. Liements of	7,900,000; Financii	i 1964, dray,615,8 Li Accounting No	142. [2]Before și 08. \$ & 7 adupi	pecial iter led in 197		ef: 1971, : mtated to	reliect 2-for-f	stk. split Apr. (	31Kestaled , 197J.
ALANCE SHEETS							_				
			E CON	SOLIDATED	BALANCE	SHEE	T. A				
	(14	ken from	report	in thousan			nge (	Commiss	ion)		
ASSETS	•-		1982	(in thousan	nds of dollar	(a)	19	79	1978	1977	
ash & time deposits	Det		1982 28,855 5,307	(in thousan 1981 26,700 856	nds of dolls: 1984 28,941 7,75	:s) 0 7 8	19 52,7 3.5	79 93 332	197 <b>8</b> 47,87 i 10,058	26,538 2,524	17.0 13.
ash & time deposits S. Govt, & other securities, co Notes & accounts receivable,	ost	• 3	1982 28,855	(in thousan 1981 26,700	nds of dolls: 1984 28,943	:a) 0 7 8 2	19 <b>52,</b> 7	79 93 332 371	1978 47,871	26,538	17.0 13.1 267.1
lash & time deposits J.S. Govt, & other securities, co [Notes & accounts receivable,	net	• 3	1982 28,855 5,307 80,524	(in thousand 1981) 26,700 856 419,747	nds of dollar 1986 28,941 7,73 417,80 337,21 791,72	7 0 7 6 2 6 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	19 52,7 3,3 407,0 321,0	779 193 1332 171 169 	1978 47,871 10,058 J32,347 316,779	26,538 2,524 273,102 297,330 599,494	17,1 13,1 267,1 269
lash & time deposits  S. Govi, & other securities, or Blotes & accounts receivable, Enventories, net  Total current sessets  nv. In affiliated cos.	pet	7 2	1982 28.855 5,307 80,524 46,288 82,974	(in thousand 1981 26,700 856 419,747 406,907 854,210 168,001	rds of dollar 198 28,94 7,75 417,80 337,21 791,72 152,38	7 0 7 0 7 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	19 \$2,7 3,3 407,0 321,0 784,4	79 93 332 77 1 169 	1978 47,871 10,058 332,347 316,779 707,055 107,780	26,538 2,524 273,102 297,330 599,494 48,273	17, 13, 267, 269. 561,
ash & time deposits  S. Govt, & other securities, or Plotes & accounts receivable, Enventories, net  Total current essets  a sfillated cos. dvances to affiliates.	net	77 2	1982 28,855 5,307 80,524 40,288 82,974 114,391 960 21,933	(in thousan 1981 26,700 26,700 856 419,747 406,907 854,210 168,001 8,524 4,809	rds of dollar 1986 28,94 7,75 417,80 337,21 791,72 152,38 8,96 5,90	7 0 7 0 7 0 0 7 0 0 0 0 0 0 0 0 0 0 0 0	784,4 137,0 784,4 137,0 2,4	79 93 332 71 669 85 67 772 66	1978 47,871 10,058 332,347 316,779 707,055 107,780 2,443	26,538 2,524 273,102 297,330 599,494 48,273 856 9,147	17, 13, 267, 269, 501, 70, 5, 25,
lash & time deposits  JS. Govt. & other securities, or Plotas & accounts recaivable, [ilaventories, net  Tetal current essets  n, in affiliated cus. dvances to affiliates  ther investments  Property, plant & equipment	pat	3 3 7 2	1982 28.855 5,307 80,524 46,288 82,974 114,391 960	(in thousan 1981 26,700 856 419,747 406,907 854,210 168,001 8,524	rds of dollar 198 28,94 7,75 417,80 337,21 791,72 152,38 8,96	78 0 77 8 2 2 6 6 7 5 5 5 5 2 4 6 8	784,4 137,0 24,4	79 93 332 371 369 ———————————————————————————————————	1978 47,871 10,058 332,347 316,779 707,055 107,780	26,538 2,524 273,102 297,330 599,494 48,273 856	17.6 13.1 267.2 269 501.1 70 51.432.1
lash & time deposits  J.S. Govt, & other securities, or Protes & accounts receivable, [Inventories, net  Total current essets  not a sillilated cos.  dvances to affiliates  Cher investments  Property, plant & equipment  Class: Depreciation reserves  Net property account	Det	2.0 1.1	1982 28,855 5,307 80,524 46,288 82,974 14,391 960 21,933 79,668 55,992	(in thousan 1981 26,700 256 419,747 406,907 854,210 166,001 8,524 4,809 2,018,586 1,110,853	rds of dollar 1984 28,94 7,75 417,80 337,21 791,72 152,18 8,96 5,90 1,882,34 1,009,69	7 8 2 2 6 3 3 5 2 2 4 8 2 2 4 2 4	19 \$2,7 3,5 407,0 321,0 784,4 137,0 2,4 6,2 1,703,4 930,5	779 93 332 771 869 85 67 72 766 81 92	1978 47,871 10,058 312,347 316,779 707,035 107,780 2,463 9,522 1,615,368 901,082 714,286	26,538 2,524 273,102 297,330 599,494 48,273 856 9,147 1,537,050 818,738	10 17,6 13,1 267,1 269,1 561,1 70,1 25,1 25,1 7,1,4,3,2 7,3,2,4
ash & time deposits. S. Govi, & oher securities, or Plotes & accounts receivable, Enventories, set  Total current essets nv. is affiliated cos. dvances to affiliates. Uher investments Property, plant & equipment Lass: Depreciation reserves  Net property account	ost	2.0 1.1	1982 28,855 5,307 80,524 46,288 82,974 14,391 960 21,933 79,668 55,992 23,676 1,821	(In thousand 1981) 26,700 856 419,747 406,907 854,210 166,001 8,524 4,809 2,018,586 1,110,853 1,167	rds of dollar 1984 28,94 7,75 417,80 337,21 791,72 182,38 8,96 5,90 1,882,34 1,009,69 872,65 4,19	7 8 22 6	19 \$2,7 3,5 407,0 321,0 784,4 137,0 2,4 6,2 1,703,4 930,5	779 93 332 771 869 85 67 72 766 81 92	1978 47,871 10,058 312,347 316,779 707,035 107,780 2,463 9,522 1,615,368 901,082 714,286	26,538 2,524 273,102 297,330 599,494 48,273 9,147 1,537,050 815,758 721,292 8,267	17.6 13.1 267.3 269.2 561.4 70.2 25.1 1.4.32.2 699.2
ash & time deposits. S. Govi, & oher securities, et Plotes & accounts receivable, flaventories, set  Total current essets nv. is affiliated cos. dvances to affiliates ther investments Property, plant & equipment flass: Deprecision reserves  Net property account condwill befored charges, etc.	setnet	2,0 1.11	1982 28,855 5,307 80,524 46,288 82,974 14,391 960 21,933 79,668 55,992 23,676 1,821 55,599	(In thousan 1981 26,700 856 49,747 406,907 854,210 166,001 8,524 4,809 2,018,586 1,110,833 907,733 1,167 52,700	rda of dollar 1988 28,94 7,75 417,80 337,21 791,72 182,34 8,96 5,90 1,882,34 1,009,69 872,65 4,19 53,85	7 7 8 2 2 6 5 3 5 5 2 4 4 8 2 2 6 7 7 2 2 6 7 2 2 6 7 2 2 6 7 2 2 2 6 7 2 2 2 6 7 2 2 2 6 7 2 2 2 2	19 \$2,7 3,3 407,0 321,6 784,4 137,6 2,4 6,2 1,703,4 930,3 772,8 5,3 52,4	79 93 332 771 869 87 772 66 81 92 89	1978 47,871 10,058 332,347 316,779 707,035 107,780 2,463 9,522 1,615,368 901,082 714,286 6,292 49,300	26.538 2.524 273,102 297,330 599,494 48,273 856 9,147 1,537,050 815,758 721,292 8,267 50,214	17.1 13.3 267.2 269. 50.3 70. 25. 1,4,32. 7,32. 7,32. 609. 7,
hash & time deposits  3. Gov.; & other securities, or  Byotes & accounts receivable,  Envestories, set  Total current essets  nv. la affiliated cos.  dvances to affiliates.  Her investments  Broperty, plant & equipment  Less: Depreciation reserves  Net property account  condwill  befored charges, etc.  Total  LIABILITIES	setnet	2.0 1.1 9	1082 28.855 5,307 80,524 464,288 82,974 114,391 9640 21,933 779,668 55,992 23,676 1,821 55,599 01,354	(in thousand 1981) 26,700 25,500 25,500 25,500 25,500 25,500 25,500 25,500 25,500 25,500 25,7	rda of dollar 1994 28,94 7,75 417,80 337,21 791,72 182,38 8,96 5,90 1,882,16 4,19 53,85	7	19 \$2,7 3,3 407,0 321,0 764,4 137,0 2,4 930,3 772,8 \$52,4 1,761,1	79 93 332 771 85 87 77 72 88 81 92 92 93 17 61	1978 47,871 10,058 312,347 316,779 707,055 107,780 2,463 9,522 1,615,368 901,082 714,286 6,292 49,300 1,596,398	26.538 2.524 273,102 297,330 599,494 88,273 856 9,147 1,537,050 815,758 721,292 8,267 50,214	17.6 13.1 267.2 269 70 561 70 25 1.4.32 732.1 609 74 54
hash & time deposits.  S. Govi, & other securities, et Plotes & accounts receivable, Enventories, set  Total current essets  nv. In affiliated cos.  dvances to affiliates  the investments  Property, plant & equipment East: Depreciation reserves  Net property account  Sodwill  Setured charges, etc.  Total  LIABILITIES  Volse payable	ostnet	2.0 1.1	1082 28,855 5,307 40,524 46,288 82,974 14,391 960 21,933 79,668 535,992 23,676 1,821 1,821 01,354 57,943 61,226	(In thousand 1981) 26,700 256 419,747 406,907 854,210 166,001 8,524 4,809 2,018,586 1,110,833 1,167 52,700 1,997,144 73,068 151,047	rda of dollar 1994 28,94 7,75 417,80 337,21 791,72 152,38 8,96 5,90 1,82,34 1,009,69 872,65 4,19 53,85 1,889,67 148,31 153,29	7 8 2 2 6 6 6 7 7 2 7 7 7 7 7 7 7 7 7 7 7 7	19 \$2,7 3,3 407,0 321,0 784,4 137,0 2,4 930,3 772,8 5,5 52,4 1,761,1 86,2	79 93 332 332 369 367 367 367 367 367 367 367 368 377 368 377	1978 47,871 10,058 312,347 316,779 707,035 107,780 2,463 9,522 1,615,368 901,082 714,286 6,292 49,300 1,596,598 50,382 126,817	26,538 2,524 273,102 297,330 599,494 48,273 856 9,147 1,537,050 815,758 721,292 8,267 50,214 1,477,543 72,100 99,759	17.1 13.2 267.2 269 561 70 5 255. 1.432 732 609 7 540 1,630 19 81
ash & time deposits. S. Govi, & oher securities, et Plotes & accounts receivable, Enventories, set  Total current essets nv. is affiliated cos. dvances to affiliates. ther investments Property, plant & equipment Lass: Depreciation reserves  Net property account Goodwill Deferred charges, etc.  Total LIABILITIES Jotas payable LCCOURTS & state inc. taxes	set	2,0 1.1 2,0	1982 28,855 5,007 80,524 46,288 82,974 114,391 960 21,933 79,668 55,992 21,676 1,821 55,599 01,354 57,943 61,226 42,910	(In thousand 1981) 26,700 256 419,747 406,907 854,210 168,001 8,524 4,809 2,018,586 1,110,853 907,733 907,733 1,167 52,700 1,997,144 73,068 151,047 14,314	ada of dollar 1994 28,94 7,73 417,80 337,21 791,72 152,38 8,96 5,90 1,882,34 1,009,69 4,19 53,85 1,889,67 148,31 153,29 42,23	7 8 2 2 6 6 5 5 5 7 7 2 7 9 9 1 1 4 1 0 0	19 \$21,0 321,0 784,4 137,0 2,4 6,2 1,703,4 930,3 772,8 52,4 1,761,1 86,2 166,6	79	1978 47,871 10,058 312,147 316,779 707,055 107,780 2,463 9,522 1,615,368 901,082 714,286 6,392 49,300 1,596,598 50,382 126,817 107,567	26.538 2.524 273.102 297.330 599.494 88.273 8.856 9.147 1.537,050 815,758 721,200 98.207 50,214 1,477,543 72,100 99,759 27,566	17, 133, 267, 269, 561, 70, 5, 25, 1,432, 732, 669, 18,130, 19,181, 81,650,
ash & time deposits. S. Govi, & oher securities, et Plotes & accounts receivable, Enventories, set Total current essets nv. in affiliated cos. dvances to affiliates. ther investments Property, plant & equipment Lass: Depreciation reserves Net property account loodwill leferred charges, etc. Total LIABILITIES lotes payable crounts payable crounts payable set, state inc. taxes corried expenses	setnet	2.0 1.1 9	1982 28,855 5,307 80,524 46,288 82,974 114,391 960 21,933 79,668 55,992 23,676 1,821 55,599 01,354 57,943 61,226 42,910 89,488	(In thousand 1981) 26,700 25,5	rda of dollar 1994 28,94 7,75 417,80 337,21 791,72 152,38 8,96 5,90 1,882,31 1,009,69 4,19 53,85 1,889,67 148,31 15,129 42,29 42,29	7 8 2 2 6 6 5 5 5 5 5 5 6 6 6 7 7 2 2 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	19 52,7 3,3 407,0 521,6 764,4 137,6 2,4 6,2 1,703,3 772,8 52,4 1,761,1 86,2 166,6 88,3 63,6	779 931 932 932 931 938 94 95 97 97 97 97 97 97 97 97 97 97 97 97 97	1978 47,871 10,058 312,347 316,779 707,055 107,780 2,463 9,522 1,615,368 901,082 714,286 6,292 49,200 1,596,598 50,382 126,817 107,567 89,634	26.538 2.524 273.102 297.330 599.494 48.273 856 9.147 1.537,050 813,738 721,292 8.267 50,214 1,477,543 72,100 99,759 27,566 72,548	17, 133, 267, 269, 561, 70, 5, 25, 1,432, 7,32, 699, 81, 81, 81, 81, 81, 81, 81, 81, 81, 81
ash & time deposits. S. Govi. & oher securities, et Plotes & accounts receivable, flavemtories, set Total current essets nv. in affiliated cos. dvances to affiliates, ther investments Property, plant & equipment flass: Deprecistion reserves Net property account coodwil. essend charges, etc. Total LIABILITIES fotes payable LS., for & state inc. taxes accrused expenses Total current tabilities Ong-term debi	ost	2.0 1.1 9	1082 28,855 5,307 80,524 46,288 82,974 114,391 21,933 79,668 21,933 79,668 1,821 55,599 01,354 57,943 61,226 42,910 89,488 51,567	(In thousand 1981) 26,700 256 419,747 406,907 854,210 166,001 8,524 4,809 2,018,586 1,110,853 1,167 52,700 1,997,144 73,068 151,047 14,114 96,888 333,317 454,356	rda of dollar 1994 28,94 7,75 417,80 337,21 791,72 152,38 8,96 5,90 1,882,34 1,009,69 4,19 5,3,85 1,889,67 148,31 153,29 42,22 61,34 405,061 334,53	7 8 2 2 6 6 7 7 2 2 7 7 7 8 8 8 8 8 8 8 9 9 9 9 9 9 9 9 9 9	19 52.7 3.1 407.0 321.6 784.1 137.0 2,4 6.2 1,703.4 930.3 772.8 5.5 52.4 1,761.1 86.2 166.6 88.5 6.3 405.0 280.6	79 93 33 33 33 34 34 34 34 34 34 34 34 34 34	1978 47,871 10,058 312,347 316,779 707,055 107,780 2,463 9,522 1,615,368 901,082 714,286 6,292 49,300 1,596,598 50,382 126,817 107,567 89,634 374,400 295,969	26.538 2.524 273,102 297,330 599,494 48,273 856 9,147 1,537,050 815,758 721,292 8,267 50,214 1,477,543 72,100 99,759 27,506 72,548	17, 133, 267, 269, 501, 70, 5, 25, 1,432, 7,32, 609, 81, 89, 63, 254, 326, 336,
ash & time deposits. S. Govi, & oher securities, or Plotes & accounts receivable, Envestories, set.  Total current essets nv. is affiliated cos. dvances to affiliates. their investments Property, plant & equipment Less: Depreciation reserves  Net property account condwill.  Missred charges, etc.  Total LIABILITIES Notes payable Lecounts payable Lecounts payable Lecounts payable Locounts payable	ost	2.0 1.1 9	1082 28,855 5,307 80,524 46,288 82,974 114,391 960 21,933 779,668 555,599 21,676 1,821 555,599 01,J54 61,226 42,910 89,468 89,468 89,468	(In thousand 1981) 26,700 256 419,747 406,907 854,210 166,001 8,524 4,809 2,016,586 1,110,853 1,167 52,700 1,997,144 73,068 151,047 14,314 96,888 335,317 454,356 134,447 21,667	rda of dollar 1994 28,94' 7,73' 417,80' 337,21' 791,72' 152,38' 8,96' 5,90' 1,822,34' 1,009,69' 872,65' 4,19' 5,3.85' 1,889,67' 148,31' 153,29' 42,22' 61,24' 405,06' 334,53' 116,70' 23,63'	77 8 2 2 6 6 7 7 2 7 7 7 7 7 7 7 7 7 7 7 7 7	19 S2.7 3.3 407.0 321.0 764.4 137.0 2.4 63.0 3.3 52.4 1,761.1 86.2 166.6 88.3 63.6 3.6 3.6 3.6 3.6 3.6 3.6 3.6 3.6	79 93 332 332 369 367 367 367 368 367 368 367 368 367 368 368 368 368 368 368 368 368 368 368	1978 47,871 10,058 312,347 316,779 707,035 107,780 2,463 9,522 1,615,368 901,082 714,286 6,292 49,300 1,596,598 50,382 126,817 107,567 89,634 374,400 293,969 80,201 27,577	26.538 2.524 273,102 297,330 509,494 48.273 9.56 9,147 1,537,050 815,758 721,292 8,267 50,214 1,477,543 72,100 99,759 27,506 72,548 271,973 329,443 329,443 389,011	17, 133, 267, 269, 70, 5, 25, 1,432, 732, 669, 1,430, 19, 81, 89, 63, 326, 75, 316,
ash & time deposits.  S. Govi, & other securities, et Plotes & accounts receivable, Enventories, set  Tetal current essets  nv. in affiliated cus.  dvances to affiliates  ther investments  Property, plant & equipment  Eless: Depreciation reserves  Net property account  Condwill.  LASILITIES  Jotal LIABILITIES  Jotal payable  ccounts payable  cc	ost	2.0 1.1 9	1982 24,855 5,307 80,524 46,288 82,974 114,391 1960 21,933 79,668 55,992 21,676 1,821 55,599 01,354 42,910 89,488 51,567 31,919 19,703 21,214	(In thousand 1981) 26,700 256 419,747 406,907 25,4210 168,001 8,524 4,809 2,018,586 1,110,853 2,700 1,97,144 73,068 151,047 14,114 96,888 335,317 454,356 114,447 22,367 22,146	ada of dollar, 1994, 28,947,753, 417,80, 337,21, 791,72, 152,38, 8,96, 82,341,009,69, 41,97,53,85, 41,97,53,85, 42,22,44,23,45,34,53,45,34,53,116,70,23,63, 22,11	7 82 6 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	199 \$2,7,3,5,407,0,10,10,10,10,10,10,10,10,10,10,10,10,1	79 932 132 132 132 132 132 132 132 132 132 1	1978 47,871 10,058 312,147 316,779 707,055 107,780 2,463 9,522 1,615,368 901,082 714,286 6,292 49,200 1,596,598 50,382 126,817 107,567 89,634 374,400 295,909 80,201 27,577 22,076	26.538 2.524 273.102 297.330 599.494 88.273 856 9.147 1.537,050 815,758 721,202 8.267 50,214 1,477,543 72,100 99,750 27,506 72,548 271,973 329,443 89,011 29,546 22,076	17, 133, 267, 269, 561, 70, 5, 1,432, 7,22, 54, 1,430, 19, 81, 89, 64,32, 7,23, 19, 81, 82, 81, 81, 81, 81, 81, 81, 81, 81, 81, 81
ash & time deposits. S. Govi, & other securities, et Plotes & accounts receivable, Inventories, net Total current essets Inv. in affiliated cos. dvances to affiliates. ther investments Property, plant & equipment Lass: Depreciation reserves Net property account Goodwill Served charges, etc. Total LIABILITIES Jotes payable counts payable referred U.S. & tgn. income tas easion liability Common stock aid-in surplus Translation adjustment	ost	2,0 1,1 9	1982 24,855 5,107 80,524 46,288 82,974 114,391 1960 21,933 79,668 555,992 21,676 1,821 55,599 01,354 57,943 61,226 42,910 87,468 51,567 31,919 19,703 19,254 19,703 29,804 996,744	(In thousand 1981) 26,700 256 419,747 406,907 254 4,800 168,001 8,524 4,800 2,018,586 1,110,853 290,733 1,167 52,700 1,977,144 73,068 151,047 14,314 96,888 235,117 454,356 144,447 21,667 22,146 90,834 draz,690	ada of dollar 1994 28,94 7,73 417,80 337,21 791,72 152,38 8,96 872,65 4,19 53,85 1,889,67 148,31 153,29 42,22 61,34 405,06 334,53 116,70 23,63 16,70 23,63 16,70 23,63 16,70 23,63 22,11 89,48	7 82 6 6 7 3 5 5 2 4 8 2 2 6 7 7 2 7 9 9 1 1 4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	199 \$2,7 3,5 407,0 407,0 407,0 704,4 6,2 1,37,0 2,4 6,2 1,761,1 80,2 1,761,1 80,3 80,4 405,0 200,4 200,	799 793 793 793 793 793 794 857 772 668 677 777 668 777 777 677 777 777 777	1978 47,871 10,058 312,147 316,779 707,055 107,780 2,463 9,522 1,615,368 901,082 714,286 6,292 49,200 1,596,598 50,382 126,817 107,567 89,634 374,400 295,969 80,201 27,577 22,076 86,225	26,538 2,524 273,102 297,330 599,494 88,273 856,9147 1,537,050 813,738 721,202 8,267 50,214 1,477,543 72,100 99,750 27,506 72,548 271,973 329,443 89,011 29,546 22,076 88,225	17, 133, 267, 269, 501, 70, 5, 25, 1,432, 7,22, 54, 1,430, 19, 81, 89, 64, 320, 75, 311, 254, 312, 312, 313, 314, 315, 316, 316, 316, 316, 316, 316, 316, 316
ash & time deposits S. Govi. & other securities, or Plotes & accounts receivable, Inventories, net Tetal current essets w. in affiliated co. dvances to affiliates ther investments Property, plant & equipment Lass: Deprecision reserves Net property account coodwill  LIABILITIES lotes payable crounts pa	ost	2.0 1.1 9 2.0 1.1 1 1 1 1,0	1982 28,855 5,307 80,524 44,288 82,974 114,391 960 21,933 779,668 535,992 21,676 1,821 55,599 01,354 57,943 61,226 42,910 89,488 51,567 31,919 19,234 19,703 23,240 29,674 22,727	(In thousand 1981) 26,700 256 419,747 406,907 854,210 166,001 8,524 4,809 2,018,586 1,110,853 1,167 52,700 1,997,144 73,068 151,047 14,314 96,888 335,317 454,356 134,447 22,146 90,834 dr12,690 961,187	rda of dollar 1994 28,94 7,75 417,80 337,21 791,72 152,38 8,96 5,90 1,882,34 1,009,69 872,65 4,19 5,3,85 1,889,67 148,31 15,32 42,23 61,34 405,08 334,53 116,70 23,63 34,53 116,70 23,63 39,48 39,48 39,48 39,48	77 8 2 2 6 6 7 7 2 7 7 7 7 7 7 7 7 7 7 7 7 7	19 52,7 3,5,3 321,6 407,0 321,6 784,4 137,6 2,4 62,4 1,761,1 86,2 86,3 63,6 405,0 104,4 220,6 88,2 220,8 88,2 230,8 88,2 230,8 88,2 24,8 25,4 25,4 26,4 27,6 28,6 28,6 28,6 28,6 28,6 28,6 28,6 28	79 793 332 332 332 332 332 332 332 332 332 3	1978 47.871 10.058 .132,147 .316,779 707,055 107,780 2,463 9,522 1,615,368 901,082 714,286 6,292 49,300 1.596,598 50,382 126,817 107,567 89,634 374,400 295,969 80,201 27,577 22,076 88,225 706,217	26.538 2.524 273.102 297.330 599.494 48.273 856 9.147 1.537,050 815,758 721,292 8,267 50,214 1,477,543 72,100 99,759 27,506 72,548 271,973 329,443 89,011 29,546 22,076 88,225 647,336	17, 133, 267, 269, 70, 5, 25, 1,432, 732, 699, 81, 89, 63, 231, 310, 321, 321, 321, 321, 321, 321, 321, 321
ash & time deposits. S. Govi, & other securities, et Plotes & accounts receivable, Enventories, set Tetal current essets nv. in affiliated cos. dvances to affiliates ther investments Property, plant & equipment Elest Depreciation reserves Net property account Condwill Seferred charges, etc.  Total LIABILITIES Jotas payable ccounts p	ost	2.0 1.1 9 2.0 1 1 1 dr	1982 24,855 5,107 80,524 46,288 82,974 114,391 1960 21,933 79,668 555,992 21,676 1,821 55,599 01,354 57,943 61,226 42,910 87,468 51,567 31,919 19,703 19,254 19,703 29,804 996,744	(In thousand 1981) 26,700 256 419,747 406,907 254 4,800 168,001 8,524 4,800 2,018,586 1,110,853 290,733 1,167 52,700 1,977,144 73,068 151,047 14,314 96,888 235,117 454,356 144,447 21,667 22,146 90,834 draz,690	ada of dollar 1994 28,94 7,73 417,80 337,21 791,72 152,38 8,96 872,65 4,19 53,85 1,889,67 148,31 153,29 42,22 61,34 405,06 334,53 116,70 23,63 16,70 23,63 16,70 23,63 16,70 23,63 22,11 89,48	7 8 2 2 6 6 7 2 2 4 8 8 2 2 4 8 8 2 2 4 8 8 2 2 4 8 8 8 8	199 52,7 33,3 321,6 407,0 321,6 764,4 137,6 2,4 930,3 772,8 55,5 52,4 1,761,1 86,2 166,6 88,3 405,0 280,6 405,0 280,6 280,6 280,6 405,0 280,6 405,0 40	79 793 332 332 332 332 332 332 332 332 332 3	1978 47,871 10,058 312,147 316,779 707,055 107,780 2,463 9,522 1,615,368 901,082 714,286 6,292 49,200 1,596,598 50,382 126,817 107,567 89,634 374,400 295,969 80,201 27,577 22,076 86,225	26,538 2,524 273,102 297,330 599,494 88,273 856,9147 1,537,050 813,738 721,202 8,267 50,214 1,477,543 72,100 99,750 27,506 72,548 271,973 329,443 89,011 29,546 22,076 88,225	17, 133, 267, 269, 70, 5, 25, 1,432, 732, 699, 81, 89, 63, 231, 310, 321, 321, 321, 321, 321, 321, 321, 321
ash & time deposits  S. Govi, & other securities, et Plotes & accounts receivable, Enventories, set  Total current essets  nv. in affiliated cus. dvances to affiliates ther investments  Property, plant & equipment Elest Depreciation reserves  Net property account  Condwill  Deferred charges, etc.  Total  LIABILITIES  Jotas payable  ccounts paya	ost	2.0 1.1 9 2.0 1.1 1 dr 1.0	1982 24,855 5,307 80,524 46,288 82,974 14,391 960 21,933 79,668 55,992 23,476 11,821 1	(In thousand 1981) 26,700 256 419,747 406,907 854,210 166,001 8,524 4,809 2,016,586 1,110,853 1,167 7,352,700 1,997,144 73,068 151,047 14,314 96,888 333,317 454,356 144,447 22,467 22,166 90,834 cf42,990 961,87 1,051,477	rda of dollar 1994 28,94 7,73 417,80 337,21 791,72 182,38 8,96 8,96 41,90 872,65 41,80 9,67 1,889,67 148,31 153,29 42,22 61,34 16,70	7 8 2 6 6 7 3 5 5 2 4 8 2 2 6 7 7 2 7 9 9 1 4 4 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	199 52,7 33,3 321,6 407,0 321,6 764,4 137,6 2,4 930,3 772,8 55,5 52,4 1,761,1 86,2 166,6 88,3 405,0 280,6 405,0 280,6 280,6 280,6 405,0 280,6 405,0 40	799 793 793 797 797 797 797 797 797 797	1978 47,871 10,058 132,347 316,779 707,055 107,780 2,463 9,522 1,615,368 901,082 714,286 6,292 49,200 1,596,598 30,382 126,817 107,567 89,634 374,400 295,969 80,201 27,577 22,076 88,225 706,217 818,518	26.538 2.524 273,102 297,330 509,494 88.273 8.56 9,147 1,537,050 815,758 721,205 90,759 27,506 72,100 90,759 27,506 72,548 271,973 3,29,443 88,011 29,546 22,076 88,225 647,336	17.6 113.1 269.2 560.1 70.0 5.3 255.1 1,432.2 7322.3 669.1 1,430.2 19.0 81.0 82.0 83.1 254.3 328.1 328
ash & time deposits  S. Govi. & other securities, et Plotes & accounts receivable, Enventories, net  Total current essets  In a filiated cos.  dvances to affiliates  ther investments  Property, plant & equipment Lass: Depreciation reserves  Net property account  coodwill  Liasilitties  talalitities  total  Liasilitties  outered charges, etc.  Total  Liasilitties  outered expenses  Vetal current tabilities  ong-term debt  eferred U.S. & Ign. income tas  easion liability  Common stock  aid-in surplus  IT-snalation adjustment  stalides surplus  Total stockholders' equity  Less: Treasury stock at cost.  Net stockholders' equity  Total  Total  Total  Total stockholders' equity  Total	ost	2.0 1.1 9 2.0 1.1 1 dr 1.0 1.0	1982 22,855 5,307 80,524 64,288 82,974 114,391 960 21,933 79,668 55,992 23,676 1,821 33,599 01,354 57,943 61,226 42,910 89,488 51,567 31,919 19,234 19,703 22,320 19,234 19,703 22,320 78,911	(In thousand 1981) 26,700 256 419,747 406,907 25,4210 168,001 8,524 4,809 2,018,586 1,110,853 2,700 1,97,144 73,068 151,047 121,667 22,146 90,834 6,42,690 961,187 1,051,477 1,051,457	ada of dollar 1994 28,94 7,73 417,80 337,21 791,72 182,38 8,96 5,90 1,82,34 1,009,69 41,29 42,29 42,29 42,29 42,23 1,63,29 42,23 61,34 1,53,29 42,23 61,34 1,670 23,63 120,11 896,27 1,009,86	7 2 2 6 6 7 2 2 6 6 7 2 2 6 6 7 2 2 6 6 7 2 2 6 6 6 6	199 52,7 3,3,5,3 321,6 764,4 137,6 2,4 930,3 772,2 1,701,4 930,3 772,2 1,6 1,761,1 104,6 220,0 405,0 280,6 220,0 405,0 244,4 405,0 244,4 405,0 244,4 405,0 244,4 405,0 244,4 405,0 244,4 405,0 244,4 405,0 244,4 405,0 244,4 405,0 244,4 405,0 244,4 405,0 244,4 405,0 244,4 405,0 244,4 405,0 244,4 405,0 244,4 405,0 244,4 405,0 4	79 93 332 332 332 333 332 333 333 333 333	1978 47,871 10,058 132,347 316,779 707,055 107,780 2,463 9,522 1,615,368 901,082 714,286 6,292 49,200 1,596,598 50,382 126,817 107,567 89,634 374,400 295,969 80,201 27,577 22,076 88,225 706,217 818,518 67 818,551	26.538 2.524 273,102 297,330 509,494 48.273 856 9,147 1,537,050 815,758 721,292 8,267 50,214 1,477,543 72,100 99,759 27,506 72,548 271,973 3,29,443 8,25 647,336 757,637 67	17, 133, 267, 269, 561, 70, 5, 25, 1,432, 732, 54, 1,630, 19, 81, 89, 63, 254, 326, 326, 327, 75, 31, 328, 328, 328, 328, 328, 328, 328, 328
ash & time deposits. S. Govi, & other securities, et Plotes & accounts receivable, Enventories, set Total current essets nv. in affiliated cos. dvances to affiliates ther investments Property, plant & equipment Lass: Depreciation reserves Net property account Condwill Setered charges, etc.  Total LITTES Jotas payable ccounts payable	ost	2.0 2.0 1.1 2.0 1.0 1.0 1.0 2.0	1982 28,855 5,307 80,524 46,288 82,974 114,391 960 21,933 79,668 555,599 21,235 61,226 42,910 89,488 51,567 31,919 19,254 19,703 21,240 96,744 22,747 779,031 120 778,911	(In thousand 1981) 26,700 256 419,747 406,907 854,210 166,007 854,210 166,007 167,007 17,008 1,110,853 1,167 12,166 17,108 151,047 14,144 151,169 17,169 11,167 12,166 17,169 11,167 12,166 17,169 11,167 12,166 17,169 11,167 12,166 17,169 11,167 12,166 17,169 11,167 12,169 11,167 11,	ada of dollar 1994 28,94 7,73 417,80 337,21 791,72 182,38 8,96 8,96 1,882,34 1,009,69 41,92 42,25 41,19 42,25 41,19 42,25 41,10 16,70 13,45,31 16,70 12,63 1	7	199 \$2,7 3.3,3 321,6 407,0 321,6 137,6 2.4 9.10,3 9.10,3 104,4	79 93 332 332 332 333 332 333 333 333 333	1978 47,871 10,058 132,347 316,779 707,055 107,780 2,463 9,522 1,615,368 901,082 714,286 6,292 49,200 1,596,598 50,382 126,817 107,567 89,634 374,400 295,909 80,201 27,577 22,076 88,225 706,217 818,518 67 818,651	26.538 2.524 273.102 297.330 509.494 68.273 68.273 68.273 68.273 68.277 68.267 50.214 1,477,543 72,100 99.759 27,506 72,548 271,973 3,29,443 271,973 3,29,443 29,546 22,076 68,225 647,336 757,637 67 757,637	17.6 113.1 1267.2 269 560 70 5.3 255 1,432 732 699 81 89 63 254 328 328 328 328 328 328 338 342 742 643 742 31.3 31 31 31 328 338.
ash & time deposits  S. Govi, & oher securities, et Plotes & accounts receivable, Envestories, set  Total current essets  nv. is affiliated cos. dvances to affiliates. their investments  Property, plant & equipment Lass: Depreciation reserves  Net property account  condwill befored charges, etc.  Total  LIABILITIES  lotes payable  crounts payable  sis, for & state inc. taxes  currend expenses  Total current kabilities  ong-term deli beforred U.S. & fgn. income tax ension liability  Common stock  ald-in surplus  Trenalation adjustment letained earnings  Total stockholders' equity  Less: Tresaury stock at cost.  Net stockholders' equity  Total  et current sesets  Net stockholders' equity  Total  total cost.	out	2,0 1,1 9 2,0 1,1 1 0,0 1,0 2,0	1982 28,855 5,307 80,524 46,288 82,974 114,391 960 21,933 79,668 555,599 21,235 61,226 42,910 89,488 51,567 31,919 19,254 19,703 21,240 96,744 22,747 779,031 120 778,911	(In thousand 1981) 26,700 25,6	ada of dollar 1994 28,94 7,73 417,80 337,21 791,72 182,38 8,96 5,90 1,82,34 1,009,69 41,29 42,29 42,29 42,29 42,23 1,63,29 42,23 61,34 1,53,29 42,23 61,34 1,670 23,63 120,11 896,27 1,009,86	7 82 6 6 3 5 5 2 4 4 8 2 2 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	199 52,7 3,3,5,3 321,6 764,4 137,6 2,4 930,3 772,2 1,701,4 930,3 772,2 1,6 1,761,1 104,6 220,0 405,0 280,6 220,0 405,0 244,4 405,0 244,4 405,0 244,4 405,0 244,4 405,0 244,4 405,0 244,4 405,0 244,4 405,0 244,4 405,0 244,4 405,0 244,4 405,0 244,4 405,0 244,4 405,0 244,4 405,0 244,4 405,0 244,4 405,0 244,4 405,0 244,4 405,0 4	79 932 332 332 332 332 332 332 332 332 33	1978 47,871 10,058 132,347 316,779 707,055 107,780 2,463 9,522 1,615,368 901,082 714,286 6,292 49,200 1,596,598 50,382 126,817 107,567 89,634 374,400 295,969 80,201 27,577 22,076 88,225 706,217 818,518 67 818,551	26.538 2.524 273,102 297,330 509,494 48.273 856 9,147 1,537,050 815,758 721,292 8,267 50,214 1,477,543 72,100 99,759 27,506 72,548 271,973 3,29,443 8,25 647,336 757,637 67	17.1 13.2 269 561 70 5 25 1.432 732.1
ash & time deposits. S. Govi, & other securities, et Plotes & accounts receivable, Inventories, net Tetal current essets  Inv. in affiliated cos. dvances to affiliates ther investments Property, plant & equipment Lass: Depreciation reserves  Net property account oodwill. effected charges, etc.  Total Liabilities  crounts payable crounts payable crounts payable crounts payable crounts payable crounts payable crounts payable incremed expenses  Yetsi current flabilities ong-term deli efferred U.S. & Ign. income tas easion liability Common stock aid-in surplus Trenslation adjustment stained earnings  Total stockholders' equity Less: Tressury stock at cost.  Net stockholders' equity Total et current seasets ROPERTY ACCT.—ANALY Additions at cost Retirements or sales ECOLAR edditions  De Per Property Accounts  De Per Per Property  Total stockholders' et current seasets  Rother edditions  De Per Per Per Per Per Per Per Per Per Pe	ost net	2,0 1.1 9 2,0 1.1 1 1 1,0 1,0 2,0 4	1982 24,855 5,307 80,524 44,288 82,974 14,391 960 21,933 776,668 555,992 23,476 11,821 357,943 61,226 42,910 89,488 51,567 31,919 19,703 22,3240 89,488 19,703 22,3240 19,703 22,3240 19,703 22,3240 76,911 120 778,911	(In thousand 1981) 26,700 256 419,747 406,907 854,210 166,001 8,524 4,809 2,018,586 1,110,853 11,10,10,10,10,10,10,10,10,10,10,10,10,1	ada of dollar 1994 28,94 7,73 417,80 337,21 791,72 152,38 8,96 8,96 872,65 4,19 93,85 1,889,67 148,31 15,1,29 42,22 61,24 405,06 334,53 116,70 23,63 1,009,84 1,009,8	77 82 66 77 82 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	199 S2,7 3,3 3,2 1,4 4,4 4,7 1,2 1,4 1,4 1,4 1,4 1,4 1,4 1,4 1,4 1,4 1,4	799 793 332 7771 789 85 85 86 87 87 87 87 87 87 87 87 87 87 87 87 87	1978 47,871 10,058 132,347 316,779 707,055 107,780 2,463 9,522 1,615,368 901,082 714,286 6,292 49,200 1,596,598 50,382 126,817 107,567 89,634 374,400 295,969 80,201 27,577 22,076 88,225 706,217 818,518 67 818,451 1,596,598 332,655 121,330 43,012	26.538 22.524 273.102 297.330 599.494 88.273 856 9147 1.537,050 815,758 721,200 99.750 72,506 72,506 72,548 271,973 329,443 88,011 29,546 22,076 88,225 647,336 757,570 1.477,543 327,570 1.477,543 327,570	17.6 113.1 269 560 70 5 255 1,432 732 660 18 18 18 19 81 82 83 18 254 318 254 318 254 318
ash & time deposits  S. Govi. & other securities, or Plotes & accounts receivable, Enventories, set  Total current essets  w. in affiliated co. dvances to affiliates ther investments Property, plant & equipment Lass: Deprecision reserves  Net property account coodwill  Liabilities  total Liabilities  total current stabilities crued expenses  Total Liabilities crued expenses  Total current stabilities ong-term delu eferred U.S. & ign. income tas ension liability Common stock aid-in surplus  Total stockholders' equity Less: Tressury stock at cost.  Net stockholders' equity Total et current sexets  Net stockholders' equity Total et current sexets  Net stockholders' equity Total et current sexets  Roperty ACCT.—ANAL's Additions at cost.  Retirements or sales  Forther additional	ost	2,0 1.1 9 2,0 1.1 1 1,0 1,0 2,0 4 1	1982 28,855 5,307 80,524 46,288 82,974 114,391 960 21,933 79,668 555,599 21,235 61,226 42,910 89,488 51,567 31,919 19,254 19,703 21,240 96,744 22,747 779,031 120 778,911	(In thousand 1981) 26,700 25,6	ada of dollar, 1994, 28,947,753, 21,947,709, 23,7,21, 22,11, 29,48, 29,4	7 2 2 6 6 7 2 7 2 7 2 7 2 7 2 7 2 7 2 7	199 52,7 33,3 36,2 407,0 321,6 62,2 4,761,1 86,2 1104,4 22,6 280,6 405,0 280,0	79 93 232 233 233 233 233 233 233 233 233	1978 47,871 10,058 132,147 316,779 707,055 107,780 2,463 9,522 1,615,368 901,082 714,286 6,292 49,300 1,596,398 50,382 126,817 107,567 89,634 374,400 295,909 80,201 27,577 22,076 88,225 706,217 818,518 67 818,451 1,590,598 312,655 121,330 43,012	26.538 22.524 273.102 297.330 599.494 88.273 856 9.147 1.537,050 815,758 721,200 99.755 50,214 1,477,543 72,100 99.755 27,506 72,548 271,973 329,443 89,011 29,546 22,076 88,225 647,336 757,537 67 757,570 1,477,543 327,551 129,716 24,900	17, 133, 267, 269, 561, 70, 5, 1,432, 7,32, 54, 1,430, 19, 81, 89, 64, 328, 75, 311, 224, 328, 328, 328, 328, 328, 328, 328, 328

Bidgs., mach. & eq. ...
Transportation eq. ...
Miscellaneous.
Construction in

Book Value

Book Value

S20,481,000

1,820,117,000

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year,

(c) Inventories: Inventories are stated at the lower of cost or market. Substantially all domestic inventories are valued on the last-in, first-out (LIFO) method, and foreign inventories are valued principally on the average cost method.

(d) Commitments and Contingent Liabili-

ties:

Co. has certain operating leases, including office space, and transportation and data processing equipment, expiring at various dates. Bental supports addition to the control of t

- 5. Find the data for depreciation in Moody's. Depreciation may be found in: the Supplementary Profit and Loss Data Section of the Comparative Consolidated Consolidated Income Account; the section called "Sources and Uses of Funds"; or the Depreciation Reserve--Analysis section, which is usually attached to the Comparative Consolidated Balance Sheet. If the depreciation data are found in the Depreciation Reserve--Analysis section, the data may be described as "Additions charged to profit and loss." Record the values for the three most recent years on Line 3.
- 6. Find the other fixed payments, which will be labelled as "Rents," "Cost of rentals," or a similar description. Record the values for the three most recent years on Line 4.
- 7. For each of the three years, add Line 1c (net profit before taxes), Line 2 (interest), Line 3 (depreciation), and Line 4 (other fixed payments) to get cash earnings before interest and taxes (EBIT). This is the numerator for calculating the fixed-Charge Coverage Ratio. Enter these values on Line 5.

Exhibit 3-10 shows the calculation of EBIT using the sample firm data.

Worksheet 3b on page 17 of the Workbook is used for calculating the Fixed-Charge Coverage Ratio without the cost of pollution control. The ratio is calculated for the three most recent years and the trend for the three years is evaluated. The steps for calculating the Fixed-Charge Coverage Ratio are as follows:

- 1. On Worksheet 3b (page 17 of the Workbook), enter on Line 1 the cash earnings before interest and taxes (EBIT) values, from Line 5 of Worksheet 3a, for the three most recent years.
- 2. Find the current portion of long-term debt on the Comparative Consolidated Balance Sheet. Record the values for the three most recent years on Line 2a.
- 3. Find the data labelled "Interest" (or "Interest expense") on the Comparative Consolidated Income Account. These data are also on Line 2 of Worksheet 3a. Enter these values on Line 2b.
- 4. Find the other fixed payments which will be labelled as "Rents," "Cost of rentals," or a similar description, on the Comparative Consolidated Income Account. These data are also on Line 4 of Worksheet 3a. Enter these values on Line 2c.
- 5. For each of the three years, add Line 2a (current portion of long-term debt), Line 2b (interest), and Line 2c (other fixed payments) to get total fixed charges. Record these values on Line 3.
- 6. Calculate the Fixed-Charge Coverage Ratio for each of the three years by dividing Line 1 (EBIT) by Line 3 (total fixed charges). Enter the results on Line 4 (page 17 of the Workbook) and on Worksheet 14 (page 57 of the Workbook).

Exhibit 3-10

WORKSHEET 3a

CASH EARNINGS BEFORE INTEREST AND TAXES (EBIT)
(\$1000)

		Three Most Recent Years of Company Data			
		Year <u>1982</u>	Year <u>1981</u>	Year <u>1980</u>	
1a.	Net Earnings (or Net Income)	86,861*	136,481	114,000	
1b.	Taxes	20, 244	51,062	23,361	
1c.	Net Profit Before Taxes Line (la) + Line (lb)	107,105	187,543	137,361	
2.	Interest Expense	50,707	46,673	37,356	
3.	Depreciation	121,841	118,839	114,472	
4.	Other Fixed Payments (Lease or rent payments, pension payments, etc.)		(not listed)		
Š.	Cash Earnings Before Interest and Taxes (EBIT) Line (1c) + Line (2) + Line (3) + Line (4)	279,653	353,055	289,189	

<sup>\*</sup>Note that extraordinary item has been deducted.

7. Compare the Fixed-Charge Coverage Ratio with the following critical values:

> 2.0 - firm is solvent
1.5-2.0 - grey area - solvency
of firm is uncertain
< 1.5 - firm is insolvent

Evaluate the historical trend over the past three years and record the evaluation on Summary Line 1 (page 17 of the Workbook) and on Worksheet 14 (page 57 of the Workbook). An example evaluation is:

"The ratio has been between 1.5 and 2.0 for the past three years, and it has increased each year."

Exhibit 3-11 shows the calculation of the Fixed-Charge Coverage Ratio without the cost of pollution control using the sample firm data.

Calculating the Fixed-Charge Coverage Ratio adjusted for the cost of pollution control equipment is a two-step process. The first step is the calculation of the debt ratio for the firm. For the purposes of this document it is assumed that the control equipment will be financed with a proportion of debt equal to this debt ratio. The debt ratio indicates the portion of total capital which has been financed by debt. It is expressed as:

DR = LTL TC

where: DR = Debt ratio
LTL = Total long-term liabilities
TC = Total capital

Total long-term liabilities are the sum of long-term debt, other accrued liabilities, deferred income taxes, and minority interest (stock in the firm that is owned by a subsidiary of the firm). Total capital is the sum of total long-term liabilities and net shareholders' equity. The calculation is done using Worksheet 3c on page 18 of the Workbook. Step 1 is done for the three most recent years and Steps 2 through 4 are done for the most recent of the three years. The steps in the calculation are as follows:

1. Find the long-term liability data on <u>Moody's</u> Comparative Consolidated Balance Sheet (see Exhibit 3-12). For the three most

#### Exhibit 3-11

#### WORKSHEET 3b

## FIXED-CHARGE COVERAGE RATIO WITHOUT COST OF POLLUTION CONTROL (\$1000)

		•	Three Mo		ecent Y ny Data		
		Year	1982	Year	<u>1981</u>	Year	1980
1.	Cash Earnings Before Interest and Taxes (EBIT) Worksheet 3a, Line 5	;	279,653	3!	53,055		289,189
2a.	Current Portion of Long-Term Debt			(not	listed	)	
2b.	Interest Expense Worksheet 3a, Line 2		50,707	4	16,673		37,356
2c.	Other Fixed Payments Worksheet 3a, Line 4			(not	listed	)	
3.	Total Fixed Charges Line (2a) + Line (2b) + Line (2c)		50,707	4	16,673		37,356
4.	Fixed-Charge Coverage Ratio Line (1) divided by Line (3)		5.5	;	7.6		7.7
	<u>sur</u>	MARY					
1.	Evaluation of three-year trend:	irm seems	to be so	olveni	; howe	ver,	cur-
rent	t portion of long-term debt and other	r fixed pay	ymients a	are ur	known.	Incl	uding
the	se missing data would make the Fixed	I-Charge Cov	verage l	Ratio	lower.		

(T)1979 includes \$28.0 mil. a sale of pigment and metha	lion (\$0,62 per		Jeen: Exhibit	3-12		Reductions	(199,684)	(150,44
make of pigment and metric [8] 980 includes \$5.8 m harge for termination of oper	nillion ( <b>50.13</b>	per sh.) Car	nital •				(22,437)	96,8
re terephthelate plant at Mi Consolidated Statement	iddleburg.	DATA FRO	M MOODY'S -	DEBT R	ATIO FOR	FIRM a notes	(15,125)	(75,24
of Poetton (in thousands)	<b>)</b> :			135,950	134,845	Exchge, of com. stk. f		
Funda Provided From Oper Sources:	rations: '	1981 Inc	rease in invest	42,978	14,754	Extraordinary gain	11,553	****
c. bef. extraord.		Ne	t chge. in work.	(109,217)	70,689	Cash dividends	(56,874)	(\$3,36
gain prac. & amort,	\$86,861 120,487	\$136,481 118,839	C&P			Not fin, trans,	(44,038)	(31,96
f. taxes on inc	(15,193)	15,092		69,711	220,289	Chices, in Ign. curr.	(11,000)	(31,54
in net inc. of affil.			Net fda, prov. fr.			trans. adj	(\$4,054)	(44,95
divs	(12,972)	2,704 3,880 F	oper	113,016	\$6,707	Other sources (uses) .	(8,3(8)	11,0
(tedows of fecil	3,544		ge, in igtm. debt:			Net incr. (decr.)		
•	182,727•	• •	w borrowings	177,247	247,270	in fds	6,606	(9,14
Recent of Earnings, yes	rs ended Dec Cost and		Oth. Inc. & I	nc. Bel. Taxes	Income	Net Commo	n !DCom. Shs.	DEarn. F
ar Net Sales 33 476,462	Expenses 410,627	Balance 65,835	Deb. (Net) 631	Taxes 66,466	Taxes 34,532	Income Dividend	s Outstand.	Com. 5
964 576,085	<b>499,04</b> 1	77,044	d695	76,149	38,382	18,52	3 38,703,611	
965 578,649 ]1966 661,319	502,348 560,023	76,301 101,296	5,731 J,456	82,033 104,752	JS.986 48.766	□46,046 19,12 55,986 21,37	2 40,247,710	(L) 1.0
1967 670,292 1968 751,035	579,956 642,915	90,336 108,140	d1,013 d6,423	<b>89,323</b> 101,717	40,30 <del>9</del> 46,117	49,014 2J,56 55,600 2J,75	7 40,483,104 3 40,856,052	1.1 <sup>4</sup> 1.3
1969 779,687	116,186	98,076	d11,269	86,807	39.675	47.132 23,74	1 41,054,192	1.1
1970	724,027 743,096	108,734 105,348	d10,988 d9,826	97,746 95,522	45,159 41,986	52,587	2 40,956,636	(D) - 1
1972 972,267 1973 1,154,775	832,866 992,203	139,401 162,572	d11,644	127,757 157,641	59,224 66,018	68,533 25,14. 91,623 29,05	3 40,319,984 6 41,732,194	2.3
74 1,525,489	1_355.316	170,173	<b>4</b> 25,574	144,5 <del>99</del>	52,575	92,024 33,420	6 41.812.649 9 42,193,700	2.3 0.7
1,41J,111 1,595,956	1,335,932 1,435,916	77,179 160,040	<i>d3</i> 6,529 40,891	40,650 200,931	8,191 94,130	106.R01 34.08	7 42.38.6028	2.4
TAfter special items: 1971 pooling of interests. (Re	i, crai,289,000 stated for Sta	; 1965, <i>cr</i> \$2,900 tements of Fin	),000; 1964, <i>dr</i> \$3,615,84 ancial Accounting No	12. (2)Belore si a. 5 k. 7 adopi	pecial items; affi ad in 1975. FIR	er: 1971, 51.41; 1965, \$ estated to reflect 2-for-	j. jo; 1964, <b>5</b> 0.95, ( -{	JRestated , 197J.
ANCE SHEETS								
	СОМР	ARATIVE C	CONSOLIDATED	BALANCE	SHEET. A	S OF DEC. 31 Commission)		
ASSETS	,	19	(in thousan	ds of dollar	rs)	79 1978	1977	
a & time deposits	ont.	28,8 5,3		28,94° 7,75	7 52,1	93 47,871 532 10,058	26,53 <b>8</b> 2,524	17 13
xes & accounts receivable	, pet	380,5	24 419,747	417,50	2 407,0	71 332,347	273,102 297,330	267 269
ventories, net		J64,2		337,21	_			-
Total current assets		782,9 214,3		791,72. 1 <b>52,3</b> 8			599,494 88,273	<b>56</b> ; , 70,
in affiliated cus		9	<b>60 8</b> ,524	8,96 5,90	2 2,6	72 2,463 166 9,522	856 9,147	5 25
r investments	t	21,9 2,079,6	68 <b>2.</b> 018.586	1.882.34	1.703.4	i81 1,615, <b>3</b> 68	1,537,050	1.432
má: Depreciation reserves	• • • • • • • • • • • • • • • • • • • •	1,155,9		1,009,69	_		815,758	732
Net property account		923,6 1.8		872,656 4,19	6 772,0 7 5,5	189 714,286 117 6,292	721,292 8,267	699. 7.
rred charges, etc.		5Š,Š	99 \$2,700	4,19 53,85	7 2 52,	61 49,200	50,214	54,
Total LIABILITIES	* . * * * * * * * * * * * * * * * * * *	2,001,3	54 1,997,144	1,889,67	1,761,	77 1,596,598	1,477,543	1,430,
es Davible		57,9	43 73,068	148,31	1 <b>3</b> 6,3		72,100	Į <b>9</b> ,
unts payable	**********	161,2 42,9	26 151,047	153,29- 42,22 61,24	4 166.0 0 <b>88.</b> 1	57 126,817	99,759 27,566	#1, #9,
ned expenses	• • • • • • • • • • • • • • • • • • • •	89,4	86 96,888	61,24	53,0		72,548	نه
Total cursos Hebilities				405.04		374,400	271,973	254
g-term debt	268	431.9 119,2	19 454,356 54 134,447	334,53 116,70	0 280.0 0 104.0	19 295,969 157 80,201	329,443 89,011	J26 75
ion liability		19,7	03 21,667	23,63	25.	07 27,577	29,546 22,076	31 22
in surplus		129.8	08 90,834	89,48			85,225	• #
unalation adjustment ined earnings		dr96,7 1,022,7	44 <i>dz</i> 42,690	898,27		88 708,217	647,136	انه
Total stockholders' equity	•	1,079,0		1,009,86			757,637	742
es: Treasury stock at cost		1	20 120	120	<u> </u>	67 67	67	
Net stockholders' equity.		2,001,3		1,009,74		<del></del>	757,570	742,
Total CUPPENT ASSETS OPERTY ACCT.—ANAL	YSIS	431,4		386,65		332,655	327,521	313
adinous at cost		4/ 1/4	19 189,110	229,16.		i86 121,J30 i73 43,012	129,716 24,900	150 1,13
etirements or sales Other additions—deduction	ong	48,2 cr61,8		50,29			21,700	4.0
Other additions—deductions PREC. RESERVE—ANA dditions charged to profit	LYSIS	121,0		114.47		106,683	OFW'TG	<b>1</b> 9.
etire. Tenewals charged to :	F88,	51,5	ns 21,903	J5,37	2 77,1	007 _ 26,882	12,140 (4)1,208	59 Le
<b>ther additions</b> ]1 <b>987:</b>		(1,25,5)	97 <b>(3</b> 4,225 puidiaries with the	 excention of	•	come currently. Pr		
						stated. For those	venra. Account	of fore
820,	,481,000	1738	urance subsidiarie	s, and Co.	s pro rata	statetti fret mose.	,	
ga., mach, & eq 1,826,	117,000 \$1.11	7.874,000 sha	re of the Hercolina	joint ventu:	res.	companies were	iransluted ut	current
gs., mach. & eq 1,826, nsportation eq 53, cellaneous 13,	117,000 \$1.11	17,874,000 sha 11,653,000 I 6,465,000 209	are of the Hercofina Investments in affil % or more, are acc	foint ventu: ialed compa ounled for o	res. Inles, owned on the equity	companies were thanke rates, excet tv. plant and equit	transluted at of that inventor oment, deprice	current ries, prop ution, go
820, s., mach. & eq 1,826, sportation eq 53, glaneous 13, kruction in	.117,000 \$1,11 ,268,000 3	17,874,000 aha 11,653,000 I 6,465,000 207	re of the Hercolina investments in affil	foint ventu- lated compa- ounted for o y-owned fin-	res. Inles, owned In the equity ance and in-	companies were thanke rates, except	transluted at of that inventur pment, deprici taxes are trans	current ( ries, prop ution, goo lated at h

General Notes

(a) Consolidated financial statements include the accounts of Co., all wholly-owned

net income includes Co.'s share of their met arcome.

All significant intercompany transactions are eliminated in consolidation.

(b) Translation of Foreign Currencies: As a result of adopting Statement of Financial Accounting Standard No. 32, Foreign Currency Translation. in 1981, for years ended Dec. 31, 1981 and thereafter balance sheet accounts of foreign companies are translated at current exchange rates. The resulting translation adjustment is included in stockholder's equity. Revenues, expenses, gains and losses for 1981 and years thereafter are translated at rates prevailing during the vest Foreign currency transaction and

depreciation, and amortization of goodwill) were translated at rates prevailing during the

year.

(c) Inventories: Inventories are stated at the lower of cost or market. Substantially all domestic inventories are valued on the last-infirst-out (LIFO) method, and foreign inventories are valued principally on the average cost method.

(d) Commitments and Contingent Liabili-ties:

Co, has certain operating leases, including office space, and transportation and data processing equipment, expiring at various dates. Rental expense relating to these leases

recent years, enter long-term debt on Line la; other accrued liabilities on Line lb; deferred income taxes on Line lc; and minority interest on Line ld of Worksheet 3c (page 18 of the Workbook). Other accrued liabilities may include such items as other deferred charges and pension liabilities. Add lines la through ld to get total long-term liability; enter results on Line le.

- 2. Find the net shareholders' equity on Moody's Comparative Consolidated Balance Sheet (see Exhibit 3-12). Record the value for the most recent year on Line 2.
- 3. For the most recent year, add Line 2e (total long-term liability) and Line 2 (net shareholders' equity) to get total capital. Record this value on Line 3.
- 4. For the most recent year, divide line le (total long-term liability) by Line 3 (total capital) to calculate the debt portion of total capital (debt ratio) for the firm. Enter the result on Line 4.

An example of this calculation using the sample firm data is shown in Exhibit 3-13.

Worksheet 3d on pages 19 and 20 of the Workbook is used to calculate the Fixed-Charge Coverage Ratio adjusted for the cost of the pollution control equipment. One of the data items needed in this calculation is the interest rate to be paid on the new long-term debt (for the pollution control equipment). One source for this information is <u>Moody's Bond Record</u>, which lists average yields by bond rating classification. The interest rate on the firm's most recent bond issue should be used to determine the interest rate. If bond interest rates for the firm are not available, assume the interest rate to be three points above the current U.S. Treasury Bill rate. The adjusted Fixed-Charge Coverage Ratio calculation is done for the most recent of the three years evaluated. The steps in the calculation are as follows:

- 1. Subtract the investment tax credit factor from 1 and multiply this by the capital cost of the pollution control equipment to get the capital cost of pollution control adjusted for the investment tax credit. This adjusted capital cost can also be found on Line 2d of Worksheet lb. Enter this value on Line 1 of Worksheet 3d (page 19 of the Workbook).
- 2. Enter the debt ratio for the firm (from Worksheet 3c, Line 4) on Line 2a.
- 3. Multiply Line 1 (adjusted capital cost of pollution control) by Line 2a (debt ratio) to get the portion of the pollution control expenditure financed with debt. Enter the result on Line 2b.

Exhibit 3-13
WORKSHEET 3c
DEBT RATIO FOR FIRM
(\$1000)

#### Three Most Recent Years of Company Data Year <u>1981</u> Year 1982 Year 1980 431,919 1a. Long-Term Debt 454,356 334,530 1b. Other Accrued Liabilities 19,703 21,667 23,638 1c. Deferred Income Taxes 119,254 134,447 116,700 **Id.** Minority Interest --------1e. Total Long-Term Liability Line (1a) + Line (1b) + Line (1c) + Line (1d) 570,876 610,470 474,888 Net Shareholders' Equity 2. 1,078,911 3. Total Capital Line (le) + Line (2) 1,649,787 Debt Ratio 4. Line (le) divided by Line (3) 0.35

- 4. Enter the interest rate charged on new debt on Line 3.
- 5. Multiply Line 2b (portion of pollution control expenditure financed with debt) by Line 3 (interest rate) to get interest expense before taxes. Enter the result on Line 4.
- 6. Divide Line 2b (portion of pollution control expenditure financed with debt) by 5 (assuming a five-year debt retirement) to get the additional principal payments for pollution control. Enter result on Line 5.
- 7. Enter total fixed charges from Line 3 of Worksheet 3b on Line 6.
- 8. Add Line 4 (interest expense), Line 5 (additional principal payments), and Line 6 (total fixed charges) to get adjusted fixed charges. Enter the result on Line 7.
- 9. Enter cash earnings before interest and taxes (EBIT) from Line 5 of Worksheet 3a on Line 8.
- 10. Enter annual O&M expenditures associated with the pollution control equipment on Line 9.
- 11. Subtract Line 9 (annual O&M expenditures) from Line 8 (EBIT) to get adjusted cash earnings before interest and taxes. Enter result on Line 10.
- 12. Divide Line 10 (adjusted EBIT) by Line 7 (adjusted fixed charges) to get the Fixed-Charge Coverage Ratio adjusted for the cost of pollution control. Enter the result on Line 11 (page 19 of the Workbook) and on Worksheet 15 (page 58 of the Workbook).
- 13. Compare the adjusted Fixed-Charge Coverage Ratio with the following critical ratios:

> 2.0 - firm is solvent

1.5 - 2.0 - grey area - solvency
of firm is uncertain
< 1.5 - firm is insolvent

Record the evaluation on Summary Line. 1 (page 20 of the Workbook) and on Worksheet 15 (page 58 of the Workbook). An example evaluation is:

"Fixed-Charge Coverage Ratio adjusted for pollution control cost is between 1.5 and 2.0. This ratio is in the grey area."

An example calculation of the Fixed-Charge Coverage Ratio (adjusted for the cost of pollution control) using the sample firm data is shown in Exhibit 3-14.

#### Exhibit 3-14

#### WORKSHEET 3d

### FIXED-CHARGE COVERAGE RATIO ADJUSTED FOR COST OF POLLUTION CONTROL (\$1000)

		Most Recent Year of Company Data Year 1982
1.	Adjusted Capital Cost of Pollution Control Worksheet 1b, Line 2d	<b>8,500</b> .
2a.	Debt Ratio Worksheet 3c, Line 4	0.35
25.	Portion of Expenditure Financed with Debt Line (1) x Line (2a)	2,975
3.	Interest Rate on New Debt	0.14
4.	<pre>Interest Expense (before tax) Line (2b) x Line (3)</pre>	416.5
5.	Additional Principal Payments Line (2b) divided by 5	595 .
6.	Total Fixed Charges Worksheet 3b, Line 3	50,707
7.	Adjusted Fixed Charges Line (4) + Line (5) + Line (6)	51,718.5
8.	Cash Earnings Before Interest and Taxes (EBIT) Worksheet 3a, Line 5	<b>279,653</b>
9.	Annual O&M Expenditures	1,000
10.	Adjusted EBIT Line (8) - Line (9)	278,653
11.	Adjusted Fixed-Charge Coverage Ratio Line (10) divided by Line (7)	5.39

# Exhibit 3-14 (continued) WORKSHEET 3d (continued)

#### SUMMARY

1.	<ol> <li>Evaluation of Fixed-Charge Coverage Ratio ag</li> </ol>	painst critical values:
	Firm appears solvent, but some data are miss	ing from original Fixed
	Charge Coverage Ratio, which may be too high	as a result.

#### Interpretation

Three analyses are used to evaluate the Fixed-Charge Coverage Ratio. These are:

- 1. critical values:
- 2. three-year trend: and
- 3. adjusted ratio.

These analyses are described below. The results should be entered on Worksheets 14 and 15 on pages 57 and 58 of the Workbook. Examples are presented in Chapter 5.

Critical values for the Fixed-Charge Coverage Ratio were developed from a statistical study of a small sample of firms (Putnam, Hayes & Bartlett, Inc., Testing a Firm's Ability To Pay, prepared for the Economic Analysis Division, Office of Planning and Evaluation, U. S. EPA, February 9, 1981). Firms with Fixed-Charge Coverage Ratios greater than 2.0 are classified as solvent. Firms with ratios between 1.5 and 2.0 are considered to be in the grey area where the solvency of the firm is uncertain. Firms with a Fixed-Charge Coverage Ratio less than 1.5 are considered to be insolvent.

The three-year trend for the firm indicates whether the firm's Fixed-Charge Coverage Ratio has increased, decreased, or remained the same. If the ratio has been steadily declining there could be some concern over the firm's solvency. On the other hand, if the ratio is in the grey area but is increasing towards 2.0 the firm's condition is probably improving.

The adjusted ratio indicates the effect of pollution control expenditures on the firm's Fixed-Charge Coverage Ratio. If the adjusted ratio is greater than 2.0 the firm should be able to afford the pollution controls without difficulty. If the adjusted ratio is less than 1.5, the pollution controls can be expected to cause solvency problems for the firm. Between 1.5 and 2.0 the adjusted ratio is in a grey area.

These three analyses can produce conflicting results. Two combinations of results can be interpreted as indications that the firm may encounter solvency problems. These are:

1) The Fixed-Charge Coverage Ratio is greater than 2.0 or between 2.0 and 1.5 and the adjusted ratio is less than 1.5;

2) The Fixed-Charge Coverage Ratio and the adjusted ratio are both between 2.0 and 1.5 and the three-year trend is declining.

#### 3.2.2.2 Beaver's Ratio

#### Theory

This test, developed by William H. Beaver, is designed to assess the short-term solvency of a firm. A study by Beaver published in 1967 indicated that this ratio was the single best predictor of bankruptcy up to two years prior to failure when judged against other individual ratios or combinations of ratios. However, it should be noted that the recent literature has been critical of Beaver's results. In addition to indicating likelihood of bankruptcy, Beaver's Ratio indicates the extent of a decrease in earnings that a firm can endure without defaulting on its fixed financial obligations.

Beaver's Ratio involves calculating the ratio of internally generated cash flow to total debt. Internally generated cash flow is defined as net income after taxes plus depreciation. Internally generated cash flow would also normally include other non-cash expenses such as deferred taxes. In order to be consistent with Beaver's study, however, non-cash expenses other than depreciation are not included. Total debt is defined as the sum of current liabilities and long-term debt. Beaver's Ratio is expressed as:

 $BR = \frac{CF}{TD}$ 

where: BR = Beaver's Ratio

CF = Cash flow TD = Total debt

#### Calculation

The Calculation of Beaver's Ratio without pollution control costs uses data from Moody's Comparative Consolidated Income Account and Comparative Consolidated Balance Sheet (Exhibit 3-15). The calculation is done using Worksheet 4a on page 24 of the Workbook. It is performed for the three most recent years and the steps are as follows:

 Find net income after taxes on the line labelled "Net income" in Moody's Comparative Consolidated Income Account. Enter values for the three most recent years on Line 1 of Worksheet 4a (page 24 of the Workbook).

Lilla Edel, Sweden

40% interest. J Taiwanese investing groups hold the remaining 60% in the joint venture. In Apr. 1973 Company and Mexican investment interests formed Petrocel, S.A. C 40% shareholder and the Mexican owned 61%, Petrocel has built a mul DATA dollar plant at Altamira, Tamaulipaa, for the production of 11Mf (dimethy) terephthalate) and TPA (terephthalic acid), both products are used in the manufacture of polyester film and polyester filter. Plant has a combined production capacity of 24,000 netric tons. In 1977 contributed interest to Hercofina joint venture.

In Feb. 1974 Company and a U.S. affiliate of Mortetison S.D.A. (Milan, Italy) formed Adria Laboratories Inc. Adria will perform the clinical testing leading up to U.S. Foud & Drug Administration approval for druss already developed and licing sold in Europe by Montedison's pharmaceutical affiliates. In Oct. 1977 Adria Laboratories, Inc. acquired Warren-Text Pharmaceuticals, Inc.
On Aug. Jl., 1976, Co. and American Petrofina. Inc. formed two joint ventures, Hercofina and Hercofina Europe, for production and marketing of terephthalates. Co. sold to American Petrofina elects to invest additional money for capital expansion.

On Jan. 1, 1978 I lavge floustries. Inc., aubaidiary, and Phillips Products Co. subsidiary of Phillips Peroleum Co. formed a Joint venture to develop chemical means of increasing oil recovery from reservoirs that afready have been tapped, called Custom Oil Recovery Technology Co.

In May 1979 Co. and American Petrofina long, announced that Hercofina sold its methanol plant in Plaquemine, La. to International Minerals & Chemical Co., to make agricultural chemical in North America.

In May 1979, Co. and Solvay Et Cie, of Brussela, Belgium formed two Joint venture partnerships, Lexar in North America and in Lurope, to commercial quantities of these synthetic pulps will be manufactured at a Solvay plant in Rosignano, 1 north America and in Lurope, to commercial guantities of these synthetic pulps will be menufactured in Deer Park, Tex. for produc

manufac France. Exhibit 3-15 in Grenoble, should a Exhibit 3-15 in Grenoble, should a Exhibit 3-15 in Grenoble, should a Exhibit 3-15 in Grenoble, should be

DATA FROM MOODY'S - BEAVER'S RATIO

ucts through industry segments listed below: PLASTICS
Polypropylene Resin
Polypropylene Film
Polypropylene Fiher
Other Plastic Products

WATER SOLUBLE PRODUCTS
Polymers, Gum and Coatings
Flavors & Fragrances
Water Management Chemicals

**ORGANICS** Elastomers & Specialty Chemicals Paper Chemicals

EXPLOSIVES AND AEROSPACE Explosives

Aerospace Graphite Fibers

OTHER PRODUCTS
Terephthalates
Graphic Systems
Recording Products
Synpulp

PRINCIPAL PLANTS & PROPERTIES

PLASTICS
Middletown, Del.
Oxford, Ga.
Marshallton, Del.
Terre Haute, Ind.
Winooski, Vt. Bayport, Tex.
Union, Mo.
Calhoun, Ga.
Covington, Va.
Lake Charles, La.
International:
Beringen, Belgium
Brantham, Eng.

Varennes, Canada

WATER-SOLUBLE PRODUCTS
Brunswick, Ga.
Harbor Beach, Mich.
Hopewell, Va.
Louisiana, Mo.
International:
Sao Paulo, Brazil
Grossenbrode,
Germany

Grossenbrode, Germany Lille Skensved,

Bergamo, Italy Amersfoort, Netherlands Zwijndrecht, Netherlands Denmark Perivale, lingland Alizay, France Bremen, Germany Tarragona, Spain Sandarne, Sweden

ORGANICS
L. Hattiesburg, Misa,
Kalamazoo, Mich,
Louisiana, Mo.,
Milwaukee, Wisc.
Portland, Ore.
Savannah, Ga.
West Elizabeth, Pa. Baton Rouge, La. Brunswick, Ga. Burlington, N.J. Chicopee, Mass. Franklin, Va. Gibbatown, N.J.

International: Traun, Austria Sao Paulo, Brazil Burlington, Canada

St. Jean, Canada Pendlebury, England Beringen, Belgium

Tampere, Finland Voreppe, France Sobernheim, Germany Busnago, Italy Middelburg, Netherlanda Zwijndrecht. Netherlands

EXPLOSIVE AND AEROSPACE emer. Ala.
Louisiana, Mo.
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Louisiana, Mo.
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eming, Mich.
Aenvil, NJ. OTHER PRODUCTS
Tex. Pulaski, Va.
Del. Wilmington, N.C. Deer Park, Ter. Middleton, Del. International: St. Jean, Canada

MANAGEMENT

Officers
A.F. Giacco, Chmn., Pres. & Chief Exec. Off. Divisional Vice-Presidents
E.D. Crittenden
A.B. Engebretsen, Treasurer
R.J. Leahy

Vice-Presidents
K.A. Wagner
orth
H.A. Schuwengerdt
R.O. Watson F.L. Buckner D.S. Hollingsworth L.G. Maury

S.M. Turk, Vice-Pres. & Gen. Counsel R.R.P. Morrow, Secretary G. MacKenzie, Controller D.F. Desmond, Asst. Treas. A.L. Searl, Ass't Treas. C.W.K. Gamble, Ass't Controller P.M. Kendall, Asst. Controller Directors

(Showing Principal Corporate Affiliations) Alexander F. Glacco, Chmn., Pres. and Chief Exec. Off.; Hercules Inc.

Eugene D. Crittenden, Jr., Divisional Vice-Pres., Hercules, Inc.

Stuart E. Eizenstei, Partner, Powell, Goldstein, Frazer & Murphy, Atlants law firm.

Arden B. Engebretsen, Divisional Vice-Pres.
and Treas., Hercules, Inc.

David S. Hollingsworth, Vice-Pres., Hercules, Inc.

Robert J. Leahy, Divisional Vice-Pres., Hercules Inc. Guy T. McBride, Jr., Pres., Colorado School of Mines.

Arthur G. Nielsen, Jr., Chairman and Chief Executive Off., A.C. Nielsen Co. John R. Petty, President and Chief Exec, Off... Marine Midland Bank, N.A. and President, Marine Midland Banks, Inc.

General Counsel: S.M. Turk Director of Purchasing: E.J. Sheehy. Auditors: Coopers & Lybrand.

Shareholder Relations: W.W. Bewley, Jr., Director Investor Relations Tel: 1(800)441-9274, Directors Meetings: Last Wednesday of each

Annual Meeting: Fourth Tuesday in March. No. of Stockholders: Dec. 31, 1982, 35,390. No. of Employees: Dec. 31, 1982, 21,598. General Office: Hercules Plasa, Wilmington, DE 19899, Tel.: (302)594-5000.

INCOME ACCOUNTS

COMPARATIVE CONSOLIDATED INCOME ACCOUNT YEARS ENDED DEC. JI
(Taken from reports filed with Securities and Exchange Commission)

•	-	(in thousand	is of dollars)		•		
Net sales & oner, revenues	1962 2,468,97 t 2,040,968 314,105	1981 2,718,366 2,198,111 308,599	1980 2,485,226 2,038,806 291,519	1979 2,345,425 1,853,120 280,786	1978 1,946,477 1,302,181 258,140	1977 1,697,787 1,346,819 226,964	1974 1,595,956 1,224,884 209,032
Operating profit Gain on sale of assets	11J,698 20,597	· 211.656	154,901 dr2,807	211,519 50,166 8,543	186,156	124,004 dr489	160,040 \$6,780 2,997
Total income Interest & dels expense Equity in net earn, affil, cos.	134.295 50,707 23,517	227.117 46.673 7,099	152,094 37,356 22,623	270,228 31,840 20,566	189,067 31,322 20,610	123,515 32,273 14,837	219,817 31,495 12,609
Inc. bef. prov. for income taxes  GU.S. & fgn. inc. tax curr. pay. Deferred U.S. & fgn. income taxes  State income taxes Invest. tax credit. Inc. bef. extra. gain.  (Extraordinary gain.	107.105 21,024 9,193 27524 9,449 86,861 11,553	187,543 76,060 cr13,930 cr482 10,566 136,481	137,361 19,969 17,756 3,659 18,023 114,000	258.954 38,864 28,718 6,139 7,300 172,533	177,755 53,676 21,466 4,632 5,283 103,264	106,079 41,242 13,033 3,309 9,435 57,930	200,931 67,444 27,565 2,103 2,962 106,801
Net Income Retained carns, begins or year Common divi lends	98,414 981,167 56,874	130,481 53,567	(1)114,000 50,915	[2]172,533 708,217 45,562	(103,264 . 647,336 42,383	(\$7,930 631,789 42,383	\$104,801 \$60,975 35,987
Retained earns, end of year	1,022,727	981,187	898,273	835,188	708,21*	647,336	031,789

■Includes research expenses: 1982, \$70,697,000; 1981, 861,610,000; 1980, 833,462,000; 1979, 846,701,000; 1978, 840,081,000; 1977, 817,361,000; 1976 \$35,389,000.

[5]Nontaxable gain from exchange of 2,038,154 earen of common stock for \$50,000,000 principal amount of 61/3% convertible autendinated delien-

©Prior to application of investment tax credit share) and \$12.2 million (\$0.27 per share), respective-1992, \$9,449,000; 1991, \$10,566,000; 1990, \$18,023,000; ly. 1979, 87,300,000; 1978, \$5,283,000; 1977, \$9,435,000; 1976, \$2,982,000.

17.7 million (\$0,39 per facilities. fourth quarters of 19

(3)1981 includes \$12.3 million (\$0.27 per share) rite down of facilities and investments; 1978 in-Mincludes gain on sale of terephthalate assets cludes \$4.9 million (\$0.11 per share) and 1977 in-and Herrsica, California, plant in the third and cludes \$6.2 million (\$0.14 per share) write-down of

[7] 979 includes \$28.0 million (	(20,62 per	ah.) gair ု	Exhibit	3-15	(continu	ued)	Reduction	ons	(199,684)	(150,4
(1980 includes \$5.8 million arge for termination of operation	n (\$0.13	per sh.	•			1,189	<b>,-4</b>	t. in notes	(22,437)	96,
e terephthalate plant at Middlei Consolidated Statement of C	prit.	DATA	FROM M	100DY'S	- BEAVE	ER'S RAT	יי סדי	of com. atk. for	(15,125) debt:	(75.2
i Footion (in thousands); Funds Provided From Operation				•	135,950	134,846	Incr. in c	ap. accts	38,845	
	982		Increase in in		42,978	14,754		linary gain	11,55,1	••••
bef. extraord.	• • • •		Net chge, in w		(109,217)	70,689	Cash div	idends	(50,874)	(5J.5
gain		\$136,481 118,839	(ap	•			Net	lin. trans	(44,038)	(11,9
, taxes on inc (15,11		15,092			69,711	220,289	Chkes. in	lgn. curr.		(41)
. in net inc. of affil, cua. in excess of #			Net ids. p	rov. le.				· •di	(\$4,664)	(44,9
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itedown of facil 3,5	<u> </u>	J,880 (	rinancing 2 Chge, in igtr	Transactions L. debt:	14	•		iṇcr. (decr.)		
182,7	727-		New borrowir		177,247	247,270	in	fds	6,606	(9.1
Record of Earnings, years on	nded Dec	.31 (in the	ousands of c	ioliara):	•	_		_		
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	499,041 502,348	77,04 76,30	14 <b>o</b>	895 7J i	76,149 82,033	38,382 35,986	1137,767	18,523 19.121	J8,703,611 J9,395,937	(1) (1) (2)
1966 661,319 3	560,023 579,956	101,29	X6 J.∙	156 1	04.752	48,766	55,986	21,372	40,247,710	1.,
1967 670,292 5 1968 751,055	379,930 642,915	90,J3 106,14	16 dt. 10 dt.	123 1	89,323 01.717	40,309 46,117	49,014 55,600	23.567 23.753	40,4#3,104 40,856,052	l. 1.
1969 779.687 (	681,611 724,027	98,07 106,73	6 dil.	26 <del>9</del>	86,807 97,746	39,675 45,159	47,132	23,741 23,642	41,054,192 40,753,376	Į,
197t <b>848.444</b> 7	743.096	105,34	18 d9.1	<b>826</b>	95.522	41,986	\$2,587 153,536	23,812	40,956,636	ooi!
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74 1,525,489 1,	992,203 ,155,316 ,135,932	170.17	3 425.	574 i	57,641 44,599	52.575	92,024	3J,426	41.812.649	2
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After special items: 1971, crs pooling of interests. Thestate	1,289,000	1965, cr82	900,000, 1964,	dr\$3,615,64	2. DBefore ap	ocial items; a	ter: 1971.	\$1.41; 1965, \$1.1i	6; 1964, <b>8</b> 0.95.	Bles Lake
	ad tot aret		e Matteriti vec-	hambhill 1106					seer abiti caba.	, , , , , ,
LANCE SHEETS	COMP	DATIVE	CONSOL	IDATED	BALANCE	SHEET.	SOPD	EC U		
					contres And					
			· /1-	L.						
ASSETS		,	1982	1981	is of dollar: 1980 28,947	a) 1	979	1978 47.871	1977 26.538	12
h & time deposits			1982 8,855 5,307	1981 25,700 856	1980 28,947 7,758	.52,	979 793 332	47,871 10,058	26,53 <b>8</b> 2,524	
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h & time deposits		78 21 22 2,07	1982 18,855 5,307 10,524 8,288 22,974 4,391 960 11,933 9,668	1981 26,700 856 419,747 406,907 854,210 168,001 8,524 4,809	1980 28,947 7,758 417,802 337,216 791,723 152,385 8,962 5,904	3) 3, 52, 3 407, 321, 784, 137, 2, 6, 1,703, 930,	979 793 532 071 089 485 087 472 266 481 592	47.871 10.056 332,347 316,779 707.055 107,780 2,463 9,522 1,615,368 901,082	26,538 2,524 273,102 297,330 590,494 88,273 856 9,147 1,537,050 815,758	26 26 36 36 36 20 21 1,43 73
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a & time deposits  Gov. & other securities, cost.  clove & accounts receivable, net  vestories, net  Total current assets in affiliated cus.  ances to affiliates  re investments  operty, plant & equipment  set Depreciation reserves  Net property account  dwilf  ared charges, stc.		78 36 78 21 22,07 1,15 92	1982 1982 1983 1997 1990 1990 1990 1990 1993 1994 1995	1981 26,700 856 419,747 406,907 854,210 168,001 8,524 4,809 2,018,586 i,110,853 1,167 52,700	1980 28,947 7,758 417,902 337,216 791,723 152,385 8,962 5,904 1,882,348 1,009,692 872,656 4,197 \$3,852	3) 3, 52, 33, 407, 321, 784, 137, 26, 1,703, 930, 772, 5, 52, 52, 52, 52, 52, 52, 52, 52, 52	979 793 532 071 089 -485 087 472 266 481 266 481 592 -889 517	47.871 10.058 3J2,347 316,779 707.055 107,780 2,463 9,522 1,615,368 901,082 714,286 6,292 49,200	26.538 2.524 273,102 297,330 599.494 88,273 856 9,147 1,537,050 815,758 721,292 8,267 50,214	26 26 36 7 1,43 73
A time deposits  Gov. & other securities, cost.  Gov. & other securities, cost.  oten & accounts receivable, net  vestories, net  Total current assets  in affiliated cos.  ances to affiliates  re investments  operty, plant & equipment  me: Depreciation reserves  Net property account  dwill  ared charges, etc.  Total  LIABILITIES		38 36 78 21 2,07 1,15 92 3	1982 8,855 5,307 0,324 4,288 12,974 4,391 960 11,933 9,668 5,592 3,676 1,821 1,334	1981 26,700 856 419,747 406,907 854,210 168,001 8,524 4,809 2,018,386 1,110,853 907,733 1,167 52,700	1980 28,947 7,738 417,802 337,7216 791,723 152,385 8,962 1,882,348 1,009,692 872,656 4,197 53,852	3) 3, 52, 3 407, 321, 784, 137, 2 2, 6, 1,703, 930, 772, 5, 52, 1,761, 1	979 793 332 071 089 485 087 472 266 481 392 889 517 461	47.871 10.058 332,347 316,779 707.055 107,780 2,463 9,522 1,615,368 901,062 714,286 6,292 49,200	26.538 2.524 273,102 297,330 399,404 88,273 856 9,147 1,537,050 815,758 721,202 8,267 50,214	26 26 36 7 1,43 73 69 3
a & time deposits  Govl. & other securities, cost.  Govl. & other securities, cost.  otan & accounts receivable, net  vestories, net  Total current assets  in affiliated cos.  ances to affiliates  rr investments  operty, plant & equipment  se: Depreciation reserves  Net property account  dwilf  sred charges, stc.  Total  LJABILITIES  so payable		38 78 78 78 78 78 78 79 70 71,15 92 3 72,00	1982 28.855 3,307 40,524 4,391 960 960 960 1,933 9,668 5,592 13,676 13,21 13,5399	1981 26,700 856 419,747 406,907 854,210 168,001 8,524 4,809 2,018,586 i,110,853 907,733 1,167 52,700 1,997,144 73,068	1980 28,947 7,758 417,802 337,216 791,723 152,385 8,962 5,904 1,882,348 1,009,692 872,656 4,197 53,852	3) 1 . 52. 3 . 407 . 52. 1 . 784 . 137. 2	979 793 532 071 089 485 687 472 206 481 481 592 889 889 517 461	47.871 10.036 3J2.347 316,779 707.035 107,780 2,463 901,082 714,286 6,292 49,200 1,396,598 50,382	26.5.38 2.5.24 273,102 297,330 599,494 88,273 856 9,147 1,537,050 815,738 721,292 8,267 50,214 1,477,543 72,100	26 26 26 7, 1,43 7,3 69
a & time deposits  Gov. & other securities, cost.  Gov. & other securities, cost.  oten & accounts receivable, net  vestories, net  Total current assets  in affiliated cus.  ances to affiliates  re investments  operty, plant & equipment  se: Depreciation reserves  Net property account  dwill  gred charges, etc.  Total  LIABILITIES  sp payable  sunts payable  (or. & state inc. taxes		78 21 22 2,07 1,15 92 3 2,00 5 16	1982 1982 1983 1984 1991 1991 1993 1994 1995	1981 26,700 856 419,747 406,907 854,210 168,001 8,524 4,809 2,018,586 i,110,853 907,733 1,167 52,700 73,068 151,047 14,314	1980 28,947 7,758 417,902 337,7216 791,723 152,385 8,962 5,904 1,882,348 1,009,692 872,656 4,197 53,852 1,889,679	3) 1 . 52, 3 . 407, 321, 784, 137, 2, 6, 1,701, 930, 772, 5, 52, 1,761, 86, 166, 88, 88, 88, 88, 88, 88, 88, 88, 88,	979 793 532 532 671 689 485 697 4472 266 481 592 686 1177 268 657 539	47.871 10.036 3J2,347 316,779 707,035 107,780 2,463 9,522 1,615,368 901,082 714,286 6,292 49,200 1,596,598 50,382 126,817 107,567	26.5.38 27.524 273.102 297.330 599.494 88,273 856 9.147 1,537,050 815,758 72,105 92,759 21,506	26 26 26 26 27 2 1,43 69 3 1,43
a k time deposits Govt. & other securities, cost. otes & accounts receivable, net vestories, net vestories, net vestories, net vestories, net vestories, net vestories, net in affiliates re investments operty, plant & equipment se: Depreciation reserves Net property account dwill rred charges, etc. Total LIABILITIES spayable units payable (or, & state inc. taxes		78 21 22 2,07 1,15 92 3 2,00 5 16	1982 8,855 5,307 10,524 4,328 12,974 4,391 960 11,933 9,668 1,821 15,599 11,J54 71,943	1981 26,700 856 406,907 854,210 168,001 8,524 4,809 2,018,586 1,110,853 907,733 1,167 52,700 1,997,144 73,068 151,047	1980 28,947 7,738 417,802 337,7216 791,723 152,348 8,962 5,904 1,882,348 1,009,092 872,656 4,197 53,852 1,889,679	3) 1 . 52, 3 . 407, 321, 784, 137, 2, 6, 1,701, 930, 772, 5, 52, 1,761, 86, 166, 88, 88, 88, 88, 88, 88, 88, 88, 88,	979 773 532 571 089 485 097 447 2464 481 592	47.871 10.036 3J2,347 316,779 707,035 107,780 2,463 9,522 1,615,368 901,082 714,286 6,292 49,200 1,596,598 50,382 126,817 107,567 89,634	26.5.38 2,5.24 27,102 297,330 590,494 85,273 85,273 856 9,147 1,537,050 815,758 721,292 8,267 50,214 1,477,543 72,100 99,759	26 26 26 26 27 2 1,43 69 3
A time deposits Gov. & other securities, cost. otes & accounts receivable, net vestories, net vestories, net vestories, net vestories, net vestories, net vestories, net vestories, net in affiliated cos. spress to affiliates re rinvestments operty, plant & equipment es: Depreciation reserves Net property account devil sred charges, stc.  Total LIABILITIES spayable ior & state inc. taxes ued expenses Total current l'abilities		38 78 21 2,07 1,15 92 3 2,00 3 16 4 8	1982 8,855 5,307 10,524 4,245 12,974 4,391 960 11,933 9,648 15,992 13,676 1,821 1,821 1,324 17,943 11,236 17,943	1981 26,700 856 419,747 406,907 854,210 168,001 8,524 4,809 2,018,586 i,110,853 907,733 1,167 52,700 7,997,144 73,068 151,047 14,114 96,688	1980 28,947 7,738 417,802 337,216 791,723 152,385 8,962 5,904 1,009,692 872,656 4,197 53,852 1,889,679 148,311 155,294 42,220 61,240	752. 3407. 321. 784. 137. 2. 6. 1,703. 930. 772. 5. 2. 1,761. 86. 166. 84. 405.	979 773 532 532 671 689 445 445 448 481 592 889 889 1177 461 1177 268 657 529 6618	47.871 10.036 3J2,347 316,779 707,035 107,780 2,463 9,522 1,615,368 901,082 714,286 6,292 49,200 1,596,598 50,382 126,817 107,567 89,634	26.5.38 2.5.24 27.1.102 297.330 599.494 88,273 88,273 88,273 8,267 15,37,050 815,738 721,202 8.267 50,214 1,477,543 72,100 99,759 27,566 72,548 271,973	1 20 20 20 20 20 20 20 20 20 20 20 20 20
a & time deposits  Gov. & other securities, cost.  Gov. & other securities, cost.  oten & accounts receivable, net  vestories, net  Total current assets  operty, plant & equipment  se: Depreciation reserves  Net property account  dwill  arred charges, stc.  Total  LIABILITIES  se payable  units payable  u		38 78 21 2,07 1,15 92 3 2,00 3 16 4 8	1982 8,855 5,307 10,524 4,245 12,974 4,391 960 11,933 9,648 15,992 13,676 1,821 1,821 1,324 17,943 11,236 17,943	1981 26,700 856 419,747 406,907 854,210 168,001 8,524 4,809 2,018,586 i,110,853 907,733 1,167 52,700 7,997,144 73,068 151,047 14,114 96,688	1980 28,947 7,738 417,802 337,216 791,723 152,385 8,962 5,904 1,822,348 1,009,692 872,656 4,197 53,852 1,889,679 148,311 153,294 42,220 61,240	72, 321, 784, 137, 2, 1,701, 930, 772, 5, 5, 52, 1,761, 86, 166, 88, 83,	979 979 352 371 352 371 089 485 087 472 266 481 592	47.871 10.058 3J2.347 316,779 707.055 107,780 2,463 901,082 714,286 6,292 49,200 1,596,598 50,382 126,817 107,567 89,634 374,400 205,969 80,201	26.5.38 21.524 273.102 297.330 599.494 88,273 856 9.147 1,537,050 815,758 72,100 99,759 27,566 72,548 271,973 329,443 89,011	36 26 26 56 7 2 1,43 69 3 1,43 4 4 4 25 32 7
a & time deposits  Gov. & other securities, cost.  Gov. & other securities, cost.  oten & accounts receivable, net  vestories, net  Total current assets in affiliated cos. ances to affiliates er investments operty, plant & equipment less: Depreciation reserves  Net property account dwill arred charges, etc.  Total  LIABILITIES spayable ounts payable , for. & state inc. taxes rued expenses  Total current liabilities  Sterm of the state inc.  Total current liabilities  Total current liabilities  Total current liabilities  Total current liabilities  Total current liabilities  Total current liabilities  Total current liabilities  Total current liabilities		38 78 21 2,07 1,15 92 3,00 \$ 16 4 4 8	1982 28,855 5,307 10,524 4,391 4,391 10,507 11,933 10,626 1,821 1,821 1,1226 1,1226 1,1226 1,1226 1,123	1981 26,700 856 419,747 406,907 854,210 166,001 8,524 4,809 2,018,586 1,110,853 907,733 1,167 52,700 1,997,144 73,068 151,047 14,314 96,888 335,317 337,350	1980 28,947 7,738 417,802 337,7216 791,723 152,348 8,962 5,904 1,882,348 1,009,092 872,656 4,197 53,852 1,889,679 148,311 153,294 42,220 61,240	321. 784, 137, 22. 6, 1,701, 930, 772, 5, 52, 1,761, 86, 405, 280, 104, 25,	979 773 773 773 773 773 773 774 775 775 775 775 775 775 775 777 775 77	47.871 10.058 332.347 316,779 707.055 107,780 2,463 9,522 1,615,368 901,062 714,286 6,292 49,200 11,596,598 \$0,382 126,817 107,567 89,634 374,400 295,969 80,201 27,577	26.5.38 2,5.24 27,102 297,330 590,404 85,273 85,273 856 9,147 1,537,050 815,758 721,202 8,267 50,214 1,477,543 72,100 99,750 27,506 72,548 27,1,973 329,443 89,011 29,546	1, 25 2, 25 1,43 2, 25 1,43 2, 25 2, 25 3, 27 3, 3
a & time deposits  Gov. & other securities, cost.  Gov. & other securities, cost.  oten & accounts receivable, net  vestories, net  Total current assets in affiliated cos. ances to affiliates er investments operty, plant & equipment less: Depreciation reserves  Net property account  dwilf arred charges, stc.  Total  LIABILITIES es payable ounts payable (or. & state inc. taxes rued expenses  Total current liabilities  sterm cov  rich fign. income taxes  rich given in sock  dien income taxes  sterm cov		38 78 21 2,07 1,15 92 3,00 3,16 4 8 3,5	1982 8,855 5,307 40,524 4,328 12,974 4,391 1960 11,933 9,668 5,592 13,676 1,821 1,226 2,910 9,488 11,236 11	1981 26,700 856 419,747 406,907 854,210 166,001 8,524 4,809 2,018,586 1,110,853 907,733 1,167 52,700 1,997,144 73,068 151,047 14,114 96,688 335,317 431,220 21,1467 22,146	1980 28,947 7,738 417,802 337,216 791,723 152,385 8,962 5,904 1,822,348 1,009,692 872,656 4,197 53,852 1,889,679 148,311 153,294 42,220 61,240	72. 784 137. 784 137. 2. 1,701. 930. 772. 5. 52. 1,761. 86, 166. 166. 168. 63. 405. 280. 104. 225. 280.	979 979 352 371 352 371 089 485 087 472 266 481 592	47.871 10.058 3J2.347 316,779 707.055 107,780 2,463 901,082 714,286 6,292 49,200 1,596,598 50,382 126,817 107,567 89,634 374,400 205,969 80,201	26.5.38 21.524 273.102 297.330 599.494 88,273 856 9.147 1,537,050 815,758 72,100 99,759 27,566 72,548 271,973 329,443 89,011	1. 26 266 266 27 22 22 24 24 24 24 24 24 24 24 24 24 24
a & time deposits  Gov. & other securities, cost.  Gov. & other securities, cost.  oten & accounts receivable, net  vestories, net  Total current assets in affiliated cos. ances to affiliates er investments operty, plant & equipment me: Depreciation reserves  Net property account  dwill gred charges, etc.  Total  LIABILITIES may payable  Sunts payable  Sunts payable  Sunts payable  Lor. & state inc. taxes  rused expenses  Total current liabilities grent U.S. & Ign. income taxes sion liability erred U.S. & Ign. income taxes sion liability errent surplus  annelation adjustment		38 36 78 21 2,07 1,15 92 5 2,00 3 16 4 8 3 3 11 12 2,07	1982 1982 1983 1983 1984 1980 1980 1983 1983 1984 1983 1984 1985	1981 26,700 856 419,747 406,907 854,210 168,001 8,524 4,809 2,018,586 1,110,853 907,733 1,167 52,700 1,997,144 96,688 335,317 39,139 134,447 21,647 22,146 472,690	1980 28,947 7,738 417,802 337,7216 791,723 152,345 8,962 1,882,348 1,009,692 872,656 4,197 53,852 1,889,879 148,311 153,294 42,220 61,240 405,055 306,050 116,700 22,638 22,638	3 . 52,	979 979 3532 552 971 089 465 087 472 266 481 552 266 618 072 268 057 618 072 273	47.871 10.058 3J2,347 316,779 707.055 107,780 2,463 901,082 1615,368 901,082 714,286 6,292 49,200 1,596,598 50,382 126,817 107,567 89,634 374,400 295,969 80,201 27,577 22,076 88,225	26.538 27.524 27.524 27.520 297.330 599.494 88,273 856 9.147 1,537.050 815.758 721.202 8.267 \$0.214 1,477.543 72.100 99,759 27.506 72.548 271,973 33.91.443 89,011 29.546 22.076 88,225	1 26 26 26 27 2 1.43 2 3 4 8 8 6 5 3 2 5 2 5 8 8 8
a & time deposits  Gov. & other securities, cost.  Gov. & other securities, cost.  oten & accounts receivable, net  vestories, net  Total current assets in affiliated cos. ances to affiliates er investments operty, plant & equipment me: Depreciation reserves  Net property account  dwill arred charges, etc.  Total  LIABILITIES as payable  Jor. & state inc. taxes  used expenses  Total current flebilities  riem of U.S. & fgn. income taxes ion flability mmon stock  las surplus annel total  annel to		38 78 21 2,07 1,15 92 3,00 \$ 16 4 8 35 11 12 21 22 217 21,02	1982 8,855 5,307 10,324 4,391 960 11,933 9,668 1,821 15,592 3,676 1,821 15,599 11,134 11,226 2,910 9,488 11,567 1,752 9,254 9,703 3,3,240 9,808 9,808 4,744 2,727	1981 26,700 856 419,747 406,907 854,210 166,001 8,524 4,809 2,018,586 1,110,853 907,733 1,167 52,700 1,997,144 96,688 335,317 21,467 22,146 991,187	1980 28,947 7,738 417,802 337,7216 791,723 152,348 8,002,948 1,002,948 1,002,948 4,197 53,852 1,889,879 148,311 153,294 42,220 61,240 405,065 505,005 116,700 21,638 22,111 89,482	3 . 52, 3 . 407, 3 . 321, 784, 137, 2, 1,701, 930, 772, 5, 52, 1,761, 86, 166, 88, 63, 405, 280, 104, 25, 22, 280, 104, 25, 22, 280, 104, 25, 25, 280,	979 979 3532 371 089 445 0087 472 266 441 3592 889 5517 461 177 268 057 657 667 607 607 607 2235	47.871 10.058 332,347 316,779 707.055 107,780 2,463 9,522 1,615,368 901,082 714,286 6,292 49,200 1,596,598 \$0,382 126,817 107,567 89,634 374,000 205,969 80,201 27,577 22,076 88,225 708,217	26.538 26.538 2.524 273,102 297,330 599,494 88,273 856 9,147 1,537,050 815,758 721,292 8,267 50,214 1,477,543 72,100 99,759 27,566 72,548 27,566 72,548 27,769 31,9443 89,011 29,546 22,976 88,225 647,336	1,43 26 26 26 26 2,43 3,73 69 5 1,43 8 8 8 6 6 25 27 7 3 2 2 3 4 4 4 4 4 6 6 6 6 6 6 7 7 7 8 8 8 8 8 8 8 8 8 8 8
a & time deposits  Gov. & other securities, cost.  Gov. & other securities, cost.  oten & accounts receivable, net  vestories, net  Total current assets  in affiliated cus.  ances to affiliates  re investments  operty, plant & equipment  se: Depreciation reserves  Net property account  dwill  arred charges, stc.  Total  LIABILITIES  so payable  sunts payable  sunts payable  unts payable  unts payable  unts payable  sunts p		38 78 21 2,07 1,15 92 3,00 \$ 16 4 8 35 11 12 21 22 217 21,02	1982 8,855 5,307 10,524 4,385 12,974 4,391 1960 11,933 9,668 15,599 11,334 1,226 2,910 19,488 11,567 19,254 11,567 19,254 11,567 19,254	1981 26,700 856 419,747 406,907 854,210 166,001 8,524 4,809 2,018,586 i,110,853 907,733 1,167 52,700 7,997,144 73,068 151,047 14,114 96,688 335,317 39,739 134,447 21,667 22,146 90,834 dri2,690 981,187	1980 28,947 7,738 417,802 337,216 791,723 152,385 8,962 5,904 1,009,692 872,656 4,197 53,852 1,889,679 148,311 153,294 42,220 61,240 405,065 30,005 16,700 21,638 22,111 89,482	3 . 52. 3 . 407 3 . 321. 784 137. 2 . 6. 1,703. 9,30, 772. 52. 1,761. 86. 166. 86. 106. 88. 108. 109.	979 979 3532 5512 671 689 445 6087 4472 2266 441 157 268 657 5529 6618	47.871 10.038 3J2,347 316,779 707.035 107,780 2,463 901,082 714,286 6,292 49,200 1,596,598 50,382 126,817 107,567 89,634 374,400 295,969 80,201 27,577 80,217 818,518	26.538 27.524 273,102 297,330 599,494 88,273 856 9,147 1,537,050 815,758 72,1050 99,759 27,506 72,506 72,506 72,548 271,973 329,443 89,011 29,546 22,076 88,225 647,336 757,637	1,43 26 26 26 26 2,43 3,73 69 5 1,43 8 8 8 6 6 25 27 7 3 2 2 3 4 4 4 4 4 6 6 6 6 6 6 7 7 7 8 8 8 8 8 8 8 8 8 8 8
a & time deposits  Gov. & other securities, cost.  Gov. & other securities, cost.  oten & accounts receivable, net  vestories, net  Total current easets  in affiliated cus.  ances to affiliates  re investments  operty, plant & equipment  se: Depreciation reserves  Net property account  dwill  gred charges, etc.  Total  LIABILITIES  se payable  sunts payable  sunts payable  jor. & state inc. taxes  used expenses  Total current liabilities  prent u.S. & ign. income taxes  ison liability  mmon stock  is surplus  ranslation adjustment  under arpings  Total stockholders' equity  ma: Treasury stock at cost.		38 78 21 2,07 1,15 92 3 2,00 3 16 4 8 33 11 12 12 17,07	1982 8,855 5,307 10,524 4,385 12,974 4,391 1960 11,933 9,668 15,599 11,334 1,226 1,321 1,324 1,357 1,7943 11,367 1,7943 11,367 1,7943 11,367 1,7943 11,367 1,7943 11,367 1,7943 11,367 1,7943 11,367 1,7943 1,367 1,7943 1,367 1,7943 1,367 1,7943 1,367 1,7943 1,367 1,794 1,	1981 26,700 856 419,747 406,907 854,210 166,001 8,524 4,809 2,018,586 i,110,853 907,733 1,167 52,700 1,997,144 73,068 151,047 14,114 96,688 335,317 22,1667 22,1667 22,1667 21,067 21,1667 21,	1980 28,947 7,738 417,802 337,216 791,723 152,385 8,962 5,904 1,82,348 1,009,692 872,656 4,197 53,852 1,889,879 148,311 153,294 42,220 61,240 405,065 394,395 116,700 23,638 22,111 89,482 498,273	3 . 52. 3 . 407 3 . 321. 784 . 137. 2 . 6 . 1,701. 9 . 30. 772. 5 . 52. 1,761. 86, 166. 68. 63. 405. 280. 104. 25. 280. 104. 25. 280. 105. 280. 106. 107. 107. 108. 109. 10	979 979 3532 552 971 089 485 087 4472 266 481 276 481 277 268 657 559 618 072 268 618 072 268 657 677	47.871 10.036 3J2,347 316,779 707,035 107,780 2,463 901,082 1,615,368 901,082 714,286 6,292 49,200 1,596,598 50,382 126,817 107,567 89,634 374,400 295,969 80,201 27,577 88,634 374,400 295,969 80,201 27,577 88,225 708,217	26.538 27.524 27.524 27.526 27.302 297.330 590.404 88,27.3 856 9.147 1,537.050 815.758 72.100 90.759 27.506 72.548 271,973 329.443 89,011 29.546 22.076 48,225 447,336 757,637 67	1, 25 26, 26 26, 27 2, 2, 3, 4, 3, 7, 3 49, 25 32, 25 32, 25 33, 27 34, 43, 44, 44, 44, 44, 44, 44, 44, 44,
a & time deposits  Gov. & other securities, cost.  Gov. & other securities, cost.  oten & accounts receivable, net  vestories, net  Total current ausets  in affiliated cus.  ances to affiliates  re investments  operty, plant & equipment  me: Depreciation reserves  Net property account  dwill  rese charges, etc.  Total  LIABILITIES  man payable  sunts payable  sunts payable  sunts payable  total current liabilities  frem of the control of the control  resed U.S. & Ign. income taxes  ion disbility  memon acock  in surplus  anniation adjustment  inced earnings  Total stockholders' equity  met Treasury stock at cost  Net stockholders' equity		38 78 21 2,07 1,15 92 5 2,00 \$ 16 4 8 35 11 11 12 2/79 1,07	1982 8.855 8.307 80.324 8.288	1981 26,700 856 419,747 406,907 854,210 168,001 8,524 4,809 2,018,586 1,110,853 907,733 1,167 52,700 1,997,144 96,688 131,047 14,114 96,688 335,317 22,146 90,834 471,290 911,187 1,051,477 120	1980 28,947 7,738 417,802 337,216 791,723 152,385 8,962 1,882,348 1,009,692 872,656 4,197 53,852 1,889,879 148,311 153,294 42,220 61,240 405,065 500,230 116,700 21,638 22,111 89,482 20,273 1,009,866	3 . 52, 3 . 407, 3 . 321, 784, 137, 2, 1,701, 930, 772, 52, 1,761, 86, 166, 63, 405, 280, 104, 225, 28, 835, 945,	979 979 3532 3512 3512 3512 3617 3689 4451 457 461 177 268 657 667 667 667 667 667 442 442	47.871 10.058 3J2,347 316,779 707.055 107,780 2,463 2,463 901,082 714,286 6,292 49,200 1,596,598 50,382 126,817 107,567 89,634 374,400 295,969 80,201 27,577 88,225 708,217 818,518 67	26.538 26.538 27.524 27.5102 297.330 596.404 88,273 856 9.147 1,537.050 815.758 72.1202 8.267 \$0,214 1,477.543 72.100 90,759 27.506 72.548 27.973 339.443 89.011 29.546 22.576 48,225 647,336 757,637 67	1. 26 26 26 26 26 27 2. 2. 2. 3. 4. 3. 3. 4. 4. 3. 4. 4. 4. 4. 4. 4. 4. 4. 4. 4. 4. 4. 4.
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a & time deposits  Gov. & other securities, cost.  Gov. & other securities, cost.  oten & accounts receivable, net  ventories, net  Total current ansets in affiliated cus. ances to affiliates  trinvestments operty, plant & equipment les: Depreciation reserves  Net property account  dwilf  rred charges, stc.  Total  LIABILITIES  spayable  Jor. & state inc. taxes  rusd expenses  Total current flebilities  sterm cut  ins upin payable  for & state inc. taxes  rusd expenses  Total current flebilities  sterm cut  Total stockholders' equity  man Treasury stock at cost  Net stockholders' equity  Total  Total stockholders' equity  Total  Current sasets  DPERTY ACCT —ANALYSIS		38 78 21 20,07 1,15 92 2,00 \$ 16 4 8 35 12 12 1,07 1,07 2,00 43	1982 8,855 5,307 10,524	1981 26,700 856 419,747 406,907 854,210 166,001 8,524 4,809 2,018,386 i,110,853 907,733 1,167 52,700 1,997,144 73,068 151,047 14,114 96,688 335,317 421,990 134,447 22,146 90,834 dri2,690 991,187 1,051,357 1,051,357	1980 28,947 7,738 417,802 337,216 791,723 152,385 8,962 5,904 1,009,692 872,656 4,197 53,852 1,889,879 148,311 153,294 42,220 61,240 405,065 22,111 89,482 29,482 20,483 1,009,866 120,746	3) 3, 52, 3, 407 3, 407 3, 21, 784 137, 2, 6, 6, 1, 703, 9, 30, 772, 5, 52, 1, 761, 86, 166, 86, 1, 66, 1,	979 979 373 532 532 671 689 485 687 4472 264 687 697 697 4481 1177 264 687 697 697 441 1177 441 1177 441 1177 441 1177	47.871 10.038 3J2.347 316,779 707.035 107,780 2,463 107,780 2,463 901,082 714,286 6,292 49,200 1,596,598 \$0,382 126,817 107,567 89,634 374,400 205,969 80,201 27,577 22,076 48,225 708,217 818,518 67 818,451 1,596,598 3J2,655	26.538 27.524 273,102 297,330 599,494 88,273 856 9,147 1,537,050 815,758 72,100 99,759 27,566 72,548 271,973 3,19,443 89,901 29,546 22,776 84,225 447,336 757,637 67	1, 25 26 26 26 26 21, 43 21, 43 21, 43 22, 7, 7, 3 22, 7, 3 24, 43 25, 32, 32 27, 7, 3 28, 43 29, 44, 45, 45, 45, 45, 45, 45, 45, 45, 45
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h & time deposits.  Govt & other securities, cost.  Govt & other securities, cost.  oten & accounts receivable, net  restal current sasets.  in affiliated cos.  ances to affiliates.  er investments  roperty, plant & equipment  see: Depreciation reserves.  Net property account  dwill  arred charges, etc.  Total  LIABILITIES  us payable  outs payable  outs payable  for & state inc. taxes  rused expenses  Total current liabilities  grient montifies  erred U.S. & Ign. income taxes  sion liability  ommon stock  -is surplus  reasilitation  Total stockholders' equity  man Treasury stock at cost  Net stockholders' equity  Total  Total  Current sasets  DERTY ACCT.—ANALYSIS  dditions at cost  DERTY ACCT.—ANALYSIS  dditions at cost  PREC. RESERVE—ANALYSIS  PREC. RESERVE—ANALYSIS		38 78 21 2,07 1,15 92 3 2,00 3 16 4 8 3 3 17 1,07 1,07 2,00 43 17 4	1982 8,855 5,307 19,524 4,391 4,391 1960 11,933 19,668 15,599 11,334 1,226 1,321 1,357 1,7943 1,357 1,7943	1981 26,700 856 419,747 406,907 854,210 146,001 8,524 4,809 2,018,586 i,110,853 907,733 1,167 52,700 1,997,144 73,068 151,047 14,114 96,688 335,317 22,146 90,834 dr42,690 981,187 1,051,477 120 1,051,477 1,051,477 1,051,477 1,051,477 1,051,477	1980 28,947 7,738 417,802 337,216 791,723 152,385 8,962 5,904 1,822,348 1,009,692 872,656 4,197 53,852 1,889,679 148,311 153,294 42,220 61,240 405,065 39,393 11,700 23,438 22,111 89,482 298,273 1,009,866 130 1,009,746 1,889,679 386,658 229,183 50,296	3, 52, 3, 407, 321, 784, 137, 2, 6, 1,701, 9,30, 772, 5, 52, 1,761, 86, 166, 68, 63, 63, 63, 63, 63, 64, 63, 64, 63, 64, 63, 64, 63, 64, 64, 64, 64, 64, 64, 64, 64, 64, 64	979 979 3532 552 971 089 485 6087 472 266 481 552 268 657 557 667 7074 667 7074 422 177 413	47.871 10.036 3J2,347 316,779 707.035 107,780 2,463 107,780 2,463 901,082 714,286 6,292 49,200 1,596,598 50,382 126,817 107,567 89,634 374,400 295,969 80,201 27,577 88,225 708,217 818,518 67 818,451 1,596,598 3J2,655 818,451 1,596,598 3J2,655 121,3J0 4J3,012	26.538 27.524 27.524 27.522 297.330 599.494 88,273 856 9.147 1,537.050 815.758 721.202 8.267 50.214 1,477.543 72.100 99.759 27.506 72.548 271,973 339.443 89.011 29.546 22.776 48,225 647,336 757,637 67 757,570 1,477,543 327,521 1,477,543 327,521 1,477,543 327,521 1,477,543 327,521	260 260 260 260 260 260 260 260 260 260
a & time deposits  Gov. & other securities, cost.  Gov. & other securities, cost.  oten & accounts receivable, net  vestories, net  Total current assets  in affiliated cus.  ances to affiliates  re investments  operty, plant & equipment  ser Depreciation reserves  Net property account  dwill  gred charges, etc.  Total  LIABILITIES  se payable  sunts payable  Total current liabilities  Total stockholders' equity  me: Treasury stock at cost  Net stockholders' equity  Total  current sassets  DPERTY ACCT —ANALYSIS  dditions at cost  ettirements or sales	<b>S</b>	38 78 21 20,07 1,15 92 2,00 \$ 16 4 8 35 21 21 21,07 1,07 2,00 43 27 44 44	1982 8.855 8.307 9.005 9	1981 26,700 856 419,747 406,907 854,210 166,001 8,524 4,809 2,018,586 1,110,853 907,733 1,167 52,700 1,997,144 73,068 151,047 14,314 96,888 335,317 22,146 90,834 dr42,690 981,187 1,051,357	1980 28,947 7,738 417,802 337,7216 791,723 152,385 8,962 5,904 1,882,348 1,009,092 872,656 4,197 53,852 1,889,679 148,311 153,294 42,220 61,240 405,045 398,273 1,009,866 1300,865 1,009,866 1,009,866 1,009,866 1,009,866	30	979 979 3532 3512 3512 3511 089 485 97 481 482 486 481 177 461 177 268 67 607 607 607 607 607 607 607 607 607	47.871 10.036 3J2,347 316,779 707,035 107,780 2,463 2,463 901,082 714,286 6,292 49,200 1,596,598 50,382 126,817 107,567 89,634 374,400 295,969 80,201 27,577 88,225 708,217 818,451 1,596,598 3J2,055 818,451 1,596,598 3J2,055 11,596,598	26.538 27.524 27.524 27.522 297.330 599.494 88,273 856 9.147 1,537.050 815.758 72.1202 8.267 50,214 1,477.543 72.100 99.759 27.506 72.548 27.973 329.443 89.011 29.546 22.776 48,225 647,336 757,637 67 757,570 1,477,543 327,521 1,477,543 327,521 1,477,543 327,521	36 36 36 36 36 36 31 35 36 36 37 31 31 31 31 31 31 31 31 31 31

Midge., mach. & eq. ...
Transportation eq. ...
Miscellaneous ......
Construction in

1.826,117,000 S1,117,374,000
S1,268,000 31,553,000
S1,558,000 6.465,000
S1,568,000 6.465,000
S1,668,000 6.465,000

companies were translated at current ex-change rates, except that inventuries, propur-ty, plant and equipment, depreciation, good-will, and deferred taxes are translated at his-torical exchange rates. Revenues, expenses, gains and losses (other than inventory costs, depreciation, and amortization of goodwill) were translated at rates prevailing during the

year.

(c) Inventories: Inventories are stated at the lower of cost or market. Substantially all domestic inventories are valued on the last-in, first-out (LIFO) method, and foreign inventories are valued principally on the average cost method.

(d) Commitments and Contingent Liabilities:

Co. has certain operating leases, including office space, and transportation and data processing equipment. expiring at transport

- 2. Find the data for depreciation in <u>Moody's</u> or on Line 3 of Worksheet 3a. Enter values for the three most recent years on Line 2.
- 3. For each of the three years subtract Line 2 (depreciation) from Line 1 (net income after taxes) to get cash flow. Enter results on Line 3.
- 4. Find current liabilities on the line labelled "Total current liabilities" on the Comparative Consolidated Balance Sheet or on Line 2 of Worksheet la. Enter values for the three most recent years on Line 4.
- 5. Enter total long-term liabilities (from Line 1e of Worksheet 3c) for the three most recent years on Line 5.
- 6. For each year add Line 4 (current liabilities) and Line 5 (total long-term liabilities) to get total debt. Enter results on Line 6.
- 7. For each year divide Line 3 (cash flow) by Line 6 (total debt to get Beaver's Ratio. Enter results on Line 7 (page 24 of the Workbook) and on Worksheet 14 (page 57 of the Workbook).
- 8. Compare Beaver's Ratio for the three years with the following critical values:

> 0.2 - firm is solvent
0.15-0.2 - grey area - solvency
of firm is uncertain
< 0.15 - firm is insolvent

Record the evaluation on Summary Line 1 (page 24 of the Workbook and on Worksheet 14 (page 57 of the Workbook). An example evaluation is:

"Ratio has been in grey area for past two years after being in the insolvent range for the previous year. Historical trend indicates improvement but ratio still indicates uncertain position."

An example of the Beaver's Ratio calculation (without the cost of pollution control) is shown in Exhibit 3-16 using the sample firm data.

Beaver's Ratio is also calculated after being adjusted for the cost of the pollution control equipment, using the conservative assumption that the equipment will be financed partly by borrowing rather than by issuing new stocks. In this calculation, any additional expenditures serve to decrease the internally generated cash flow of the firm while increasing the firm's total debt, thus decreasing the ratio of cash flow to total debt.

# Exhibit 3-16 WORKSHEET 4a BEAVER'S RATIO WITHOUT COST OF POLLUTION CONTROL (\$1000)

		Three Most Recent Year of Company Data				
	Year <u>1982</u>	Year <u>1981</u>	Year 1980			
. Net Income After Taxes	98,414	136,481	114,000			
. Depreciation Worksheet 3a, Line 3	121,841	118,839	114,472			
. Cash Flow Line (1) + Line (2)	220, 255	255,320	228,472			
. Current Liabilities Worksheet la, Line 2	351,567	335,317	405,065			
. Total Long-Term Liabilities Worksheet 3c, Line le	570,876	610,470	474,888			
. Total Debt Line (4) + Line (5)	922,443	945,787	879,953			
Beaver's Ratio Line (3) divided by Line (6)	0.24	0.27	0.26			
<u>:</u>	SUMMARY					
. Evaluation of Beaver's Ratio val	ues: <u>Ratios ind</u>	icate solveno	y for all			
three years.						

To account for the pollution control costs, all additional interest payments and annual operating and maintenance costs are subtracted from the firm's internally generated cash flow, and any additional debt which will be incurred to finance any capital expenditures are added to the firm's total debt. Any tax shield realized from the additional depreciation is added to the firm's cash flow because depreciation is a non-cash tax-deductible expense. Thus, for any increase in depreciation, the firm's income after taxes will decline by the amount of the depreciation expense after tax (or (1-tax rate) x depreciation). The cash flow will increase by the amount of depreciation less the depreciation expense after tax since depreciation is added to after-tax income to arrive at cash flow. Therefore cash flow will increase by an amount equal to the increase in depreciation multiplied by the tax rate. This is often referred to as the depreciation tax shield.

Beaver's Ratio adjusted for the cost of pollution control is calculated for the most recent of the three years using Worksheet 4b on pages 25 and 26 of the Workbook. The steps in the calculation are as follows:

- 1. Enter portion of capital expenditures financed by debt (from Line 2b of Worksheet 3d) on Line 1 of Worksheet 4b (page 25 of the Workbook).
- 2. Enter interest expense before tax (from Line 4 of Worksheet 3d) on Line 2.
- Enter marginal tax rate for firm (if available or use 0.46) on Line 3.
- 4. Subtract Line 3 (marginal tax rate) from 1; enter result on Line 4.
- 5. Multiply Line 2 (interest expense before tax) by Line 4 to get aftertax interest expense. Enter result on Line 5.
- 6. Enter annual O&M expenditures for pollution control equipment (from Line 9 of Worksheet 3d) on Line 6.
- 7. Multiply Line 4 by Line 6 (annual O&M expenditures) to get after-tax O&M expenditures. Enter result on Line 7.
- 8. Multiply the capital cost of the pollution control equipment by the investment tax credit factor to get the adjusted capital cost, or find this value on Line 1 of Worksheet 3d. Enter this value on Line 8a.
- 9. Divide Line 8a (adjusted capital cost) by 5 (years until debt retirement) to get additional tax depreciation. Enter result on Line 8b.

- 10. Multiply Line 4 by Line 8b (additional tax depreciation) to get tax shield from depreciation. Enter result on Line 8c.
- 11. Enter cash flow (from Line 3 of Worksheet 4a) on Line 9.
- 12. Subtract Line 5 (after tax interest expense) and Line 7 (after-tax 0&M expense) from Line 9 (cash flow) and add Line 8c (tax shield from depreciation) to get adjusted cash flow. Enter result on Line 10.
- 13. Enter total debt (from Line 6 of Worksheet 4a) on Line Ila.
- 14. Add Line 1 (portion of capital cost financed with debt) to Line 11a (total debt) to get adjusted total debt. Enter result on Line 11b.
- 15. Divide Line 10 (adjusted cash flow) by Line 11b (adjusted total debt) to get Beaver's Ratio adjusted for pollution control expenditures. Enter result on Line 12 (page 26 of the Workbook) and on Worksheet 15 (page 58 of the Workbook).
- 16. Compare the adjusted Beaver's Ratio with the following critical values:

> 0.2 - firm is solvent
0.15-0.2 - grey area - solvency
of firm is uncertain
< 0.15 - firm is insolvent

Record the evaluation on Summary Line 1 (page 26 of the Workbook) and on Worksheet 15 (page 58 of the Workbook). An example evaluation is:

"Adjusted Beaver's Ratio is between 0.15 and 0.2, indicating borderline solvency."

An example of the Beaver's Ratio calculation adjusted for the cost of pollution control is shown in Exhibit 3-17 using the sample firm data.

#### Interpretation

Three analyses are used to evaluate Beaver's Ratio. These are:

- 1. critical values:
- 2. three-year trends; and
- adjusted ratio.

These are described below. The results should be entered on Worksheets 14 and 15 on pages 57 and 58 of the Workbook. Examples of this are presented in Chapter 5.

#### Exhibit 3-17

#### WORKSHEET 4b

### BEAVER'S RATIO ADJUSTED FOR COST OF POLLUTION CONTROL (\$1000)

		Most Recent Year of Company Data
		Year <u>1982</u>
1.	Portion of Expenditure Financed with Debt Worksheet 3d, Line 2b	2,975
2.	Interest Expense (before tax) Worksheet 3d, Line 4	416.5
3.	Marginal Income Tax Rate	0.46
4.	1 - Tax Rate	0.54
5.	After-Tax Interest Expense Line (2) x Line (4)	224.9
6.	Annual O&M Expenditures for Pollution Control Equipment Worksheet 3d, Line 9	1,000
7.	After-Tax O&M Expenditures Line (4) x Line (6)	540
8a.	Capital Cost of Pollution Control Adjusted for ITC Worksheet 3d, Line 1	8,500
86.	Additional Tax Depreciation Line (8a) divided by 5	1,700
8c.	Tax Shield from Depreciation Line (4) x Line (8b)	918
9.	Cash Flow. Worksheet 4a, Line 3	220, 255
10.	Adjusted Cash Flow Line (9) - Line (5) - Line (7) + Line (8c)	220,408.1
11a.	Total Debt Worksheet 4a, Line 6	922,443

### Exhibit 3-17 (continued)

#### WORKSHEET 4b (continued)

Most Recent Year of Company Data
Year <u>1982</u>
925,418

11b. Adjusted Total Debt Line (1) + Line (11a)

12. Adjusted Beaver's Ratio
Line (10) divided by Line (11b)

0.24

#### SUMMARY

1.	Evaluation of Beaver's Ratio:	With costs of pollution control, firm is
	still in solvency range.	

Critical values are ranges for Beaver's Ratio which indicate the relative probability of bankruptcy. In Beaver's study of 79 pairs of firms (each pair consisting of one firm which went bankrupt and another that remained solvent) the mean ratio of the failed firms was about 0.15 five years prior to failure and it declined steadily thereafter. Using his results as target values, the firm should be classified as solvent if it has a Beaver's Ratio (cash flow to total debt) which exceeds 0.20. If this ratio falls below 0.15, the firm is considered insolvent. A grey area exists between 0.15 and 0.20.

The three-year trend indicates whether the firm's Beaver's Ratio has increased, decreased, or remained the same in recent years. Generally an increase indicates improving financial conditions. Industry averages are not available for comparison with the three-year trend.

The adjusted ratio indicates the effect of pollution control expenditures on the Beaver's Ratio for the firm. If the adjusted Beaver's Ratio is above 0.20, this test indicates a low probability of bankruptcy; below 0.15 indicates a high probability of bankruptcy. Values between 0.20 and 0.15 are considered to be in a grey area.

These three analyses can produce conflicting results. Two combinations of results can be interpreted as indications of potential solvency problems. These are:

- Beaver's Ratio is less than 0.20 and the adjusted ratio is less than 0.15; and
- 2) Both the Beaver's Ratio and the adjusted ratio are in the grey area between 0.20 and 0.15) and the three-year trend is declining.

#### 3.2.3 Leverage Ratios

Leverage Ratios measure the extent to which a firm has fixed financial obligations. Leverage is the proportion of a firm's value that is financed by debt relative to that which is financed by stockholders. Leverage Ratios can indicate in a general way how much more debt financing (loans) a firm could expect to receive. A highly levered firm (one with a high Leverage Ratio) is likely to have problems borrowing more. The Debt/Equity Ratio is the most commonly used measure of leverage.

#### 3.2.3.1 Debt/Equity Ratio

#### Theory

The Debt/Equity Ratio is the ratio of long-term debt to total stockholders' equity. In general, the debt holders (banks, etc.) in a highly levered firm (one with a high Debt/Equity Ratio) bear more risk than those in a less levered company, especially if there is some probability of bankruptcy. Thus, while the Debt/Equity Ratio alone is not a particularly useful number for assessing financial health, it can be used in combination with the Solvency Ratios to evaluate the stability of a firm's operations.

The Debt/Equity Ratio is calculated for the three most recent years and is not adjusted for the cost of pollution control. This is because the firm is assumed to be at its optimal debt/equity level before the pollution control equipment is added. Investment in pollution control is a capital investment that does not increase a firm's borrowing power because it will not produce future cash flows to repay the debt. It is assumed that the pollution control equipment will be paid for with amounts of debt and equity which are proportional to the total debt ratio of the firm.

The Debt/Equity Ratio is expressed as:

D/E = LTL TSE

where: D/E = Debt/Equity Ratio

LTL = Total long-term liabilities TSE = Total stockholders' equity

#### Calculation

The data needed to do this calculation are found in the liabilities section of Moody's Comparative Consolidated Balance Sheet (Exhibit 3-18) and in Morris' Annual Statement Studies (Exhibit 3-19). The three-year trend in a firm's Debt/Equity Ratios is evaluated and it is compared to average industry values. These industry ratios are Debt/Worth Ratios, in which total long-term liabilities are divided by tangible net worth. The Debt/Equity calculation is done using Worksheet 5 on pages 29 and 30 of the Workbook. The steps are as follows:

1600		MC								
1979 includes \$28.0 r		eb.) gain	Uses: Prop., pl	L& Exhib	it 3-18		Reductio	na	(199,684)	(150,44
As a sharpe for termination of a	million (\$0.13 perations of th	per sh.)	Capital e	xix		167.189		. in notes	(22,437)	3,49
ure terephthalate plant at Consolidated Statemer	t of Change	DATA	FROM	MOODY'S	- DEBT/	OUITY RA	OITA	of com, stk. for	(15,125) debt:	(75,24
ilel Position (in thousand Funds Provided From O			_		135,950	134,846	Incr. in c	ap.accis,	38.845	
Sources:	1982	1981		in invest , in work.	42,978	14,754		linary gain idenda	11,55,1 (56,874)	
nc. bef. extraord.	\$86,861	\$136,481			(109,217)	70,689				(53,56
Deprec. & amort Del. taxes on inc	120,487 (15,193)	118,839			69,711	220,289		lin, Itans Ign. cutr.	(44,038)	(31,96
iq. in met inc. of affil.	(,,		Net	ids, prov. (r.			trans	. <del>adj.</del>	(\$4,654)	(44,95
divs	(12,972)	4,704	op	er	113,016	56,707	Other so	urces (uses) .	(#:5,0)	11,0
Vritedown of facil	3,544	J,880	Chge, in i	ing Transactions. gun. debt:		•		iner. (decr.)		
	182,727-	276,996		rowings	177,247	. 247,270	1D	fda ,	6,606	(9.16
Record of Earnings, y	Cost and		Off	h. Inc. &	Inc. Bel.	Income	Net	Солттол	¹ฏCom. Shs.	Earn. 1
ear Net Sales 83 476,462	Expenses 410,627	Bala: 65,1 77,0	nce De IJS	b. (Net) 631	Taxes 66,466	Taxes 34,532	Income 11.9.15	Dividends	Outstand. 36.543,423	Com.
1964 576,085 1965 578,649	499,041 502,348	76.3	Ю1	<i>d</i> 895 5,731	76,149 82,033	38,382 35,986	137,767 146,046	18,523 19,121	38,703,611 39,195,917	②1.04 ②1.04
41966 661,319 41967 670,292	560.023 579,936	101.2	196 136	3,456 d1,013	104,752 89,323	48,766 40,309	55,986 49,014	. 21,372 23,567 23,753	40.247,710 40.483,104	—()q 1.19
1968 751,055 1969 779,687	642,915 681,611	1.801	140	d6.423 d11,269	101.717	46,117 39,675	\$5,600 47,132	23,753 23,741	40,856,052 41,054,192	i.36 I.15
11970 832,761 11971 848,444	724,027 74J,096	98,0 108,7 105,3	H	d10,988 d9,826	86,807 97,746 65,522	45,159 41,986	52,587 ①53,536	23,642 23,812	40.753.370	1.21 (2)1.31
到1972 972,267	832,866	139,	01	d11.644	95,522 127,757	59,224 66,018	68,533 91,623	25,143 29,056	40,956,636 40,319,984 41,732,194	_1.10
71973 1,154,775 1974 1,525,489 75 1,413,111	992,203 1,355,316	170.1	73	64,931 625,574	157,641 144,599 40,650	\$2,575 8,191	92,024 J2,459	33,426 33,579	41,812,649	2.2 2.3
75 1,413,111 76 1,595,956	1,335,932 1,435,916	77,1 160,0	40	436,529 40,891				35,987	42.193,700 42.38J,028	0.71 2.4
76	Restated for Sta	rements of	Financial	Accounting N	ios. 5 & 7 adop	ed in 1975. (LR	estated to	reflect 2-for-1	stk. split Apr. 6	1973.
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				liled with	D BALANCE Securities and	Exchange	S OF D Commiss			
ASSETS			1982	1981	nds of dollar	0 19	979	1978	1977	
ah & time deposits S. Govi. & other securities	COSE		28,855 5,307	26,700 856	24,94 7,75	7 52, 6 3,	532	47,87 t 10,058	26,538 2,524	17,0 1 <b>3</b> ,
Notas & accounts receival Laventories, net	ole, net	٠ .	5,307 80,524 68,288	419,747 406,907	417,80 337,21	2 407.0	071	332,347 316,779	273,102 297,330	267.9 269
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v. in affiliated cos		ž	14,391 960	164,001 8,524	152.38	5 137.0	087 172	107,780	88,273 856	\$6; .1 70,. 5,.
ivances to affiliates her investments			21.933	4.809	8,96 5,90	6,3	266	2,46J 9,522	9,147	25,
Property, plant & équipm Less: Depreciation reserve	ent		79,668 55,992	2,018,586 1,110,853	1,882,J4 1,009,69	8 1,703. 2 930.	592	836,213,1 \$80,10 <b>0</b>	1,537,050 815,758	1,432,1 732,1
Net property account .	***********		23,676	907,733	872.65	772,		714,286	721.292	699.
oodwill	••••••		1,821 55,599	1,167 52,700	4,19 <b>53,4</b> 5	2 52,	517 461	6,292 49,200	8,267 50,214	.7. .54.
TotalLIABILITIES	• • • • • • • • • • • • • • • • • • • •	2,0	01,354	1,997,144	1,889,67	1,761,	177	1,596,598	1,477,543	1,430,
			57.943	73,068	148,31	1 \$6,:		50,382	72,100	19,9
Counts payable	************	1	61,226 42,910	151,047	153,29	t 166,0 0 88.1	529	126,817	99,759 27,506	81,3 89,6
crued expenses	••••••		19,481	14,314 96,888	61,24	63,7	518	89,634	72,548	43,5
Total current liabilities			51,567 31,919	J35,317 454,356	405,06 334,53	5 405,6 D 280,6	72	374,400 295,969	271,973 329,443	254.5 326.
ong-term debt	taxes	ī	19.254	134,447	116,70	104.	157	80,201	89.011	75.
Çommon stock	• • • • • • • • • • • • • •		23,240	22,146	22.11	25,	076	22,076	29,546 22,076	22.0 88,
id-in surplus			29,808	90,834	89,48		• • •	88,225	88,225	
tained earnings			22,727	981,187	898,27			708,217	647,336	411
Total stockholders' cou	E	1.0	79 011	1 051 427	1 019 80		67	818,518 67	757,637 67	742,1
Net stockholders' equit	· · · · · · · · · · · · · · · · · · ·	1,0	78,911	1,051,357	1,009,74	945,4	122	818,451	757,570	742,
Total		2,0	01,354 31,407	1,997,144 518,893	1,889,67 386,65			1,596,598 3J2,655	1,477,543 327,521	1,430 31 <b>3</b> ,
recurrent essets	LYSIS	•	71,219	189,110	229,16			121,130	129,716	150.
Batiromante ne asias			48,296	37,648 cr15,224	50,29	5 107,5	373	43,012	24,900	i.i.
Ouher additions—deduce EPREC. RESERVE—AN Additions charged to prof	ALYSIS		61,841		*****				91%16	89.
Kente tellemen curtiles :	O 1764	-	21,841 51,105	118,839 21,903	. 114,47 38,37	2 77,0	007	106,683 20,882	12,140	50.
Other additions			25,597 	(1)0,225 ries with the	exception of			(i)5,523 errently, Prin	[i]1,208 r yeara have i	<u>رق</u> : not been
ind	20,481,000		insurance	e subsidiar	ies, and Co.	's pro rata	stated.	For thuse ye	urs, account	of loter
dgs., mach. & eq. ಘ 1,8 ransportation eq. 🔑		1,653,000	Invest	iments in aff	ia joint ventui illated compa	inies, owned	change	rates, excent	inslated at that inventor	ies, prop
		6,465,000	20% of 1	more, are ac	counted for o	n the equity	ty. plan	t And equips	nent, depressi sea are transl	tion, got
	o6,222,000		surance	aubaidiaries	(due to the	ir dissimilar	torical -	exchange fai	en. Revenues	. expens
_Total \$2.0	79,468,000 \$1,15	5,992,000	net inco	me includes:	Accordingly of Co.'s share of	their net in-	deprecia	uion, and a	ser than inver nortization o	[ KOOUW
MAILET reserves (1982, \$4	.918.900).		come.				Mana 100	natated at re	tes prevailing	during t
(I)Co. extensively uses the ethod for valuing invento	irri-on	t (LIFO)	All, si	gnificant in inated in con	tercompany	transactions	Year.		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	

are eliminated in consolidation.

(b) Translation of Foreign Currencies: As a resulted at the lower of cost or market. Substantially all the lower of cost or market.

### DATA FROM MORRIS - DEBT/EQUITY RATIO MANUFACTURERS - PLASTIC MATERIALS & SYNTHETIC RESINS BICS 2021

Current Data					_		retive Historica					
		8/30-8/30/81)						77. 6/30/76 78 3/31/76	3/31/60			
	0 1MM 24	1-10444 68	10-50MM 18	60-100MM E	ALL 118	ASSET SIZE NUMBER OF STATEMENTS	ALI 120		ALL 144	ALL 127	ALI 11	
	*	3	*	*	*	ABSETS	*	<u> </u>	<u> </u>		, <u>, , , , , , , , , , , , , , , , </u>	
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	197	227	24 9		22 4	Inventory	24 3	223	24 8	215	30 1 22 4	
	17 65 5	1 2 58 2	1 9 5 8 2		14 Ail Other Current 20 596 Total Current 606			2 2 82 3	14 585	504		
	25.2	33 6 1.6	32.6		314	Fixed Assets (net)	33.0	333	316	32 6	311	
	9 1	5 6	7 5		7 6	intangibles (net) All Other Non-Current	5 9		13 48	8 0	1 7	
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	60 459	2 0 40.4	4 0 39 4		3 2 40 6	All Other Current Total Current	40.7		44	3 2 39 7	3 40	
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	74 67	47 8.4 586.3	64 6.6 68 5.4	47 50	7.7	Sales/Receivables	47 78	47 7.7	46 79	49 75	47 7	
	161	29 12.7	37 100		<u>.63</u> 12.4	•	62 , 5 s	•	55 _ 6 6 34 10 8	59 <u>6</u> 2 33 112	. <sup>58</sup> . 6 29 12	
	9.0	42 8.6	60 73	43	8 5	Cost of Salet/Inventory	54 61	50 73	50 73	43 84	43 8	
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	11 4	13.5	10.7		123	Sales/Working Capital	10		65 116	6 9 1 1 5	7	
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١	5.1 2.2	62 (68) 3.1	3 7 (17) 2.0	(101)	7.6 2.8	EBIT/interest	(95) 37		78 (115) 38	87 (105) 29	(101) 2	
•	_12	1.5.			14.			1	16		1	
,	# 3 2.7	(55) 4.0	6.3 (13) 2.6	45.41	7.9	Cook Place Cook have 1 Cook	77	74	6.7	77	7	
	1.5	2.3	1.3	(84)	3.9 2 1	Cash Flow/Cur. Mai. L/T/D	(87) 2 (		(90) 36 15	(93) 31 15	(84) 3	
	.4	.5	.7		.5							
	. <b>8</b> 2.0	10	1.3 2 1		1.0 1.7	Fixed/Worth				7	1	
	10		13		<u>-'. '</u> .9				مثلت ا			
	2.2 7.7	1.6 3.2	2.2		1.0	Dabs/Worth	1	15	16	14	:	
	- <i>''</i> 39 6	35.9	38 0		35.7	% Profit Before Taxes/Tangible	2 1		39.4	<del></del>		
	25.6	(64) 24.0	16.5	(110)	234	Net Worth	(136) 22	(111) 253	(138) 240		(1 10) 23	
	5.7 13 fl	10.5	· -2.5			1		129		1.?	6	
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	17.4 13.2	13.2 7.2	9,1 6 1		134. 74	Sains/Net Fixed Assets	10.4	10.2	127 79	113 86	13 7	
	7.7	1.0	140		43		3	4.2	46		<u>.</u>	
	3.3 2.7	2.9 2.2	2.4 2.0		2.0	Calca Catal Accord	2 (	2.7	2.7	2.8	2	
_	1.0	1.8	2.0 14		2.2		2.1 1.7		2 2 1 6	2 1 1 5	2	
		14	16		13		15 13		15	1.4	1	
	1 P 2 7	(63) 2.0 3.3	(17) 1.9 2.8	(108)	2.0		(113) 2.	(105) 23	(134) 21	(118) 21	(108) 2	
	1.7	.3	- <del></del>	· ·	.5		<del>-</del>	1 4	1.4.	. 3ª.	× .	
}	2.3	{24} 9		(45)	1.5	% Lease & Rental Exp/Sales	(56) 1 (	(45) 10	(72) 12	(58) 12	5 12 (46) 1	
· <b>—</b>	3.5 2 9	17			20.	·-· - · -· · ·	; 2:	20	2 2	22	2	
ł	4.1	(26) 20		(43)	27 35 47	% Officers' Comp/Sales	(43) 4	25	2 1 (57) 40	2 tr (43) 3 b	(43) 3	
3.	6 5 4932M	4 3 871178N	744444		47	% Officers' Comp/Sales	51	1201 97	/6			
	27204	2531904		635430M 16 437520M 11	<b>44033</b> M	. Not Sales (\$)		IM 1204793N IM 854930N	4 1682 <i>251</i> 0 4 7260724	7619578M 1364301M		

- Enter total long-term liabilities for the three most recent years (from Line 1e of Worksheet 3c) on Line 1 of Worksheet 5 (page 29 of the Workbook).
- 2. Find common stock at par (the value of the stock at its original purchase price) on the Comparative Consolidated Balance Sheet and subtract the value of any treasury stock. Record the results for the three most recent years on Line 2.
- 3. Find additional paid-in capital (may also be listed as "Capital Surplus") on the Comparative Consolidated Balance Sheet. Record values for the three most recent years on Line 3.
- 4. Find the total value of the preferred stock (if any is listed) on the Comparative Consolidated Balance Sheet. Record values for the three most recent years on Line 4.
- 5. Find retained earnings on the Comparative Consolidated Balance Sheet. Record values for the three most recent years on Line 5.
- 6. For each year add Line 2 (common stock at par), Line 3 (additional paid-in capital), Line 4 (preferred stock), and Line 5 (retained earnings) to get stockholders' equity. Enter the results on Line 6.
- 7. For each year divide Line 1 (total long-term liabilities) by Line 6 (stockholders' equity) to get the Debt/Equity Ratio. Enter the results on Line 7 (page 29 of the Workbook) and on Worksheet 14 (page 57 of the Workbook).
- 8. Locate Debt/Worth Ratios for the appropriate SIC code in Morris' Annual Statement Studies. Record upper quartile, median, and lower quartile values for Debt/Worth Ratios for the three most recent years on Lines 8a through 8c.
- 9. Evaluate the three-year trend in the firm's Debt/Equity Ratios. Record the evaluation on Summary Line 1 (page 29 of the Workbook) and Worksheet 14 (page 57 of the Workbook). An example evaluation is:

"Debt/Equity Ratio has declined over the past three years, indicating an improvement in the firm's leverage position."

10. Compare the firm's Debt/Equity Ratios with the industry average Debt/Worth Ratios. Record the evaluation on Summary Line 2 (page 30 of the Workbook) and on Worksheet 14 (page 57 of the Workbook). An example evaluation is:

"The firm has had a Debt/Equity Ratio between the industry median and upper quartile for the past three years. The ratios have declined relative to industry averages over the past three years, indicating an improved leverage position."

An example calculation of the Debt/Equity Ratio using the sample firm data is shown in Exhibit 3-20.

## Exhibit 3-20 WORKSHEET 5

# DEBT/EQUITY RATIO WITHOUT COST OF POLLUTION CONTROL (\$1000)

		Three Most Recent Years of Company Data			
		Year <u>1982</u>	Year <u>1981</u>	Year <u>1980</u>	
1.	Total Long-Term Liabilities Worksheet 3c, Line 1e	570,876	610,470	474,888	
2.	Common Stock at Par	23,120	22,126	21,991	
3.	Additional Paid-In Capital	129,808	90,834	89,482	
4.	Preferred Stock				
5.	Retained Earnings	1,022,727	981,187	898,273	
6.	Stockholders' Equity Line (2) + Line (3) Line (4) + Line (5)	1,175,655	1,100,147	1,009,746	
7.	Debt/Equity Ratio Line (1) divided by Line (6)	0.49	0.55	0.47	
8a.	Industry Debt/Worth Ratio Upper Quartile	0.9	0.8	0.9	
8b.	Industry Debt/Worth Ratio Median	1.8	1.4	1.6	
8c.	Industry Debt/Worth Ratio Lower Quartile	3.5	2.8	2.9	
	<u>s</u>	UMMARY			
1.	Evaluation of three-year trend in	Debt/Equity Rat	ios: Firm's	Debt/Equity	
	Ratio has remained fairly constan	t over three yea	rs.		

# Exhibit 3-20 (continued) WORKSHEET 5 (continued)

2.	Comparison of Debt/Equity Ratios with industry averages: Firm is in much
	better position than rest of industry.
	·

#### Interpretation

Two analyses are used to evaluate the Debt/Equity Ratio. These are:

- 1. industry averages; and
- 2. three-year trend.

The results should be recorded on Worksheets 14 and 16 on pages 57 and 58 of the Workbook. Examples are provided in Chapter 5.

No critical values are available because the degree of leverage that is desirable is a function of a firm's operating characteristics and therefore varies among industries and even over the life cycle of one firm. No adjusted ratio is calculated because pollution controls will not affect the Debt/Equity Ratio, assuming that the expenditure will be financed at the prevailing debt ratio.

Industry average Debt/Worth Ratios are more important comparative indicators than the three-year trend, since they depict the level of debt commonly associated with the riskiness of that line of business. Industry median and quartile ratios are used for comparison because better targets do not exist, but this comparison alone is often too simplistic. Operating characteristics may vary considerably within an industry, causing target leverage ratios to be different. Industry averages should, therefore, be used only as general indicators of the firm's degree of leverage. A Debt/Equity Ratio greater than the upper quartile Debt/Worth Ratio for the industry indicates that the firm may have trouble borrowing additional capital.

The three-year trend indicates whether the Debt/Equity Ratio has increased, decreased, or remained the same in recent years. If the Debt/Equity Ratio is above the industry median, an increase may indicate potential problems. A high Debt/Equity Ratio is a problem if there is a fair degree of uncertainty about future earnings of the firm. This uncertainty could be caused by unstable business conditions in the firm or the industry as a whole. A company with small fluctuations in earnings over a long period of time can afford to have a higher Debt/Equity Ratio than a less stable firm. An unstable firm is likely to have periods of low earnings during which the risk of defaulting on loans is high.

#### 3.3 MARKET VALUE ANALYSIS

The financial statement analysis provides a review of recent historic performance and a point-in-time picture of a firm's financial status. What is not discernible from this vantage is how pollution control costs would affect expectations of the future performance of the firm. To predict the future effects one needs a prospective look based on expected financial performance of the firm with and without pollution control expenses.

One way of doing this would be to project pro forma (predicted) financial statements into future years by extrapolating past behavior and performance trends. Certain items such as inventory value, accounts receivable, and accounts payable could be estimated from past performance of the management of the firm in terms of ratios to total sales or average length of collection or payment time, for example. Other items like sales and operating costs could be extended along recent trend lines. These would allow a permit writer to estimate what future balance sheets and income statements might look like. Unfortunately, this would require a detailed understanding of the firm's industry and market, including how sales and costs vary with inflation, who the competitors are, what new technologies are influencing the supply and demand for the product, and how production assets are tied to sales volume and costs. collecting this information would be a formidable task beyond the scope of the permit writer's interests or capabilities. Instead a proxy for this forward-looking approach is used--analysis of stock prices. This is the purpose of the second component of the firm-level analysis -- the market value analysis.

Stock prices reflect the opinions of many analysts and participants in the stock market who set the price of a stock by their buying and selling behavior. In theory, the price of a corporate stock is a measure of the net present value (NPV) of the future cash flows (profitability) of the firm. The value of money over time is considered in net present value by reducing—or discounting—the estimated future cash flow to a lesser amount based on the length of time involved and an assumed or effective interest rate. Thus stock prices are indicators of investors' expectations of the future profitability of a firm. They constitute a single—number substitute for a series of projected future financial statements. Because there are many security analysts who conduct detailed

financial evaluations of firms for investors who value such information very highly, and many investors who act on that information, it can be assumed that the market price of a firm's stock is a good substitute for the more rigorous and time-consuming analysis.

Any cost associated with pollution control will have only negative value as an investment for a firm, because the costs will not produce any revenue and will only result in reductions in net income. This reduction in income would reduce the stock value. Assuming the stock price represents the per-share amount of profits available now and in the future, it thus provides an indication of the upper limit on the after-tax cost of pollution control that could be incurred by a firm before deficit operation.

The market value analysis is performed in three steps. The first is the calculation of the NPV of the pollution control investment. The second is the determination of the stock price adjusted for the cost of pollution control. The third step is the calculation of the Market-to-Book Ratio of the stock, with and without the cost of pollution control.

#### 3.3.1 Net Present Value Cost of Pollution Control

#### 3.3.1.1 Theory

Comparisons involving expenditures and/or receipts at different times over a span of years are valid only if all are expressed relative to one point in time. The most convenient point in time to use is the present, and net present value (NPV) of a flow of receipts and/or expenditures is the standard method employed. Future cash flows, whether positive or negative, are expressed as a present value by discounting the specific cash flow, at a given or assumed interest rate, over the period of time from the present to the time of occurrence of the cash flow. Cash flow in this context is the gross amount of money received or spent in a transaction. The cash flow determination does not consider such things as the form or source of the funds or taxes or credits that may be involved in the transaction. For example, money expended in the current year to purchase and install pollution control equipment is a negative cash flow. It is not subject to discounting because it occurs in the current year. Operating and maintenance costs for this equipment are also negative cash flows, and revenue

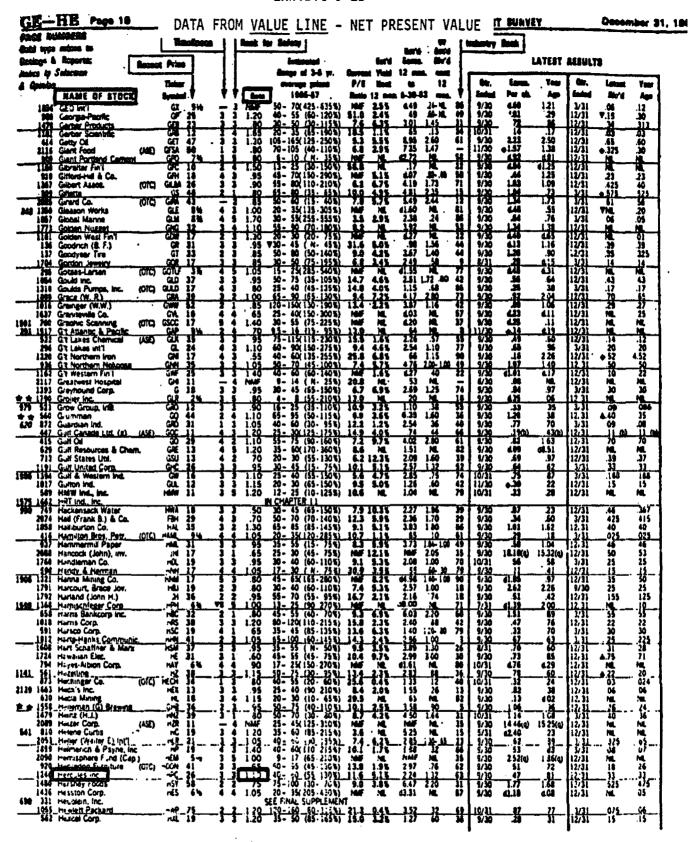
received from the sale of by-products recovered by this equipment would be positive cash flows. Both of these future cash flows would have to be discounted to be correctly included in aggregate cash flow estimates for pollution control systems of interest. These discounted cash flows plus the present cash flow are summed to obtain the net present value, which may be negative for expenditures or positive for receipts. The net present value (NPV) of the cost of pollution control equipment may be approximated as the initial cost of the equipment plus the present value of the operating expenses discounted at an interest rate equal to the cost of equity (see Section 2.1 for a further discussion of cost of equity). Worksheet 6 on page 34 of the Workbook is used to calculate the cost of equity and the present value of the pollution control equipment. This is done for the most recent year for which data are available. In this calculation, the O&M costs are also discounted at the cost of equity.

The estimate of the cost of equity is based on the sum of a risk-free interest rate, e.g. the rate on U.S. Treasury Bills, and a historical rate of return on stocks in excess of the risk-free rate. The latter is calculated for a specific firm using the <u>Value Line</u> beta  $(\beta)$ . This value is used as a multiplier to reflect an estimate of the comparative financial risk associated with a specific firm in relation to all firms listed on the New York Stock Exchange (NYSE). A firm representing a higher risk would expect its cost of equity to be higher, hence its beta would be greater than the NYSE average of 1.0.

#### 3.3.1.2 Calculation

The data needed to calculate the NPV of the pollution control equipment can be obtained from the <u>Value Line</u> report on the firm (see Exhibit 3-21) and Standard & Poor's Daily Stock Price Record. Information concerning the pollution control equipment itself (O&M cost, estimated life, and rate of growth O&M cost, for instance) must be developed by the permit writer or supplied by the firm. The NPV calculation is done on Worksheet 6 (page 34 of the Workbook), and the steps are as follows:

1. Multiply the capital cost of the pollution control equipment by 1 minus the investment tax credit factor or find the adjusted capital cost on Line 8a of Worksheet 4b. Enter this value on Line 1 of Worksheet 6 (page 34 of the Workbook).



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<sup>## \$</sup> Supplementary Report in this week's entrion.

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- 2. Enter annual O&M expenditures for pollution control (from Line 6 of Worksheet 4b) on Line 2.
- 3. Record the operating life of the pollution control equipment (should not be greater than 10 years) on Line 3.
- 4. Record the rate of growth or inflation in O&M cost (in percent per year expressed as a decimal fraction) on Line 4.
- 5. Find the company beta (p) in the <u>Value Line</u> report for the firm. Record this value on Line 5.
- 6. Enter the risk-free rate of interest on Line 6. Use the current rate of return on six-month U.S. Treasury Bills to approximate the risk-free interest rate. This will be available from a local bank or the Federal Bank of the appropriate Federal Reserve District.
- 7. Mutiply Line 5 (company beta) by 0.08 and add this to Line 6 (risk-free interest rate) to get the discount rate. Record the result on Line 7. The 0.08 is the excess return on the stock market over the risk-free rate and it has historically been about eight percent.
- 8. Enter the value of recovered by-products from the pollution control equipment (if any) on Line 8. Use cost of production if recovered materials are produced at the specific plant and price as the value of raw materials are recovered. Prices of many chemicals and other substances are reported in the Chemical Marketing Reporter and other trade journals.
- 9. Using the following formula, calculate the present value of the O&M costs discounted and summed over the life of the pollution control equipment:

PVOM = 
$$\frac{(0M) \times \left(1 - \left(\frac{1+g}{1+r}\right)^{L}\right)}{1 - \left(\frac{1+g}{1+r}\right)}$$

where: PVOM = Present value of O&M costs

L = Life of equipment (Line 3) OM = Annual O&M costs (Line 2)

g = Rate of growth in O&M costs (Line 4)

r = Discount rate (Line 7)

Enter the result on Line 9a.

10. Using the following formula, calculate the present value of recovered materials discounted and summed over the life of the pollution control equipment:

$$PVRM = \frac{(CR) \times (1-(1+r)^{\perp})}{-r}$$

where: PVRM = Present value of recovered materials

L = Life of equipment (Line 3)

CR = Credits for product recovery (Line 8)

r = Discount rate (Line 7)

Enter the result on Line 9b.

11. Add Line 1 (adjusted capital cost) and Line 9a (present value of 0&M costs) and subtract Line 9b (present value of recovered materials) to get the net present value of the costs of pollution control. Enter the result on Line 9c.

Exhibit 3-22 demonstrates this calculation using the sample firm data.

#### 3.3.2 Adjusted Stock Price

#### 3.3.2.1 Theory

Because the stock price reflects the net present value of expected future cash flows (profitability), subtracting the after-tax NPV of pollution control costs from the firm's market value provides an estimate of the impact of the equipment on the present value of future cash flows. In essence, the difference between market value and the NPV of pollution control costs is what the firm's market value would be if the control were required. Worksheet 7 on page 37 of the Workbook is used to perform this calculation.

#### 3.3.2.2 Calculation

The data needed to calculate the adjusted stock price can be found in Moody's, Standard & Poor's Daily Stock Price Record, or Value Line. High and low stock prices for the year and the average number of shares outstanding can generally be found in the Financial and Operating Data section of Moody's (see Exhibit 3-23). This is the best source of these data. If the data are not available in Moody's, the permit writer should check the other sources. The stock price data in Standard & Poor's are expressed as 25-7, 22-1, etc., which means 25-7/8, 22-1/8, etc. The permit writer must go through an entire year's data to find the annual high and low stock prices in Standard & Poor's. The calculation is done for the most recent year and the steps are as follows:

#### Exhibit 3-22

#### WORKSHEET 6

#### NET PRESENT VALUE COST OF POLLUTION CONTROL (\$1000)

			Most Recent Year of Company Data
			Year 1982
1.	Capital Cost of P Adjusted for ITC Worksheet 4b, Lin		8,500
2.	Annual Operating tenance Cost (OM) Worksheet 4b, Lin	•	1,000
3.	Estimated Life of in Years (L)	Equipment	5
4.	Expected Rate of O&M cost (g)	Growth in	0.05
5.	Company Beta ( \beta	)	1.10
6.	Risk-Free Rate (r	•)	0.0944
7.	Discount Rate (r) Line (6) + (0.08		0.0953
8.	Credits for Produ	ct Recovery (CR)	0
9a.	Present Value of	O&M Costs (PVOM)	·
	PVOM = (OM) 1-(	$\begin{pmatrix} \left(\frac{1+q}{1+r}\right)^{L} \\ \frac{1+q}{1+r} \end{pmatrix}$	4,603
9b.	Present Value of	Recovered Materials (	PVRM)
	PVRM =	$\frac{(CR) \times \left(1-(1+r)^{L}\right)}{-r}$	0
9c.	Present Value of	Pollution	
	Control Costs Line (1) + Line (	(9a) - Line (9b)	13,103

1981. 1982, minimum rental payments under noncancellable leases 436,450,000 of which \$25,050,000 is \$436,450,000 of which \$25,050,000 is \$1984, \$19,100.00 DATA \$10,750,000 in 1986, and \$13,600,000 
conditions.

(e) Property, plant and equipment are stated at cost. For financial accounting purposes, Co. depreciates major portion of its processing facilities, using a modified declining bal-

DATA FROM MOODY'S - ADJUSTED STOCK PRICE inion, the financial statements reversed to consolidated subsidiaries are depreciated or amortized principally on straight. Incension for the years and changes in their financial statements are charged to income; major renewals and are charged to income; major renewals and the statements are capitalized. Upon normal restrictions are charged to income; major renewals and the statements are capitalized. Upon normal restrictions are charged to income; major renewals and the statements are capitalized. Upon normal restrictions are charged to income; major renewals and the statements are capitalized. Upon normal restrictions are charged to income; major renewals and the statements are capitalized. Upon normal restrictions and changes in their financial statements."

Administration and changes in their financial sposition for the years ended December 31, 1982, 1981 and 1980, in conformity with generally accepted accounting principles consistently applied during the period except for the method of accounting for foreign currency translation, as described in Noise 2 to the consolidated financial statements."

FINANCIAL & OPERATING DATA		•					
Earned per share—	1982	1981	1980	1979	1978	1977	
—com. & com, eq. on yr. end. shs	TR2.16	(TE),09	(E)\$2,59	(183.89	[T]\$2_36	<b>(2)81.36</b>	. 1976 1782,36
	782.22	<b>683.09</b>	<b>1</b> 82,60	€ 33.89	382.36	281.36	182.44
A Triming and the state of the	-ننات	\$1.26	\$1.20	\$1.073/2	\$1.00	\$1.00	30.85
Price Range—common	281/4-161/4	26%-18%	25-151/4	223/4-161/4	18%-1214	281/4-141/4	J8-24
בייניייי בעני שאים ביינייייייייייייייייייייייייייייייייי	8274,0078	85-67	8344-65	841/4-73	87-76 103-94	1021/4-821/4	117-931/4
Notes, 83/4s, 1983	993/4-931/6 #24.14	961/4-871/4 824.70	97-821/4 823.69	981/4-861/4 \$22-18	\$19;£5	105%-101%	106%-101
Net tangible assets per sh,—common Times charges earned:	844.14	929.1U	623.07	-444.10	419,00	817.68	\$17.34
Before income taxes	3.11	5.02	4.68	9.13	6.68	4.29	7.38
After income taxes	2.71	3.92	4.05	6.42	4.30	2.78	4.39
No. of shares—							
z end	44.613.710	42,514,428	42,445,478	42,383,028	42,383,028	42,383,028	42,383,028
—common, average	43,213,839	42,508,368	42,420,225	42.383.028	42,383,028	<b>42,383,028</b>	42,332,752
Current assets + current liabilities	2.23	2.55	1.95	1.94	1.89	2.20	2.23
% cash & securities to current assets	4.36	3.33	4.64	7.18	<b>3</b> .19.	4.85	5.40
% inventory to current assets	47.04	47.64	42.59	40.93	44.80	49.60	47.41
% net current assets to net worth	39,99	49.35	38.29	40.13	40.64	43.23	42.22
% property depreciated	5 <u>5.59</u>	\$\$.03	53.64	54.63	55.78	53.07	51.17
% ann, depr. & amort, to gross prop	5.79	5.89	6.06	6.25	6.60	6.11	6.23
Capitalization:	28.59	30.18	24.89	22.89	26,56	30.31	30.55
% long term debt	28.39 71.41	69.82	75.11	77.11	20.30 73.44	50.51 60.69	49.45
Sales - inventory	6.70	6.68	7.37	7.30	6.14	5.71	5.93
Sajes - receivables	6.49	6.48	5.95	3.76	3.86	6.22	5,96
% sales to net property	267.30	299.47	284.79	303.46	272.51	235,38	228.19
% sales to total assets	123.37	136.11	131,52	133.17	121.91	114.91	111.58
% net income to total assets	4.92	6.83	6.03	9.80	6.47	3.92	7.47
% net income to net worth	9.12	12.98	11.29	18.25	12.62	7.65	14.39
Analysis of Operations Sales, less disc, etc.	100.00	100.00	100.00	100.00	100.00	100.00	100,00
Cost of goods sold	82.66	20.86	\$2.04	79.01	77.17	79.33	76.87
Sell., gen, & adm. exp.	12.73	11.35	11.73	11.97	13.26	13.37	13.10
Balance	4.61	7.79	6.23	9.02	9,57	7.30	10.03
Other income	1.78	.83	0.80	3.38	1.18	0.85	4.53
Total income	6.39	8.62	7.03	12.40	10.75	8.15	14.56
Interest & debt expense	2.05	1.72	1.50 5.53	1.36	1.61	1.90	1.97
Net income before income taxes, etc.	4.34	6.90	5.53	11.04	9.14 3.83	6.25 2.84	12.59 5.90
Income & franchise taxes	0.82 0.47	1.88	0.94	3.68	****		
Net income	1.99	5.02	4.59	7.36		3.41	6.69
Includes \$0.66 nonrecurring gains. 211	cludes \$0.14 plan	write-down. [3	Uncludes \$0.11 p	lant write-down.	Findudes \$0.6	2 gain on sale of	pisment and
mathematicana // Includes PO 11 less from tem				-1	. All selector		facilities and

methanol assets. [Lincludes 30, 13 loss from terminating operations at joint-venture terephthalate plant at Middleburg, [Blincludes 50,27 write-down of facilities and investments. [Blincludes 20,25 extraordinary gain.

#### LONG TERM DEBT

1. Hercules inc. 81/4% notes, due 1983:

Reling—A2
AUTH.—\$100,000,000; outstg., Dec. 31, 1982, \$100,000,000.
DATED—Apr. 1, 1975, DUE—Apr. 1, 1983, INTEREST—A&O I to holders registered M&A 15.

INTEREST—AGO 1 to notice regarded M&A 15.
TRUSTEE—Citibank, N.A., NYC.
DENOMINATION—Fully registered, \$1,000
or any integral multiple thereof.
CALLABLE—As a whole or in part at any
time on or after Apr. 1, 1981 on at least 30 but
not more than 60 days' notice at 100, plus ac-

CALLABLE—As a whole or in part at any time on or after Apr. 1. 1981 on at least 30 but not more than 60 days' notice at 100, plus accrued interest.

SINKING FUND—None.

SECURITY—Not secured. Co. nor any restricted subsidiary may create, assume or guarantee any secured debt without making effective provision for securing the notes (and any other indebtedness of, or indebtedness guaranteed by, Co. or such restricted subsidiary then entitled thereto) equality and ratably with such secured debt, except for (i) certain mortgages, pledges, liena or encumbrances in connection with the acquisition or construction of property by Co. or a restricted subsidiary, (ii) certain mortgages on property of Co. or a restricted subsidiary on which new plants are constructed if, in the opinion of the board of directors, such property was substantially unimproved for its intended use prior to such construction, (iii) mortgages, pledges, llens or encumbrances on property existing at the time of acquisition thereof, whether or not assumed by Co. or a restricted subsidiary, (iv) mortgages, pledges, liens or encumbrances on property, shs. of stock or indebtedness of any corporation existing at the time such corporation existing at the time such corporation is merged into or consolidated with Co. or a restricted subsidiary, (v) mortgages, pledges, liens or encumbrances on property of a corporation existing at the time such corporation is merged into or consolidated with Co. or a restricted subsidiary or at the time of a sale, lease or other disposition of the properties of a corporation or firm as an entirety or substantially as an entirety to Co. or a restricted subsidiary, (vi) mortgages, pledges, liens or encumbrances on property of Co. or a restricted subsidiary, (vi) mortgages, pledges, liens or encumbrances on property of Co. or a restricted subsidiary, (vi) mortgages, pledges, liens or encumbrances on property of Co. or a restricted subsidiary, (vii) mortgages pledges, liens or encumbrances on property of Co. or a restricted subsi

a solid plant write-down. (Bincludes \$0.21 plant to respect to the light of special part and operations at joint-venture terephthalate plant at Middleburg. (Bincludes \$0.27 write-down of incilities and stricted subsidiary in favor of the United States of America or any State thereof, or in favor of Any other country, or any agency, in favor of any other country, or any agency, in the secure certain payments purpose of financing all or any part of the purpose of financing all or any part of the purpose of financing all or any part of the purpose of financing all or any part of the purpose of sinancing all or any part of the purpose of sinancing all or any part of the property subject to subdivision of the property subject to subdivision of the property subject to serviced aubsidiary owns or acquired any property and under the terms of which Co. or a restricted aubsidiary conveys or assignments under the terms of which Co. or a restricted aubsidiary conveys or asalgns an interest in oil, gas or other mineral or the proceeds thereof, (x) lone or mineral or the proceeds the proceeds thereof, (x) lone or mineral or the proceeds there

- 1. Obtain the high and low stock prices for the most recent year from Moody's, Value Line, or Standard & Poor's. Record the values on Lines la and 1b of Worksheet 7 (page 37 of the Workbook).
- 2. Obtain the average number of shares outstanding during the most recent year from Moody's, Value Line, or Standard & Poor's Daily Stock Price Record. Record the value on Line 2.
- 3. Multiply Lines 1a and 1b (high and low stock prices) by Line 2 (number of shares outstanding) to get the high and low market values of the firm. Record the results on Lines 3a and 3b.
- 4. Enter the NPV cost of pollution control (from Line 9c of Worksheet 6) on Line 4.
- 5. Enter the marginal tax rate for the firm (if available or use 0.46; can also be found on Line 3 of Worksheet 4b) on Line 5a.
- 6. Subtract Line 5a (marginal tax rate) from 1; enter result on Line 5b.
- 7. Multiply Line 4 (NPV cost of pollution control) by Line 5b to get the after-tax NPV cost of pollution control. Record the result on Line 6.
- 8. Subtract Line 6 (after-tax NPV cost of pollution control) from Line 3a (market value high) or Line 3b (market value low) to get the high and low market values adjusted for the after-tax NPV cost of pollution control. Record the results on Lines 8a and 8b.
- 9. Divide Line 7a (adjusted market value high) or Line 7b (adjusted market value low) by Line 2 (number of shares outstanding) to get the high and low stock prices adjusted for the after-tax NPV cost of pollution control. Record the results on Lines 8a and 8b.
- 10. Divide Line 6 (after-tax NPV cost of pollution control) by Line 3a (market value high) or Line 3b (market value low) to get a measure of the impact of the pollution control cost on the firm. It is expressed as what fraction the after-tax NPV pollution control cost is of the high and low market values of the firm. Record these values on Lines 9a and 9b.

An example of the above calculations using the sample firm data is shown in Exhibit 3-24.

#### Exhibit 3-24

#### WORKSHEET 7

#### ADJUSTED STOCK PRICE

	Most Recent Year of Company Data
	Year 1982
1a. Stock Price (\$/share) - High	28.75
1b. Stock Price (\$/share) - Low	16.875
2. Number of Shares Outstanding (X1000)	43,212
3a. Market Value (\$1000) - High Line (1a) x Line (2)	1,242,345
3b. Market Value (\$1000) - Low Line (1b) x Line (2)	729,203
4. NPV Cost of Pollution Control (\$1000) Worksheet 6, Line 9c	13,103
5a. Marginal Tax Rate Worksheet 4b, Line 3	0.46
5b. 1 - Line (5a)	0.54
<ol> <li>NPV Cost of Control After Tax (\$1000)</li> <li>Line (4) x Line (5b)</li> </ol>	7,076
7a. Adjusted Market Value (\$1000) - High Line (3a) - Line (6)	1,235,269
7b. Adjusted Market Value (\$1000) - Low Line (3b) - Line (6)	722,127
8a. Adjusted Stock Price (\$/share) - High Line (7a) divided by Line (2)	28.59
8b. Adjusted Stock Price (\$/share) - Low Line (7b) divided by Line (2)	16.71
9a. NPV Cost of Control After Tax as a Fraction of Market Value - High Line (6) divided by Line (3a)	0.0057
9b. NPV Cost of Control After Tax as a Fraction of Market Value - Low Line (6) divided by Line (3b)	0.0097

#### 3.3.3 Market-To-Book-Ratio

#### 3.3.3.1 Theory

The third part of the market value analysis is the calculation of Market-to-Book Ratio. This ratio measures the value the stock market places on a firm in relation to an estimate of the tangible asset value of the firm "on the books", i.e. the net worth of the firm. Net worth, or book value, is computed as total assets minus total liabilities. Book value is expressed per share as is the stock market price. Stockholders' equity is an alternative measure of net worth, as used on Worksheet 8 on pages 40 and 41 of the Workbook. Market-to-Book Ratio is used to assess the trend in stock market evaluation of the firm over a period of time relative to the book evaluation for the same The effect of the cost of pollution control equipment on market evaltime. uation is expressed as the net present value of the total cost after-tax subtracted from the current stock market price. The Market-to-Book Ratio is recomputed with market value adjusted as described previously. Changes in the ratio are indicators of the pollution control cost effects.

#### 3.3.3.2 Calculation

The Market-to-Book Ratio is calculated using Worksheet 8 on pages 40 and 41 of the Workbook. The calculation is done for the three most recent years without the cost of pollution control and for the most recent year adjusted for the cost of pollution control. The data needed are available in <u>Value Line Industry Surveys</u>, <u>Moody's</u> (Exhibit 3-25), Standard and Poor's Industry Reports, or the firm's annual reports. The steps in the calculation of Market-to-Book Ratio are as follows:

- 1. Obtain the high and low values of the firm's stock from Moody's (see Exhibit 3-25), Value Line, or Standard & Poor's Daily Stock Price Record. Record values for the three most recent years on Lines 1a and 1b of Worksheet 8 (page 40 of the Workbook).
- 2. Enter stockholders' equity, from Line 6 of Worksheet 5, for the three most recent years on Line 2a.
- 3. Enter average number of shares outstanding for the three most recent years on Line 2b. This information can be found on Line 2 of Worksheet

as \$41,100,000 in 1982 and \$37,300,000 in ance meth preciated Exhibit 3-25 scilities is de-RI. preciated
At Dec. 31, 1982, minimum rental payments ful lives, L. DATA FROM MOODY'S - MARKET-TO-BOOK RATIO

conditions.

conditions.

(e) Property, plant and equipment are stated at cost. For financial accounting purposes.

Co. depreciates major portion of its processing facilities, using a modified declining bal-

Maintenance, repairs, and minor renewals are charged to income: major renewals and betterments are capitalized. Upon normal retirement or replacement, cost of property (less proceeds of sale or salvage) is charged to accumulated depreciation.

Auditor's Report

The following is an excerpt from the Report of Independent Auditors, Coopers & Lybrand, ared in 1982 Annual Report.

(ATIO shows present fairly the consolidated position of Hercules Incorporated and subsidiary companies as of December 31, 1982 and 1981, and the consolidated results of their operations and changes in their financial position for the years ended December 31, 1982, 1981 and 1980, in conformity with generally accepted accounting principles consistently applied during the period except for the change in 1981, with which we concur, in the method of accounting for foreign currency translation, as described in Note 2 to the consolidated financial statements."

FINANCIAL & OPERATING D	ATA
STRUCKER RECORD	
Parad non observe	

Earned per share— —com. & com. eq. on yr, end. sha.; —cum. & com. eq. on avge. shs	1982 1982.16 1982.22	1981 (\$3.09 (\$3.09	1960 (32.59 (32.60	1979 483.89 483.89 \$1.074	1978 [382.36 [382.36 \$1.00	1977 [7]81,36 [2]81,36 #1,00	1976 1182.36 1182.44
Price Range—common	281/4-161/4	263/4-183/4	25-151/4	22%-161/4	18%-121/4	2814_1487	\$0,85 38-24
Compression of the contract of	8374.0078	E3-01	9974509	841/4-73	87-76	1021/2-821/4	117-93%
Notes, 8%s, 1983	9914-9314	961/4-871/4	97-821/4	981/4-861/4	103-94	103/4-101/	1069/4-101
Net tangible assets per sh.—common	\$24.14	\$2,4.70	\$23.69	\$22.18	<b>£19.16</b>	\$17.68	817.34
Times charges earned: Before income taxes	3.11	5.02	4.68	9.13	6.68		
A fee income taxes	2.71	3.92	4.05	6.42	4.30	4.29 2.78	7.38 4.39
No. of shares—	•17.1	4.76	7100	4.10	420	4.10	4.39
THO, OF SHAPE	44 612 710	42 514 428	42.448.474	42,383,028	42,383,028	42,383,028	42,383,028
-common, average	43.211.839	42,508,368	42,420,223	42,383,028	42,383,028	42,383,028	42,332,752
Pinancial and operating Hanes							
Current assets + current liabilities	2.23	2.55	1.95	1.94	1.89	2.20 4.85	2.23
% cash & securities to current assets	4.36	3,23	4.64	- 7.18	8.19.	4.85	5.40
inventory to current assets	47.04	47.64	42.59	40.93	44.80	49.60	47.41
% net current assets to net worth	79,99	49.35	Ja.29	40.13	40.64	43.23	42.22
% property depreciated	55,59	55.03	53.64	54.63	\$5.78	\$3.07	\$1.17
% ann. depr. & amort, to gross prop	5.79	5,89	· 6.08	6.25	6.60	6.11	6.23
Capitulization:	** **	**	04.00				
% long term debt	28.59	30,18	24,89 75,11	22.89	26.56	30.31	30.55
% common stk. & surplus	71.41	69.82		77.11	. 73.44	69.69	69,45
Seles + inventor	4.70	6.68	7.37	7.30	6.14	5.71	5,93
Sales - receivables	6.49 267.30	6.48 299.47	5.95 284,79	5.76 303.46	5.86 272.51	6.22 235.38	5.96
% sales to net property			131.52	133.17			228,19 111,58
% sales to total assets	123.37	136.11		9.80	121.91	114.91	
% net income to total assets	4.92 9.12	6.83	6.03 11.29		6.47 12.62	3.92 7.65	.7.47
% net income to net worth	7.12 %	12.9 <b>8</b> %	11.69 67.	18.25	7.02	7.63 %	14.19
Sales, less disc., etc	100,00	100.00	100.00	100.00	100.00	100.00	100,00
Cost of goods sold	82.66	80.86	82.04	79.01	77.17	79.33	76.87
Sell, gen. & adm. exp.	12.73	11.35	11.73	11.97	13.26	13.37	13.10
Balance	4.61	7.79	6.23	9.02	9.57	7.30	10.03
Other income	1.78	دُهُ:	0.80	3.38	1.18	0.85	4.53
Total income	6.39	8.62	7.03	12.40	10.75	8.15	14.56
Interest & debt expense	2.05	1.72	1.30	1.36	أغا	1.90	1.97
Net income before income taxes, stc	4.34	6.90	\$.33	11.04	9.14	6.25	12.59
Income & franchise taxes	0.82	1.88	0.94	3.68	<b>ڏف</b> ڏ	2.84	5.90
Extraordinary gain	0.47		14144	41144	*****	****	
Net income	3.99	5.02	4.59	7.36	5.31	3.41	6.69
Cincludes \$0.66 nonrecurring gains, Min.							

Uncludes \$0.46 nonrecurring gains. [Includes \$0.14 plant write-down. [Ilincludes \$0.11 plant write-down. [Ilincludes \$0.62 gain on sale of pigment and methanol assets. [Ilincludes \$0.13 loss from terminating operations at joint-venture terephthalate plant at Middleburg. [Pincludes \$0.27 write-down of facilities and investments. [Ilincludes \$0.25 extraordinary gain.]

#### LONG TERM DEBT

#### 1. Hercules Inc. 81/4% notes, due 1983:

Rating-A2 -\$100.000,000; outsig., Dec. 31, 1982, AUTH.—\$100.000,000; outsig., Dec. 31, 1982, \$100.000,000.
DATED—Apr. 1, 1975, DUE—Apr. 1, 1983, INTEREST—A&O 1 to holders registered

\$100.000.000.
DATED—Apr. 1, 1975. DUE—Apr. 1, 1983.
INTEREST—A&O 1 to holders registered M&A 15.
TRUSTEE—Citibank, N.A., NYC.
DENOMINATION—Fully registered, \$1,000 or any integral multiple thereof.
CALLABLE—As a whole or in part at any time on or after Apr. 1, 1981 on at least 30 but not more than 60 days' notice at 100, plus accrued interest.
SINKING FUND—None.
SECURITY—Not secured. Co. nor any restricted subsidiary may create, assume or guarantee any secured debt without making effective provision for securing the notes (and any other indebtedness of, or indebtedness guaranteed by, Co. or such restricted subsidiary then entitled thereto) equally and ratably with such secured debt, except for (i) certain mortgages, pledges, liens or encumbrances in connection with the acquisition or construction of property by Co. or a restricted subsidiary, (ii) certain mortgages on property of Co. or a restricted subsidiary (iii) certain mortgages on property of Co. or a restricted subsidiary (iii) certain mortgages on property of Co. or a restricted subsidiary, (iii) certain mortgages, pledges, liens or encumbrances on property existing at the time of acquisition thereof, whether or not assumed by Co. or a restricted subsidiary, (iv) mortgages, pledges, liens or encumbrances on property, als. of stock or indebtedness of any ecoporation existing at the time of acquisition thereof, whether or not assumed by Co. or a restricted subsidiary, (v) mortgages, pledges, liens or encumbrances on property of a corporation existing at the time such corporation existing at the time such corporation becomes a restricted subsidiary, (v) mortgages, pledges, liens or encumbrances on property of a corporation existing at the time of a sale, lease or other disposition of the properties of a corporation or firm as an entirety or substantially as an entirety or substantially as an entirety to Co. or a restricted subsidiary (vi) mortgages, pledges, liens or encumbrances on property of Co. or a restricted subsidiary, (vii) mortgages, pledges, lien

stricted subsidiary in favor of the United States of America or any State thereof, or in favor of any other country, or any agency, instrumentality or political subdivision thereof, to secure certain payments pursuant to any contract or statute or to secure indebtedness incurred for the purpose of financing all or any part of the purpose of financing all or any part of the purpose of financing all or construction of the property subject to such mortgages, (viii) reservations or exceptions contained in any instruments under which Co. or a restricted subsidiary owns or acquires any property and under the terms of which any vendor, lessor or assignor reserves or excepts an interest in oil, gas or any other mineral or the proceeds thereof, (ix) conveyances or assignments under the terms of which Co: or a restricted subsidiary conveys or assigns an interest in oil, gas or other mineral or the proceeds thereof, (x) liens on any property owned by Co. or a restricted subsidiary owns an interest, to secure payment of Co:'s or such restricted subsidiary's proportionate part of the expenses of developing or conducting operations for the recovery, storage, transportation or sale of the mineral resources of such property, or (xi) any extension, renewal or replacements), in whole or in part, of any mortgage, pledge, lien or encumbrance referred to in the foregoing clauses (i to x), inclusive. Notwithstanding the above, Co. and one or more restricted subsidiaries may, without securing the notes, issue, assume or guarantee secured debt which would otherwise be subject to the foregoing restrictions, provided that, after giving effect thereto, the aggregate amount of such secured debt permitted under the foregoing exceptions) and the aggregate "value" of sale and lesseback transactions (other than such transactions in connection with which indebtedness has been, or will be, retired in accordance with the following provision) at such time does not exceed 5% of shareholders' ownership.

The indenture will provide that no consolida

thereto would become subject to the lien of such mortgage, unless the notes shall be secured by a direct lien upon all such important property, prior in rank to all liens other than any theretofore existing thereon, subject to applicable priorides of payment.

SALE & LEASEBACK PROVISION—Sale and leaseback transactions by Co. or any restricted subsidiary of any important property will be prohibited unless (a) the property involved is property which could be mortgaged without equally and ratably securing the notes, or (b) an amount equal to the proceeds of sale or the fair value of the property sold (whichever is higher) is applied to the retirement of indebtedness for money borrowed by Co. or a restricted subsidiary, which was recorded as funded debt as of the date of its creation and which, in case of such indebtedness of Co., is not subordinate and junior in right of payment to the prior payment of the notes.

Co. will not itself, and will not permit any restricted subsidiary to, transfer any important property to any unrestricted subsidiary, without retiring indebtedness as summarized in clause (b) of the preceding paragraph.

INDENTURE MODIFICATION—Indenture may be modified, except as provided, with consent of 66% of notes outsts.

LISTED—On New York Stock Exchange.

PURPOSE—Proceeds to reduce domestic short-term borrowings.

OFFERED—(\$100,000,000) at 100 (proceeds to Co., 99.30) on Mar. 26, 1975 thru Lehman Brothers, Inc. and Merrill Lynch, Pierce, Fenner & Smith, Inc. and associates.

2. Mercules, Inc. convertible subordinated debenture 6½s, due 1898:

2. Hercules, inc. convertible subordinated de-benture 6%s, due 1998:

Rating-A3 Reting—A3
AUTH.—\$100,000,000: outstg., Dec. 31, 1982, \$50,000,000.
DATED—Aug. 15, 1974. DUE—June 30, 1999.
INTEREST—J30 & D31 to holders registered J&D 15.
TRUSTEE—Bankers Trust Co., NYC.
DENOMINATION—Fully registered, \$1,000 or any integral multiple thereof.
CALLABLE—As a whole or in part at any time on at least 30 but not more than 60 days' notice to each June 29, as follows:

7 (for the most recent year) and Moody's, Value Line, or Standard & Poor's Daily Stock Price Record. It should be noted that the number of shares outstanding can change from year to year so the values may not all be the same.

- 4. For each year divide Line 2a (stockholders' equity) by Line 2b (number of shares outstanding) to get book value per share. Enter the results on Line 2c.
- 5. For each year divide Line 1a (market value/share high) or Line 1b (market value/share low) by Line 2c (book value/share) to get the Market-to-Book Ratios. Record the results on Lines 3a and 3b and on Worksheet 14 (page 57 of the Workbook).
- 6. For the most recent year, enter high and low adjusted market values per share (from Lines 8a and 8b of Worksheet 7) on Lines 4a and 4b.
- 7. Divide Line 4a (adjusted market value/share high) or Line 4b (adjusted market value/share low) by Line 2c (book value/share) to get the Market-to-Book Ratios adjusted for the cost of pollution control. Record the results on Lines 5a and 5b and on Worksheet 15 (page 58 of the Workbook).
- 8. Evaluate the three-year trend in stock prices and Market-to-Book Ratios. Record results of this evaluation on Summary Line 1 (page 40 of the Workbook) and on Worksheet 14 (page 57 of the Workbook).
- 9. Evaluate the change in Market-to-Book Ratio due to the cost of pollution control. Record results of this evaluation on Summary Line 2 (page 41 of the Workbook) and on Worksheet 15 (page 58 of the Workbook).

Exhibit 3-26 shows a calculation of Market-to-Book Ratios using the sample firm data.

#### 3.3.3.3 Interpretation

Two analyses are used to evaluate the Market-to-Book ratio. These are:

- 1. three-year trend; and
- 2. adjusted ratios.

These analyses are described below. The results and interpretation should be entered on Worksheets 14 and 15 on pages 57 and 58 of the Workbook. Examples are provided in Chapter 5.

Critical values and industry averages are not used because Market-to-Book Ratios vary widely from industry to industry and from firm to firm. In addition, Market-to-Book Ratios may vary widely over the life cycle of a given firm.

Exhibit 3-26
WORKSHEET 8
MARKET-TO-BOOK RATIO
(\$)

		Three Most Recent Years of Company Data		
		Year 1982	Year <u>1981</u>	Year <u>1980</u>
la.	Market Value per Share - High	28.75	26.375	25.0
1b.	Market Value per Share - Low	16.875	18.75	15.125
2a.	Stockholders' Equity (\$1000)	1,175,655	1,100,147	1,009,746
2b.	Number of Shares Outstanding (X100	0) 43,212	42,508	42,420
2¢.	Book Value per Share Line (2a) divided by Line (2b)	27.21	25.88	23.80
3a.	M/B Ratio - High Line (la) divided by Line (2c)	1.06	1.02	1.05
3b.	M/B Ratio - Low Line (1b) divided by Line (2c)	0.62	0.72	0.64
4a.	Adjusted Market Value per Share - High Worksheet 7, Line 8a	28.59		
4b.	Adjusted Market Value per Share - Low Worksheet 7, Line 8b	16.71		
5a.	Adjusted M/B Ratio - High Line (4a) divided by Line (2c)	1.05		
5b.	Adjusted M/B Ratio - Low Line (4b) divided by Line (2c)	0.61		

#### SUMMARY

1.	Three-year trend in stock prices and Market-to-Book Ratios: Stock prices
	and Market-to-Book Ratios have been fairly constant over the past three
	years.

## Exhibit 3-26 (continued) WORKSHEET 8 (continued)

2.	Change in Market-to-Book Ratios due to cost of pollution control: No	
	noticeable changes in Market-to-Book Ratios due to pollution control cost	<u>s</u> .
•		

The three-year trend indicates whether the Market-to-Book Ratio has increased, decreased, or remained the same in recent years. In general, a decreasing ratio is a negative sign because it indicates decreasing investor confidence in the earning potential of the firm. A stable or increasing ratio indicates investor confidence. However, two factors must be considered in using the Market-to-Book Ratio. First, stock prices frequently rise and fall in response to other factors other than the expected performance of the firm. As a result, changes in stock price, and consequently in the Market-to-Book Ratio, may be largely unrelated to the expected performance of the firm. Second, market prices may be affected by changes in dividend payments by the company, which may not be directly related to the financial health of the firm.

The adjusted ratio indicates the Market-to-Book Ratio that would be expected if the pollution control investment is made. The adjusted ratio will always be less than the unadjusted ratios. The reduction in the ratio is to be considered in relation to the recent trends of the ratio:

- does it seem to indicate that the cost will seriously jeopardize an already precarious corporate situation; or
- will it turn a marginally promising situation into a questionable one;
   or
- will the effect be no greater than the variation found in the recent past?

The adjusted ratio can also be considered in terms of the percent reduction from the unadjusted ratio. The significance of the reduction is a qualitative judgement, as is the comparison to recent trends. No precise guidelines are available as to what would constitute acceptable or un- acceptable impacts on the Market-to-Book Ratio. Substantial reductions or changes may be viewed as one set of adverse indicators to be considered with the other firm-level results discussed in this chapter.

#### CHAPTER 4

#### PLANT-LEVEL ANALYSIS

#### 4.1 INTRODUCTION

The firm-level tests presented in Chapter 3 are relatively straightforward and depend on readily available data. However, these tests may not be sufficient to determine if an individual plant can maintain operations when faced with additional pollution control expenditures. Even though a <u>firm</u> could afford the additional cost, it may be more profitable to close a plant rather than install the pollution control equipment. Two conditions would indicate a need for plant-level analysis:

- the firm contends that investment in pollution control would make the plant unprofitable to operate; or
- the firm-level analysis indicates that investment in pollution control would have a serious detrimental effect on the firm's financial health.

The plant-level analysis described in this chapter is based on plant-specific costs and revenues and is designed to focus on potential plant shutdowns rather than total corporate ability to pay. An analysis of a plant's ability to pay for pollution control can be very complex because:

- plant-level financial data are usually confidential;
- the necessary data, particularly concerning the allocation of corporate overhead expenses, are not always collected by firms at the plant level; and
- non-standardized accounting procedures used internally by firms do not facilitate easy verification of reported cost and revenue items.

The plant-level tests are intended and designed as screening tests rather than rigorous and definitive evaluations of a plant's ability to afford pollution control costs. If the test results indicate that pollution controls would impose severe economic impacts, then a more detailed plant closure analysis would be necessary. This would entail working closely with the plant and corporate accountants to gather information on a variety of costs, revenues, and accounting procedures. Mathematical modelling of the plant's profitability may

be necessary. Information on salvage values of equipment as well as projections of future economic conditions may be desirable or required. A methodology for plant closure analysis is not presented in this document.

Three tests are presented in this chapter: the Earnings Test, the Gross Margin Test, and the Revenue Test. The choice of test to be used depends on the availability of data. The Earnings Test, which is the most accurate of the three tests, also requires the most data. The permit writer should use Exhibit 4-1 as a guide in determining which test to perform.

These tests are designed to be simple to perform. However, the data needed may not always be readily available or easily derived. The most significant data problems are summarized below.

- Corporate overhead expenses are not usually allocated to individual plants, and if they are, biases in the allocation method are not easily detected.
- Gross margin at the plant level may not be explicitly calculated and the components of gross margin may not be recorded.
- The components of cost of goods sold are subject to biases and misallo-cations.
- Transfer prices for inputs "purchases" by the plant from other parts of the company can be inflated to bias costs upward.
- Transfer prices that are assigned to intermediate products "sold" to other parts of the company may be artificially low, causing revenues to be biased downward.
- Average industry ratios of earnings before taxes (EBT) to gross margin and EBT to revenue may not reflect specific plant ratios.

Exhibit 4-1
GUIDANCE FOR USE OF PLANT-LEVEL TESTS

Test	Plant Data Needed	Worksheets Needed
Earnings Test	Total annual cost of pollution control; revenues; cost of goods sold; corporate overhead	9, 10, 11
Gross Margin Test	Total annual cost of pollution control; revenues; cost of goods sold	9, 10, (Lines 1-3), 12
Revenue Test	Total annual cost of pollution control; revenues	9, 10 (Line 1), 13

#### 4.2 POLLUTION CONTROL COSTS AND EBT

Once the permit writer has obtained the available data from the plant, two items must be calculated before a plant-level test can be performed. These are the total annual cost of pollution control and the plant's earnings before taxes (EBT). These calculations are described in this section.

#### 4.2.1 Total Annual Cost of Pollution Control

#### 4.2.1.1 Theory

Any piece of pollution control equipment has two types of costs associated with it:

- Capital Cost the cost of buying and installing the equipment; and
- Operating and Maintenance (O&M) Costs the annual expenses necessary to maintain and operate the equipment.

The plant-level tests require comparisons of pollution control costs to annual income statement items, so it is necessary to put the lump sum capital cost in annual terms. A capital recovery factor (CRF) is used to annualize capital investment cost over the useful life of the equipment. This factor, when multiplied by the capital cost of the equipment, defines a series of annual cash flows. When these values are added to the annual O&M cost, the result is the total annual cost of the pollution control technology.

#### 4.2.1.2 Calculation

The formula for the capital recovery factor is:

$$CRF = \frac{i(1+i)^n}{(1+i)^n - 1}$$

where: CRF = Capital recovery factor

i = Cost of capital (or interest rate)

n = Life of pollution control equipment

Ideally, the cost of capital (i) would be calculated for every firm based on its debt/equity ratio, borrowing rate, market risk, and state and local tax rates. This

is discussed in more detail in Chapter 2 (Section 2.2.3.1). Because information needed to calculate the cost of capital for a firm can be very time-consuming to collect, the interest rate is usually substituted for the cost of capital. This is the value for interest rate on new debt used in Worksheet 3d (Line 3). As can be seen in the formula, the capital recovery factor is a function of the interest rate (or cost of capital) and the life of the pollution control equipment. Both of these items therefore will have a significant effect on the value of the capital recovery factor. If information on the interest rate and/or equipment life are uncertain or essentially unavailable to the permit writer, these items could be varied in a sensitivity analysis to assess their impact on the total annual costs. All of the data needed to calculate the total annual cost of the pollution control technology can be found on the worksheets which were used in the firm-level analysis. The calculation of the total annual cost is performed using Worksheet 9 on page 45 of the Workbook. The steps in the calculation are as follows:

- 1. Enter the capital cost of the pollution control technology (from Line 2a of Worksheet 1b on page 7 of the Workbook) on Line 1 of Worksheet 9 (page 45 of the Workbook).
- 2. Enter the interest rate on new debt (from Line 3 of Worksheet 3d on page 19 of the Workbook) on Line 2a.
- 3. Enter the estimated life of the pollution control equipment in years (from Line 3 of Worksheet 6 on page 34 of the Workbook) on Line 2b.
- 4. Calculate the capital recovery factor (CRF) using the following formula:

$$CRF = \frac{i(1+i)n}{(1+i)n-1}$$

where : CRF = Capital recovery factor

i = Interest rate on new debt (Line 2a)

n = Estimated life of pollution control equipment in years
 (Line 2b)

Enter the result on Line 2c.

- 5. Multiply Line 1 (capital cost of pollution control equipment) by Line 2c (capital recovery factor) to get the annualized capital cost. Record the result on Line 3.
- 6. Enter the annual O&M cost for pollution control (from Line 6 of Worksheet 4b on page 25 of the Workbook) on Line 4.

7. Add Line 3 (annualized capital cost) and Line 4 (annual O&M cost) to get the total annual cost of pollution control. Enter the result on Line 5.

Exhibit 4-2 shows the calculation of total annual cost using the sample plant data.

#### 4.2.2 Earnings Before Taxes

#### 4.2.2.1 Theory

The three plant-level tests use items from the income statement of a plant. The basic components of a plant-level income statement are revenues, cost of goods sold, and corporate overhead, as shown in Exhibit 4-3. The plant should be able to provide some or all of this information.

Many companies do not keep records of revenues for each plant. Instead they maintain only cost records for the plant and record revenues and earnings at the division or firm level. However, most products have identifiable market prices. When revenues are not available for a plant, they can be calculated by multiplying the market price per unit of product by the number of units produced over the year to get total revenues. A permit writer can verify the prices for each product by checking with the appropriate trade journals. however, products produced at one plant are used as inputs to processes in another plant in the same firm. These products are no external market and are called "intermediate goods". To determine the "revenues" associated with these products, a transfer price needs to be assigned. The plant should be able to provide this information. It should be noted that a plant can bias revenue estimates downward and cause their financial condition to appear worse than it is by assigning an artificially low transfer price to intermediate goods. Because transfer prices are often developed by bargaining between plants within the firm, very little can be done to detect biased transfer prices.

Revenues which are unrelated to the product or services produced at the plant should not be included in plant revenues. Examples of such revenues are the sale of property or rental income. If the firm is unable to supply revenue data, or if revenues cannot be estimated by the permit writer, none of the plant-level tests can be performed.

#### Exhibit 4-2

### WORKSHEET 9

### TOTAL ANNUAL COST OF POLLUTION CONTROL (\$1000)

1.	Capital Investment Cost (C) Worksheet 1b, Line 2a	10,000
2a.	Interest Rate on New Debt (i) Worksheet 3d, Line 3	0.14
2b.	Estimated Life of Pollution Control Equipment in Years (n) Worksheet 6, Line 3	5
2c.	Capital Recovery Factor (CRF)	
	$CRF = \underline{i(1+i)^n}$	0.291
	(1+i) <sup>n</sup> -1	
3.	Annualized Capital Cost Line (1) x Line (2c)	2,910
4.	Annual O&M Cost Worksheet 4b, Line 6	1,000
5.	Total Annual Cost of Pollution Control Line (3) + Line (4)	3,910

#### Exhibit 4-3

#### INCOME STATEMENT COMPONENTS

#### REVENUES

• (Units of Product) x (Price per Unit)

#### COSTS OF GOODS SOLD

- Cost of materials
- Direct labor cost
- Production overhead cost (indirect labor, rent, heat, etc.)
- e Extraordinary costs should not be included

#### GROSS MARGIN

• (Revenues) - (Cost of Goods Sold)

#### CORPORATE OVERHEAD

- Selling, general, and administrative expenses
- Interest expense
- R&D expense
- Depreciation on common property

#### EARNINGS BEFORE TAXES

• (Revenues) - (Cost of Goods Sold) - (Corporate Overhead)

The cost of goods sold includes the cost of materials, direct labor, and production overhead (indirect labor, rent, heat, etc.). Standard costs can be used in process industries like the chemicals industry to assign costs to each of those categories if necessary, but actual costs are more descriptive of the true cost of goods sold during the year. Extraordinary costs that are unusual in nature and occur infrequently (such as the purchase of equipment) should not be included in the cost of goods sold, nor should any items described in Exhibit 4-3 as corporate overhead.

Corporate overhead is the fraction of total corporate expenses that is allocated to an individual plant. There are a number of different bases by which firms allocate these expenses, and these expenses are often difficult to determine for a particular plant. Because of the relatively arbitrary nature in which corporate overhead expenses may be allocated, a firm could assign artificially large portions of corporate costs to a plant in order to misrepresent its earnings before taxes.

The income statement format in Exhibit 4-3 is based on "standard absorption costing." Under the standard absorption costing method, each unit of product produced absorbs a pro-rated share of both the fixed and variable costs of production during each accounting period. Most firms use the standard absorption costing method. However, many firms use the "variable costing" method. This costing method assigns only variable costs to the costs of goods sold. Fixed costs of production realized during an accounting period are treated as expenses of that period when determining net income, but are not included in cost of goods sold. Net income will be different under the two costing systems when production in a period does not equal sales of that period. Because the income statement format in Exhibit 4-3 is based on standard absorption costing, the permit writer should verify that the plant's cost and revenue data are recorded using the same method. If not, it is possible that the plant would record enough information to derive the data needed to complete the income statement.

#### 4.2.2.2 Calculation

Earnings before taxes (EBT) are calculated for the most recent year by subtracting the cost of goods sold and the plant's share of corporate overhead

from the plant's revenues. Exhibit 4-4 shows the income statement data for a sample plant in the sample firm. These data are for a hypothetical plant, although they do represent realistic numbers. The calculation of EBT is done using Worksheet 10 on page 48 of the Workbook. The steps in the calculation are as follows:

- 1. Enter the plant's revenues for the most recent year on Line 1 of Worksheet 10 (page 48 of the Workbook).
- 2. Enter the cost of goods sold (excluding extraordinary items) for the most recent year on Line 2.
- 3. Subtract Line 2 (cost of goods old) from Line 1 (revenues) to get gross margin. Enter the result on Line 3.
- 4. Enter the plant's portion of the corporate overhead for the most recent year on Line 4.
- 5. Subtract Line 4 (corporate overhead) from Line 3 (gross margin) to get the plant's earnings before taxes (EBT). Enter the result on Line 5.

Exhibit 4-5 shows a calculation of the EBT for a plant using the sample plant data.

# HYPOTHETICAL PLANT INCOME STATEMENT (\$1000)

REVENUES	200,000
COST OF GOODS SOLD	
Cost of Materials Direct Labor Production Overhead Extraordinary Costs  Total	90,000 38,000 20,000 -0- 148,000
CORPORATE OVERHEAD	
Selling, General, Administrative Interest Research and Development Depreciation	15,000 2,000 7,000 18,000
Total	42,000

## WORKSHEET 10

# EARNINGS BEFORE TAXES (EBT) FOR PLANT (\$1000)

		Most Recent Year of Company Data
		Year <u>1982</u>
1.	Revenues	200,000
2.	Cost of Goods Sold	148,000
3.	Gross Margin Line (1) - Line (2)	52,000
4.	Corporate Overhead	42,000
5.	Earnings Before Taxes (EBT) Line (3) - Line (4)	10,000

#### 4.3 PLANT-LEVEL TESTS

This section describes the three plant-level tests, which use the total annual cost of pollution control and EBT information calculated on Worksheets 9 and 10 to obtain an estimate of the impact of pollution control expenditures on plant operations. Only one of the plant-level tests needs to be performed. The permit writer should determine which test to perform based on the availability of the necessary data.

### 4.3.1 Earnings Test

#### 4.3.1.1 Theory

The Earnings Test seeks to answer the question "Are earnings before taxes greater than zero?". The Earnings Test assumes that a plant will continue to be profitable if the EBT minus the total annual cost of pollution control is greater than zero. This test is strict but reasonable because a plant which can cover all fixed and variable costs with earnings before taxes will in the long run remain in operation. In the short run, plants are concerned with covering variable costs only and could operate with EBT less than zero. EBT of zero does not permit a plant to earn its entire required return on investment because depreciation alone will not supply the required return. However, because depreciation is a noncash expense, actual cash flow will be greater than zero even when EBT equals zero, and money would be available for reinvestment in assets. Thus, EBT of zero does not preclude a plant from taking advantage of growth opportunities and from earning future profits.

Although the Earnings Test is appropriate conceptually, it has some significant practical problems. Most importantly, corporate overhead expenses are not usually allocated to individual plants explicitly; instead they are assigned to division-level profit centers. If a plant or firm can provide corporate overhead expense data which relate to a specific plant, then this test should be performed. However, the permit writer must recognize that biases in the overhead allocations will be difficult to detect without a very detailed plant-level questionnaire.

#### 4.3.1.2 Calculation

The Earnings Test is very straightforward to perform; the necessary data are obtained from Worksheets 9 and 10 on pages 45 and 48 of the Workbook, respectively. The test is done using Worksheet 11 on page 50 of the Workbook. The steps in the calculation are as follows:

- 1. Enter earnings before taxes (from Line 3 of Worksheet 10 on page 48 of the Workbook) on Line 1 Worksheet 11 (page 50 of the Workbook).
- 2. Enter the total annual cost of pollution control (from Line 5 of Worksheet 9 on page 45 of the Workbook) on Line 2.
- 3. Subtract Line 2 (total annual cost of pollution control) from Line 1 (EBT) to get the EBT adjusted for the cost of pollution control. Enter the result on Line 3 of Worksheet 11 (page 50 of the Workbook) and on Worksheet 15 (page 58 of the Workbook).
- 4. Indicate whether the adjusted EBT (from Line 3) is greater than, less than, or equal to zero on Summary Line 1 of Worksheet 11 (page 50 of the Workbook) and on Worksheet 15 (page 58 of the Workbook).

Exhibit 4-6 shows an Earnings Test calculation using the sample plant data.

#### 4.3.1.3 Interpretation

Interpreting the result of the the Earnings Test involves comparing earnings before taxes (EBT) adjusted for the cost of pollution control to zero. If the adjusted EBT value is greater than zero, the plant should be able to absorb the annual costs of pollution control and still maintain positive EBT. This would mean that the financial impact due to the cost of pollution control would not be severe enough to cause the plant to become unprofitable. An adjusted EBT value of less than zero indicates that the annual costs associated with pollution control would have a negative economic effect on the plant. A grey area exists if the adjusted EBT value is zero (or close to zero). In this case a more detailed plant closure analysis would be needed. It should be noted that the other plant-level tests will not be helpful if the results of the Earnings Test are in the grey area. The interpretation of the Earnings Test, if it is the plant-level test performed by the permit writer, should be entered on Worksheet 15 on page 59 of the Workbook. An example is provided in Chapter 5.

## WORKSHEET 11

# EARNINGS TEST (\$1000)

1.	Earnings Before Taxes (EBT) Worksheet 10, Line 5	10,000
2.	Total Annual Cost of Pollution Control Worksheet 9, Line 5	3,910
3.	Adjusted EBT Line (1) - Line (2)	6,090

## SUMMARY

1. Is the adjusted EBT greater than, less than, or equal to zero? <u>Adjusted</u>

<u>EBT is greater than zero</u>, plant should be able to afford pollution control.

If the Earnings Test cannot be performed because data which allocate corporate overhead to individual plants are not available, one of the two following tests—the Gross Margin Test or the Revenue Test—should be used for the plant—level analysis. Like the Earnings Test, both of these tests are based on the goal of maintaining an EBT value which is greater than zero.

#### 4.3.2 Gross Margin Test

#### 4.3.2.1 Theory

Gross margin (or gross profit) is equal to revenue minus the cost of goods sold. It is a measure of the profit at a plant before corporate overhead expenses have been deducted. Thus, the use of the Gross Margin Test avoids the difficult problem of determining what corporate overhead expenses are allocated to a plant. Since the cost of pollution control technology relative to EBT is the standard by which a permit writer decides whether the technology is economically achievable, the Gross Margin Test has been designed to provide a similar measure.

The Gross Margin Test measures the total annual cost of pollution control as a fraction of gross margin. If total annual pollution control costs exceed a defined range, then the technology may adversely affect the plant's profitability. The range is defined by the ratio of EBT to gross margin for a specific industrial sector or SIC code. If total annual pollution control costs exceed this range, the EBT may be less than zero and the technology could cause the plant to close.

The Gross Margin Test is easy to perform and it avoids the need for data on corporate overhead expenses. It still has limitations, however. First, it is only a substitute for the Earnings Test; actual EBT are not known. The EBT/gross margin ratio is only an <u>industry average</u> and may not accurately reflect the actual plant's situation.

Implicitly assumed in the Gross Margin Test is that plants cannot pass through any of the added pollution control costs to customers through higher prices. In this sense, the test is conservative because if prices could be raised then some of the impact could be reduced.

Although the problem of obtaining corporate overhead allocation data is avoided with the Gross Margin Test, the potential for misrepresenting revenues and plant costs still exists. If revenues include intermediate goods that are assigned transfer prices by the company, there is little the permit writer can do to check the accuracy of the prices. Thus, revenues could be biased downward. Costs can also be misallocated because of the variety of methods of inventory valuation. Standard costs are used most frequently and they are based on predetermined production levels. Actual year-end costs, rather than standard costs, should be requested, although the former may not be representative in unusual years.

#### 4.3.2.2 Calculation

The data needed to perform the Gross Margin Test are obtained from Worksheets 9 and 10 (pages 45 and 48 of the Workbook, respectively) and Robert Morris Associates' Annual Statement Studies. Exhibit 4-7 shows an example of where to find the data in Morris. The Gross Margin Test is done using Worksheet 12 on page 52 of the Workbook. The steps in the calculation are as follows:

- 1. Enter the gross margin (from Line 3 of Worksheet 10 on page 48 of the Workbook) on Line 1 of Worksheet 12 (page 52 of the Workbook).
- 2. Enter the total annual cost of pollution control (from Line 5 of Worksheet 9 on page 45 of the Workbook) on Line 2.
- 3. Find the EBT data (called "Profit before taxes") for the appropriate SIC code in Morris' Annual Statement Studies. Enter the data for up to four firm sizes on Line 3a. (The data in Annual Statement Studies is presented for different firm sizes. The EBT/GM ratio is calculated for each firm size in the appropriate SIC code.)
- 4. Find the gross margin data (called "Gross profit") for the same SIC code in Morris. Enter the data for up to four plant sizes on Line 3b. The plant sizes for the industry EBT and the gross margin data should be the same.
- 5. For each plant size, divide Line 3a (industry EBT) by Line 3b (industry gross margin) to get industry EBT/gross margin (GM) ratios. Record the results on Line 3c.
- Enter the lowest of the EBT/GM ratios (from Line 3c) on Line 3d.
- 7. Divide Line 2 (total annual cost of pollution control) by Line 1 (gross margin) to get the total annual cost of pollution control as a fraction

#### DATA FROM MORRIS - GROSS MARGIN TEST

## MANUFACTURERS - PLASTIC MATERIALS & SYNTHETIC RESINS

		arrent Data		ļ				Otive Historica		
	30-9/30/81)		1/61-3/31/62)	i	ACCET CITE	6/30°27. 3/31/78	6/30.78 3/31/78	3/31.00	6,30 86 3/31 81	3/3 €/3(
9 1MM 24	1-10MM 68	10-50MM 18	60-100MM 6	ALL 116	ASSET SIZE NUMBER OF STATEMENTS	120_	ALL 116	ALL 144	127	î
8 6	9.	3 5	*	5 6	ASSETS Cash & Equivalents	6 2	67		*	
35 5	29 5	28 9		301	Accts & Notes Rec - Trade(net)	280	29 8	6 B 28.5	5 2 26 5	30 30
19.7 1.7	22.7 1.2	24 9 1 9		224	Inventory  All Other Current	243 20	223	24 6 2.2	215 14	22
65 5 25 2	56 2 33 5	59 2 32 6		50 d 31 8	Total Current Fixed Assets (net)	60 6 33.0	50.1 33 3	623 316	58 S 32 6	59
. i 9 1	1.6 8.6	7.5		1.1	Intangibles (net) All Other Non Current	5.0	14 52	13	8	1
_100.0	100.0	1000		1000	Total	1000	1000	100.0	1000	100
7.0 4.1	8 8 3.2	9 7 2.7		8.4	LIABILITIES Notes Payable Short Term	. 10 1	8 0	8.7	6.3	8
24 1	19.7	16.4		3 2 19 7	Cui. Mat L/T, D Accts & Notes Payable - Trade	3.7 18 3	33 179	4 1 20 4	3.4 19.2	19
4 6 6.0	8 8 2 0	6 7 4 0		32	Acciung Expenses All Other Current	5 6 2 9	<b>66</b> 41	6 5	5 7 3 7	6
45 9 76 1	40.4 18.5	39 4 25 2		40.6	Total Current Lung Term Dobt	407	39 8 18 4	44.2 17.7	397	4 U
5.5 32.5	2.8 38.3	3 0 32 4		36	All Uther Non-Current Net Worth	19	2 4	2 1	3 2	3
100.0	100.0	1000		100 0	Total Liabilities & Net Worth	1000	39 4 106 D	1000	40 G 10G O	37 100
100.0	1900	100 0		100.0	INCUME DATA Not Sales	1000	100 0	1000	16070	 10.
27 1 27 9	27.2	223		76 8 ] 23.2 :	Giras Pralit	75.7 24.3	76 2 23 8	75 8 24 2	76 J 23 7	76
30	18.9	18:9 5.4		182	Obergrund Exhempes	197	16 0	19 4	18 6	11
10	1.3	29		14	Operating Profit All Other Expenses (net)	46 14	5 A 10	4.8 1 1	50 13	1
19	41	28		36	Profit Before Taxes	32	4.8	_ · 31	3.6	
2.1 1.6 1.0	2.1 1.4 1.1	2.5 1.5 1.1		2.2 1.6 1.1	Current	2 1 1 5 1.2	2.2 1 6 1.2	2 1 1 5 1 1	2 1 1 5 1 1	;
1. <b>5</b> 1.1	1.2	1.2 .8		1.3	Quick	1.3	1 3 1.0	1.3	13 10	
97	35 10 5	40 91		.6 36 10.2	-	38 9 7	37 10.0	36 10 4		<b>36</b> 10
67	43 0.4 58 0.3	64 68 68 54		67 77 68 63	Sales/Ruceivables	47 78 62 59	47 7.7 62 5.9	46 7 8 55 6 8	48 75 59 62	47 58
9 16,1 7 9.8 9 6.1	29 12,7 42 8.6 57 8.4	37 10.0 50 73 85 43		20 12 4 43 8 5 63 8.8	Cost of Sales/Inventory	42 8 7 64 6.8 70 5 2	29 12 6 80 7.3 68 5 4	34 10 8 80 7 3 69 5 3	33 112 43 84 66 56	29 1 43
7.2 11 8 1/NF	7.5 13.5 32,7	6.0 10.7 31.1	<del></del>	7.0	Sales. Working Capital	6 B 10 7	6 1 9 0	0 5 11 6	6 y 11,5	1
5.1 } 22	8 2 (58) 3.1	3 7 (17) 2.0	(10	32.3 7.6 01) 2.8	EBIT/interest	22 P 9 8 (95) 2 7		33 9 7 8 (115) 3 8	2 <u>7 3</u> 8 7 [165] 2 8	3: (101)
12 83 1) 27	! 6 8.7 (55) 4,0	. 9 6.3 (13) 2.6		1.4 7.9 84) 3.8	Cash Flow/Cur. Mat. L/7/D	[6,	7 4 (78) 4 5	6.7 (90) 36	12 77 (93) 31	(84)
1.5 .4	<u>2,3</u>	1,3		<u>21</u> . 6	man in	17.	20	(90) 36 15	(93) 31 15	(84)
2.0	10 16	13		1:0 17	Fixed/Worth	14		1.5	14	
22	1.6 3.2	2 2 4.3		3.5		15	1.5	16	1.4	
39 6	36.9	380		36 7	% Profit Befüre Texas/Tengible	35 7	28. 41 <b>9</b>	2 <u>9</u> 394	32.2	3
25.6	10.5	16 5 	:1] ·	10) 234	% Profit Before Texas/Tengible Net Worth	(118) 22 5 4 3	111) 253	(138) 240 fl 4	(123) IRB 77	(110) 2
13.8 8.3 1.2	15.6 8.8 3.0	113 60 - 6		13.9	A Profit Before Taxes/Total Assets	14 6	16 4 10 2 4 1	153 82 27	19 8 8 0 2 1	i
17 4 13.2 7.7	13.2 7.2 4.0	9 1 6.1 4 0		13.4 7.4 4.3	Salus/Net Fixed Assets		10.2	127	113	- 1
3.3 2.7	2.9	2.4 2.0	-	2.0 2.2	Sales/Total Assets	24 2.1 1.7	2.7 2.1	<del>3.9</del> , 27 22	<u> १३.</u> 28 21	
<u>!!</u>	1 4	1.6		12	men e deremandermen, y memberen opmensore 				21 <u> 1</u> 5.	
	(63) 2.0 3.3	(17) 1.9 2.8		08) 20 32	% Depr . Dep . Amort./Sales		(105) 23 3 8	(134) 23	{116) 21 35	(168)
1.7 5) 23 38	17		((	46) 1.5 20	% Lease & Rental Exp/Sales	(56) 16 23	[45] 4 20	2.2	(58) 17 22	
2 P 6 5	1.8		(4	43) 3.5 47	<b>▼</b> Officers' Comp/Sales	(43) 4 1	(38) 2.5 (38) 4.0	2.1	2.0	
34932M	571178M 253180M	741490M ***	636430M 437530M	1964039M	Met Sales (2) Total Assets (2) M = Sthougen Smilhot through 12 to 109 atton of Re	1129219M	1204793N	14822516	2639528M	19840
	440CIB106 181		~~/ <i>?</i> E <b>V</b> ~~	· · · · · · · · · · · · · · · · · · ·	i orac wasett (5)	6/47Z\$M	454930N	725073N	i 1364301M	11061

- of gross margin. Enter the result on Line 4 of Worksheet 12 (page 52 of the Workbook) and on Worksheet 15 (page 58 of the Workbook).
- 8. Determine whether the total annual cost of pollution control as a fraction of gross margin (from Line 4) is greater than, less than, or equal to the lowest industry EBT/GM ratio (from Line 3d). Record the evaluation on Summary Line 1 of Worksheet 12 (page 52 of the Workbook) and on Worksheet 15 (page 58 of the Workbook).

Exhibit 4-8 shows an example of the Gross Margin Test performed using the sample plant data.

#### 4.3.2.3 Interpretation

The Gross Margin Test compares the total annual cost of pollution control (expressed as a fraction of the plant's gross margin) to the industry's EBT (expressed as a fraction of the industry's gross margin). If the total annual cost of pollution control/plant gross margin ratio is less than the EBT/gross margin ratio for the industry, the plant will probably be able to afford the pollution control technology without experiency negative economic effects. Conversely, if the pollution control cost/plant gross margin ratio is greater than the EBT/gross margin ratio for the industry, the economic effects on the plant could be severe. A grey area exists if these two ratios are equal. In this case a more detailed plant closure analysis would be needed. The interpretation of the Gross Margin Test, if it is the plant-level test performed by the permit writer, should be entered on Worksheet 15 on page 59 of the Workbook.

If the data on cost of goods sold are not available and gross margin cannot be calculated for a plant, the Gross Margin Test cannot be performed. The Revenue Test, which is described in the next section, does not require any cost data and therefore avoids the use of information that may be unavailable or potentially biased.

#### WORKSHEET 12

## GROSS MARGIN TEST (\$1000)

1.	Gross Margin Worksheet 10, Line 3			52,000	
2.	Total Annual Cost of Worksheet 9, Line 5	Pollution Co	ntrol	3,910	
3.	Threshold Values - I	ndustry EBT/GI	M Ratios		
		Plant Size	Plant Size	Plant Size #3	Plant Size
3a.	Industry EBT	1.9	4.1	2.6	•
3b.	Industry Gross Margin	27.9	22.2	22.3	
3c.	Industry EBT/GM Ratios Line (3a) divided by Line (3b)	0.07	0.18	0.12	
3d.	Lowest EBT/GM Ratio	0.07			
4.	Total Annual Cost of Pollution Control as a Fraction of Gross Margin Line (2) divided by Line (1)	0.06			

## SUMMARY

1. Is Line 4 greater than, less than, or equal to Line 3d? Because the total annual cost of pollution control as a fraction of gross margin is less than the industry's lowest EBT/GM ratio, the plant should be able to afford pollution control.

#### 4.3.3 Revenue Test

#### 4.3.3.1 Theory

The Revenue Test is one step simpler than the Gross Margin Test and is therefore less sophisticated. To perform the test, the total annual cost of pollution control is measured as a fraction of the plant's revenues. If total annual pollution control costs exceed a defined range, then the plant may not be able to afford the technology. The range is defined by the ratio of EBT to revenues for a specific industrial sector or SIC code. If total annual pollution control costs exceed this range, EBT may be less than zero and the technology might cause the plant to close.

The Revenue Test requires only information on plant revenues. As mentioned above, if individual plants do not record revenues, they can be calculated by multiplying the market or transfer price per unit of product by the number of units of product produced. The Revenue Test should be used when gross margin (or the data to calculate it) is not available for a plant because the plant's accounting system does not gather costs in the appropriate manner.

Because the Revenue Test requires very little information from the plant, it is easy to perform. However, it is also somewhat crude because it does not consider specific plant costs but depends almost entirely on industry average data. In addition, as with the other tests, biased information could be a problem because the firm or plant must provide transfer prices for intermediate goods.

#### 4.3.3.2 Calculation

The data needed to perform the Revenue Test are obtained from Worksheets 9 and 10 (pages 45 and 48 of the Workbook, respectively) and from Morris. Exhibit 4-9 shows an example of where to find the data in Morris. The Revenue test is done using Worksheet 13 on page 54 of the Workbook. The steps in the collection are as follows:

- 1. Enter revenues (from Line 1 of Worksheet 10 on page 48 of the Workbook) on Line 1 of Worksheet 13 (page 54 of the Workbook).
- 2. Enter the total annual cost of pollution control (from Line 5 of Worksheet 9 on page 45 of the Workbook) on Line 2.

#### DATA FROM MORRIS - REVENUE TEST

## MANUFACTURERS - PLASTIC MATERIALS & SYNTHETIC RESINS 80C# 2821

	Cı	errent Deta					Camp	arative Historica	l Data	
E2(6/30-			1/81-3/31/82)			6/30 I	8 3/31/	3/31/10	6, JO.80. 3/31, 81	6:3: 3:3
0-11666 24	1-104AL 68	10-504M 18	60-1004444 6	ALL 116	ASSET SIZE NUMBER OF STATEMENTS	120			ALL 127	1
*	*	*	*	*	ASSETS	*			*	
8 6 35.5	4 8 29.5	3 5 28.9		301	Cash & Equivalents Accts & Notes Ruc - Trade(net)	6 2 28.0	8 7 29 8	26.5	6 2 29 5	30
197	22 7	24.9		22 4	Inventory	243	223	24 8	215	22
1 7 65 5	1.2 58 2	19 592		14 596	All Other Current Total Current	2 O 60 6	1 4 60.1	2 Z 62 3	1 4 5 8 5	51
25. <u>2</u> 1	33 6 7 8	32.6 .6		318	Freed Assets (net) Intangibles (net)	33.0	33.3 1.4	316 13	32 6 9	Ď
9 i	66	. 75		76	All Other Non-Current	5 9	5 2	49	8 0	
100.0	100.0	100.0		100.0	Total	1000	1000	100,0	1000	10
70	8.8	9.7		84	LIABILITIES Notes Payable Short Term	. 101	8 0	8 7	8 3	٠,
4 1 24 1	3.2 19.7	2.7 18.4		3 Z   19 7	Cui Mat L/T/D Accts & Notes Pavable Trade	' 37 183	3 3 17 9	4 1 20 4	3 4 15 2	
4 6	6.8	6 7		61	Accrued Expenses	5 6	6 6	6.5	5.7	31
6.0 45 9	2.0 40.4	4 0 39 4		3 2 40 6	Ail Other Current Total Current	2.9 40.7	4 1 39 8	442	3 <b>7</b> 39 7	4
16 1 5 5	18 5 2.8	25 2		18.7	Lung Term Dept	17.1	18 4	17.7	104	1
32 5	38.3	3.0 32.4		3.6 37 1	All Giner Non Current Net Worth	1.9 40 3	2.4 39 4	36.0	3 2 40 5	3
100 0	1000	1000	<del></del>	100.0	Tatal Lisbilities & hel Worth	100.0	1000	1000	1000	. 10
100.0	1000	1000		100 0	Net Sales	1000	100 0	100 0	Reco	10:
27.9	778	777		76 8	CON IN Sales	25.7	16 2	75.8	16.3	7
24.9	22.2 16 9	22.3 16 8		23 2 18.2	Grees Profit Operating Expenses	243 19.7	23 8 18 0	24 2 19 4	237 188	2
30	6.3	6.4 		50	Operating Profit	46	5.6	4.8	5 0	
19	4.1	2.0		36	Profit Before Texes	14 32	1.0 4 <b>8</b>	1 1 3 7	13	
					MATIOS					
2.1 1.6	2.1 1.4	2.5 1.5		2.2 1.5	Current	21 15	2 2	2.1 1.5	2.1 15	
10	<u> </u>	1.1						ii	<u>ii</u>	
1.5 1.1	1.2 .8	1.2 .8		1.3	Quick	1.3	1.3 1.0	1.3	13	
	<u> </u>	i_			WHICH				10	
M 07 35		40 91	3			38 97	37 10.0	35 10 4	40 92	36 1
18 74 43 14 67 58		54 6 B 68 5 4	4	7 77 8 63	Sales/Receivables	47 78 62 59	47 7.7 62 5 9	46 79 55 68	49 75 50 62	47 68
3 16 1 29	• • •	37 10.0	2		•	42 87	29 12 6	34 10 8	33 112	29 1
17 BB 42 10 B1 67		50 7.3 86 4.3	4		Cost of Sales/Inventory	54 4 B 70 5 2	50 73 68 54	60 73	43 84	43
7.2	7.8	6.0		70		6.8	<u></u>	<u>69</u> <u>5</u> 3.	655 6 6 a	<u> 63</u>
118 11MF	13.5 32.7	10.7 31 \$		123	Sales/Working Capital	107	9 0	116	115	1
6.1	8 2	37		<u>323</u> 7.6			<u>29</u> 5 13 2	<u>. 3</u> 39 78	27.3	3
2) 22 (54	) 31 (	17) 2.0	[10	1) 28	EB!T/Interest	(95) 37	(83) 45	(175) 38	87 (105) 29 (	101)
12	19	٠.	•	1.4		10	22	16	12	•
8 3 2) 2.7 (56	· 87 ) 4.0 (	63 13) 2.6	18	7 <b>9</b> 4) 3.8	Cash Flow/Cur. Mat. L/T/D	(87) 28	(78) 45	67 (90) 36	77	(84)
1.5	2.3	1.3		21		1.7	(78) 45 20	(90) 36 15	(93) 3 f	(5,4)
.4	5	7		5		4	5	4	5	
2.0	16	13		1.0	Fued/Worth		1 5	8	7 14	
10	9	13		9	* **	124	8	. <u>1</u> .5 ,	' ¥.	<del>-</del>
22	1. <b>6</b> 3.2	2.2 4.3		1.8 3.5	Debt/Worth	15			14	
39 6	36.9	310		35.7	S Profit Before Taxes/Tempible	2 5 2 5	2,8	2.0		• ••
2) 25 6 (64 57	10.5	16.5	(1)	0) 23.4	% Profit Before Taxes/Tengible Net Worth	(116) 225	(111) 253	(138) 240	(123; 18 8 (	110) 2
13.8	15.8	<u> </u>		13 0	% Profit Before Texes. Total	}				• •• •
6.3	11	50		7.3	Assets	į 81	1 6 4 10 2	8.2	13 6 8 0	1
12.4	3.0 13.2	<u></u>		15		19				
13.2	7.2			13 4 7 4	Sales/Net Fixed Assets	104	10.2 6.8	12 7 7 9	113 66	1
<u> 7.1</u> _	4.0	4.0		43		L <u>3.7</u>	4.2	45.		
33 27	2.9 2.2	. 24 2.0		2.8 2.2	Sales/Total Assets	2 d 2.1		27	2 8 2.1	
1.0	<u> </u>			17	201037.10(3) W296(3	2.1	16		2.1 15	
.8 Ca) 0 1 (C:	14	16		13		1.5	13	15	1.4	
27	3.3	2.8	{10	1) 20	% Depr. Dep. Amart/Sales	(113) 23 37	(105) 23	{134} 2 1		1108;
17	.3			5		1 7		5	, "E," . S	
5) 23 (24 3.5	) , #		(4	61 1.5	% Lease & Rental Exp/Sales	(56) 16	(45) 10		(58) 12	
2 9	! { . 1.0			20		23			2 2	
18) 41 (26	29		(4	3) 3.5		[43] 41	(38) 40	(57) 40	7 C (43) 36	(43)
6 5 24932M	4 3 571178M	74 14 144	636430M	47	Not Sales (2) Total Assets (8) M = 616eueen	5.8	0.1	16	6.5	1011
	263180M	463 163M	437520M	100573M	met Sales (3) Total Assats (8)	; 11292}£ ; 474794	M 1204793	M 1482251A	75J9528M	1964: 1106:
12720M bert Morris Asso				.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,						

- 3. Find the EBT data (called "Profit before taxes") for the appropriate SIC code in Morris' Annual Statement Studies. Enter the data for up to four plant sizes on Line 3a.
- 4. Find the revenue data (called "Net sales") for the same SIC code in Morris. Enter the data for up to four plant sizes on Line 3b. The plant sizes for the industry EBT and revenue data should be the same.
- 5. For each plant size, divide Line 3a (industry EBT) by Line 3b (industry revenues) to get industry EBT/revenue ratios. Record the results on Line 3c.
- 6. Enter the lowest of the EBT/revenue ratios (from Line 3c) on Line 3d.
- 7. Divide Line 2 (total annual cost of pollution control) by Line 1 (gross margin) to get the total annual cost of pollution control as a fraction of gross margin. Enter the result on Line 4 of Worksheet 13 (page 54 of the Workbook) and on Worksheet 15 (page 58 of the Workbook).
- 8. Determine whether the total annual cost of pollution control as a fraction of gross margin (from Line 4) is greater than, less than, or equal to the lowest industry EBT/GM ratio (from Line 3d). Record the evaluation on Summary Line 1 of Worksheet 13 (page 54 of the Workbook) and on Worksheet 15 (page 58 of the Workbook).

Exhibit 4-10 shows an example of the Gross Margin Test performed using the sample plant data.

#### 4.3.3.3 Interpretation

The Revenue Test compares the total annual cost of pollution control (expressed as a fraction of the plant's revenues) to the industry's EBT (expressed as a fraction of the industry's revenues). If the ratio of the annual cost of pollution control to the plant's revenue is less than the EBT/revenue ratio for the industry, the plant will probably be able to afford the pollution control technology without experiencing negative economic effects. Conversely, if the ratio of the pollution control cost to the plant's revenue is greater than the EBT/revenue ratio for the industry, the economic effects on the plant could be severe. A grey area exists if these two ratios are equal. In this case a more detailed plant closure analysis would be needed. The interpretation of the Revenue Test, if it is the plant-level test performed by the permit writer, should be entered on Worksheet 15 on page 58 of the Workbook.

#### WORKSHEET 13

# REVENUE TEST (\$1000)

1. Revenues Worksheet 10, Line 1

200,000

2. Total Annual Cost of Pollution Control Worksheet 9, Line 5

3,910

3. Threshold Values - Industry EBT/Revenue Ratios

		Plant Size	Plant Size #2	Plant Size	Plant Size
3a.	Industry EBT	1.9	4.1	2.6	
3b.	Industry Revenues	100.0	100.0	100.0	
3c.	Industry EBT/ Revenue Ratios Line (3a) divided by Line (3b)	i 0.02	0.04	0.03	
3d.	Lowest EBT/ Revenue Ratio	0.02			

4. Total Annual Cost
of Pollution Control
as a Fraction of
Revenues
Line (2) divided by
Line (1) 0.02

#### SUMMARY

1. Is Line 4 greater than, less than, or equal to Line 3d? Because the plant's total annual cost of pollution control as a fraction of revenues is equal to the lowest industry EBT/revenue ratio, the Revenue Test cannot be used to conclude whether the plant can afford pollution control.

#### CHAPTER 5

#### ANALYSIS OF TEST RESULTS

#### 5.1 INTRODUCTION

Chapters 3 and 4 discussed several measures of financial health and described how they could be interpreted. The insights provided by these tests must be intergrated to evaluate the economic effect of pollution controls on a firm or plant. The purpose of this chapter is to assist the permit writer with integrating the results of the firm-level and plant-level analyses and interpreting them as a whole.

In some instances all of the test results will suggest the same evaluation. If all tests uniformly indicate that a firm is financially healthy and can afford pollution control equipment, the economic effect is clearly acceptable. Similarly, if all tests indicate poor financial condition, the economic effect would probably not be acceptable. Unfortunately, the results of each test are unlikely to agree with regard to the financial condition of the firm, and some total evaluation or tradeoff among test results will be necessary.

This chapter provides a framework for evaluating such conflicting results. Explanation of all possible combinations is not possible within the scope of this text. This methodology, therefore, does not provide a "cookbook" format to follow in evaluating conflicting results. However, it provides an understanding of the interactions among the tests that will assist the permit writer in evaluating some of the possible combinations.

## 5.2 SUMMARY OF TEST RESULTS

The first step in interpreting the firm-level tests together and in conjunction with the plant-level analysis is to summarize the test results. This is done by entering the numerical results and summary comments for each test on Worksheets 14 and 15 on pages 57 and 58 of the Workbook. This is included in the step-by-step instructions for performing each test, so that by the time the permit writer has completed all of the necessary firm-level and plant-level tests, Worksheets 14 and 15 should be complete. Exhibits 5-1 and 5-2 show these two worksheets completed using the sample firm and plant data.

The next step in summarizing the test results involves completing Worksheet 16 on page 59 of the Workbook. This is done by comparing the test results on Worksheets 14 and 15 with the guidelines shown in Exhibit 5-3. Each test is given an overall summary result in the form of a "+" or "-" sign. Exhibit 5-4 shows the test results summarized in this way for the sample firm and plant data.

Exhibit 5-1
WORKSHEET 14
THREE-YEAR TREND WITHOUT POLLUTION CONTROL COSTS

	Year 1982	Year 1981	Year 1980	Industry Comparison
Liquidity Ratios				
Current Ratio	2.2	2.5	2.0	close to or better than upper quartile
Quick Ratio	1.2	1.3	1.1	always higher than median
Solvency Ratios				
Fixed-Charge Coverage Ratio	5.5	7.6	7.7	not applicable
Beaver's Ratio	0.24	0.27	0.26	not applicable
Leverage Ratio				
Debt/Equity Ratio.	0.49	0.55	0.47	much better than
				rest of industry
Market-to-Book Ratio	0.62-1.06	0.72-1.0	0.64-1.05	not applicable

Exhibit 5-2
WORKSHEET 15
RESULTS FOR MOST RECENT YEAR

Firm-Level Tests	Without Pollution Control Costs	With Pollution Control Costs	Change/ Industry Comparison
Liquidity Ratios			
Current Ratio	2.2	2.2	no change/at ind. upper quartile
Quick Ratio	1.2	1.2	no change/near in- dustry upper quar- tile
Solvency Ratios			
Fixed-Charge Coverage	Ratio 5.5	5.39	little change
Beaver's Ratio	0.24	0.24	no change
Leverage Ratio			
Debt/Equity Ratio	0.49	N/A	much lower than industry
Market-to-Book Ratio	0.62-1.06	0.61-1.05	little change
Plant-Level Tests <sup>1</sup>			
Earnings Test	N/A	well above	N/A
Gross Margin Test	N/A	zero	N/A
Revenue Test	N/A		N/A

N/A - not applicable

 $<sup>^{1}</sup>$  one of the three plant-level tests should be performed

Exhibit 5-3
GUIDELINES FOR TEST RESULTS

Firm-Level Tests	Positive	Grey Area	Negative
Liquidity Ratios Current Ratio Quick Ratio	> 2.0 > 1.0	N/A N/A	< 2.0 < 1.0
Solvency Ratios Fixed-Charge Coverage Ratio Beaver's Ratio	> 2.0 > 0.2	1.5 - 2.0 0.15 - 0.2	< 1.5 < 0.15
Leverage Ratio Debt/Equity Ratio	declining	N/A	increasing
Market-to-Book Ratio	high/increasing	N/A	low/decreasing
Plant-Level Tests			
Earnings Test	> 0	N/A	< 0 .
Gross Margin Test	> lowest industry EBT/GM ratio	N/A	<pre>&lt; lowest industry     EBT/GM ratio</pre>
Revenue Test	> lowest industry EBT/revenue ratio	N/A	<pre>&lt; lowest industry EBT/revenue ratio</pre>

N/A - not applicable

#### Exhibit 5-4

#### WORKSHEET 16

## OVERALL RATING (WITH POLLUTION CONTROL COSTS WHERE APPLICABLE)

Firm-Level Tests		
Liquidity Ratios Current Ratio Quick Ratio	+ +	
Solvency Ratios Fixed-Charge Coverage Ratio Beaver's Ratio	+ +	
Leverage Ratio Debt/Equity Ratio	+	
Market-to-Book Ratio	constant	
Conclusion:		
Plant-Level Tests <sup>1</sup>		
Earnings Test	+	
Gross Margin Test		
Revenue Test		
Final Conclusion:		

<sup>+ =</sup> positive test result or economic effect not negative

<sup>- =</sup> negative test result or economic effect

 $<sup>^{1}</sup>$  one of the three plant-level tests should be performed

#### 5.3 INTERPRETATION OF RESULTS

The results of the financial analysis are interpreted and conclusions are drawn for the firm-level tests as a group and then in conjunction with the plant-level test result to determine the overall economic effect of pollution control expenditures. When these evaluations have been made, the results are entered in the "conclusions" sections of Worksheet 16 and final conclusions noted. Interpretation of the firm-level and plant-level test results will be discussed in the next two sections.

#### 5.3.1 Interpretation of Firm-Level Tests

In some instances, all of the firm-level test results will suggest the same conclusion. Such results provide a clear picture of the economic effects of the pollution control requirement. For example, the economic effects would almost certainly be acceptable for a firm with:

- Liquidity Ratios relatively high;
- Solvency Ratios high;
- Leverage Ratios low; and
- Market-to-Book Ratio high.

More typically, test results for a firm will include a combination of positive and negative indicators. No firm rules can be stated for evaluating conflicting results from different types or ratios. However, the general pattern of results is often apparent upon inspection. A financially weak firm will have several negative indicators among the firm-level tests. Similarly, a financially sound firm may have one or two negative indicators but will have a positive overall pattern. These general trends should be noted in evaluating the economic effects of pollution controls. Following are examples of four common combinations of ratios that may appear to be conflicting with some explanations for interpreting each.

Positive Indicator: Liquidity Ratios High

Negative Indicator: Solvency Ratios Low

Debt/Equity Ratio High

In general, if Liquidity Ratios are high, indicating that the pollution control equipment can be paid for with cash and equivalent current assets, the purchase of such equipment should be considered to have a negligible economic effect. The exception to this is when the Liquidity Ratios have recently increased, the Debt/Equity Ratio has increased, and Solvency Ratios have decreased. changes may indicate that the firm has recently borrowed money to invest in a new business opportunity and is holding that money temporarily as cash or marketable securities. This can be verified if debt has recently increased on the If the firm were required to spend this cash on pollution control, an investment with no return, instead of investing in the new business opportunity, they would either have to forfeit the business investment or issue bonds or borrow to pay for it. In this case, rely on the interpretation of the Solvency Ratios to determine economic effects. This is shown as Example #1 in Exhibit 5-5. The conclusion would be that an investment in pollution controls would probably cause the firm financial hardship. Examples #2 through #4 in Exhibit 5-5 show variations on this example of the firm-level test results and the conclusions that would be drawn.

Positive Indicator: Debt/Equity Ratio Low Negative Indicator: Market-to-Book Ratio Low

This combination of indicators probably means that the firm's assets (expressed in these ratios as stockholders' equity and book value of the firm's stock) have been overvalued for some reason. If these assets were not overvalued, the Debt/Equity Ratio (which was a positive indicator) would be higher—a less positive indicator. Place emphasis on the Liquidity and Solvency Ratios to determine the economic effect of a pollution control option. Examples #5 and #6 in Exhibit 5-5 show two situations based on these indicators and the firm-level conclusions that would be drawn when the Liquidity and Solvency Ratios are included.

Positive Indicator: Debt/Equity Ratio Low

High Bond Ratings

Negative Indicator: Solvency Ratios Low

Solvency Ratios (Fixed-Charge Coverage Ratio and Beaver's Ratio) measure the ability of average cash flows to cover payments on bonds and long-term debts.

Exhibit 5-5
EXAMPLES OF TEST RESULTS

## Example:

Firm-Level Tests	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10
Liquidity Ratios Current Ratio Quick Ratio	+	++	-	-	+	-	ND ND	+	- -	+
Solvency Ratios Fixed-Charge Coverage Ratio	-	+	+	-	-	+	-	-	-	-
Beaver's Ratio	-	+	. +	-	-	+		-	-	-
Leverage Ratio Debt/Equity Ratio	-	-	•	+	+	+	+	ND	ND	ND
Market-to-Book Ratio	ND	ND	ND	ND	-	-	ND	+	+	<b>-</b> ,
Conclusion:		+			+		 + <sup>1</sup>	+	 -	· ;
Plant-Level Tests <sup>2</sup> Earnings Test Gross Margin Test Revenue Test	•	+	ND	+	-	+	ND	ND	•	+
Final Conclusion:	•	+	•	?	?	?	+1	+		+

<sup>1</sup> if bond ratings are above Ba/BB

 $<sup>^{2}</sup>$  one of the three plant-level tests should be performed

<sup>+ =</sup> positive test result or economic effect not negative

<sup>- =</sup> negative test result or economic effect

ND = no data

<sup>? =</sup> results indeterminate - plant closure analysis needed

Low ratios, therefore, could mean that cash flow may be inadequate to cover debt. If the Debt/Equity Ratio is also low and, more importantly, if bond ratings are high (both indicating low risk of defaulting on debt) low Solvency Ratios can be ignored. In general, bond ratings are good indicators of default risk and they can be relied upon over the Solvency Ratios. Moody's Industrial Manual and Standard and Poor have bond-rating services that assign a firm's bonds to one of nine rating categories:

Moody's	Standard & Poor
Aaa	AAA
Aa	AA
A	A
Baa	BBB
Ba	88
В	В
Caa	CCC
Ca	CC
C	C

Aaa and AAA are the best ratings, assigned to bonds with the smallest degree of investment risk. Thus, if other indicators are positive, trade off low Solvency Ratios against a high bond rating (above Ba/BB) and conclude that the firm can afford pollution control. This is shown in Example #7 in Exhibit 5-5.

Positive Indicator: Market Value of Stock Not Declining

Liquidity Ratios Above Cutoff

Negative Indicator: Solvency Ratios Declining

If Solvency Ratios are lower than in previous years while other indicators show steady or improving conditions, it could be due to the lagging effect of a new investment on the income statement. For example, if long-term debt is increased and stock is issued to purchase new process equipment, the following balance sheet items are affected:

- Long-Term Debt -- increased:
- Common Stock -- increased: and
- Property, Plant, and Equipment -- increased.

Payments on the loan as a result of the purchase are expenses that occur on the income statement, causing a decrease in net income.

Because the capital outlay for process equipment does not immediatley produce an increase in revenues, the Solvency Ratios (which use income statement items in the numerator and balance sheet items in the denominator) would indicate worse financial conditions than before the purchase. These ratios are misleading, however, because the new process equipment will increase income in future periods and perhaps improve the firm's financial condition. Rely on the Liquidity Ratios and market value of the stock to draw conclusions. This set of conditions and variations on it are shown in Examples #8 through #10 in Exhibit 5-5, along with the conclusions that would be drawn concerning the firm-level analysis.

#### 5.3.2 Interpretation of Plant-Level Test

The final step in interpreting the results of the financial analysis is assessing the result of whichever plant-level test is performed in conjunction with the conclusion reached for the firm-level analysis. Obviously, this only needs to be done if a plant-level analysis was deemed necessary and was per-If the firm-level analysis indicates that the firm can pay for formed. pollution control and the plant-level test result indicates likewise, the final conclusion should be that there would be no negative effect due to an investment in pollution control. If both the firm-level and plant-level analyses indicate a negative economic effect due to a pollution control investment, the conclusion should be that the plant could not afford the technology and that a less costly technology should be evaluated. A more detailed closure analysis would be necessary if the conclusions of the firm-level and plant-level analyses disagree with each other. Various combinations of firm-level and plant-level results and the appropriate final conclusions are shown in Exhibit 5-5. Exhibit 5-6 shows the firm-level and final conclusions using the sample firm and plant data.