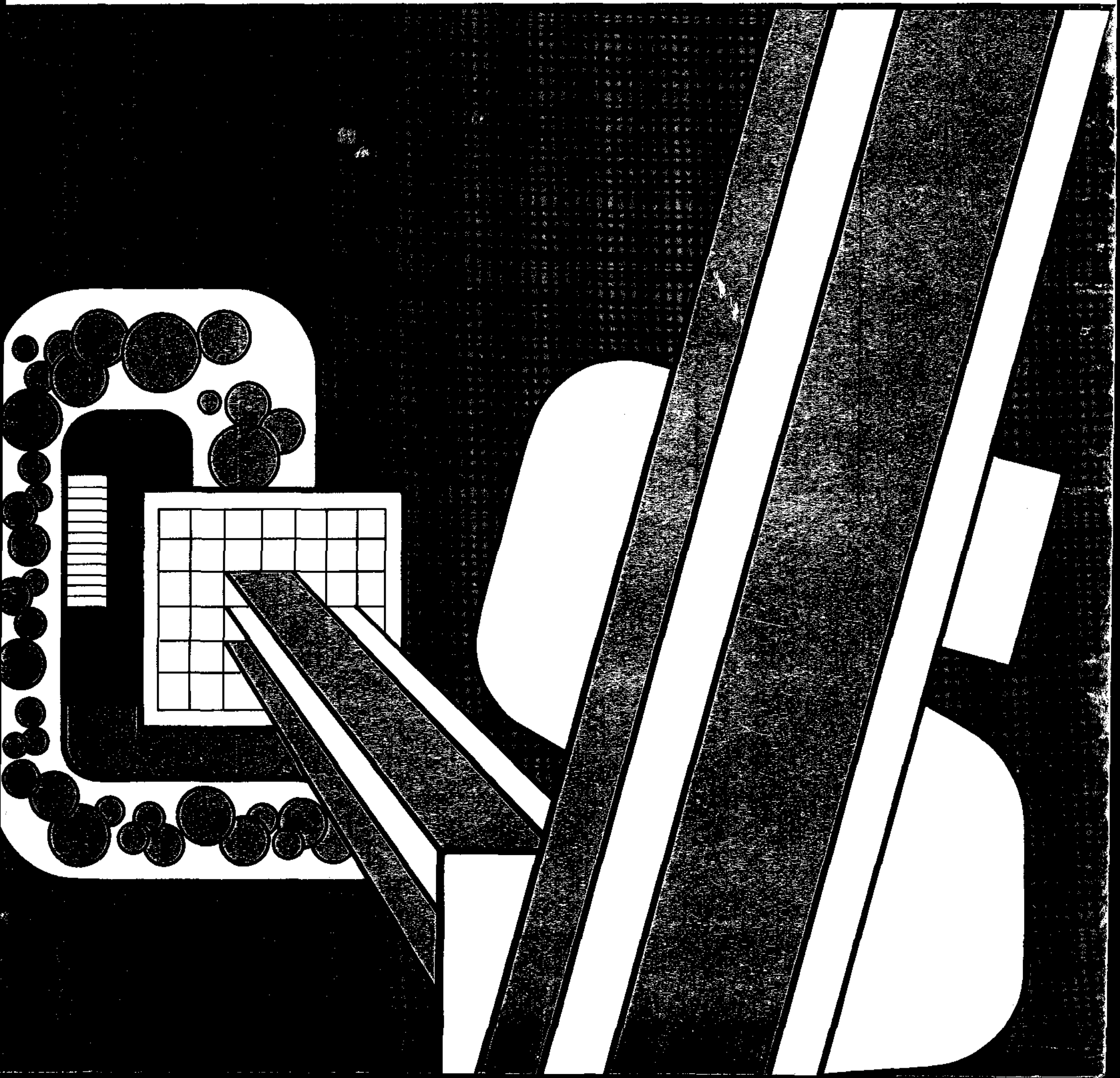
Choosing Optimum Financial Strategies

Pollution Control Systems

EPA Technology Transfer Seminar Publication



EPA-625-3-76-005

CHOOSING THE OPTIMUM FINANCIAL STRATEGY FOR POLLUTION CONTROL INVESTMENTS

ENVIRONMENTAL PROTECTION AGENCY • Technology Transfer

JUNE 1976

ACKNOWLEDGMENTS

This seminar publication contains materials prepared for the U.S. Environmental Protection Agency Technology Transfer Program and has been presented at Technology Transfer design seminars throughout the United States.

This publication was prepared by C. Marshall and J. Commins of JACA Corporation, Fort Washington, Pa.

NOTICE

The mention of trade names or commercial products in this publication is for illustration purposes, and does not constitute endorsement or recommendation for use by the U.S. Environmental Protection Agency.

CONTENTS

Chapter I

INTRODUCTION

As the 1970's proceed, environment-related management decisions will continue to be complex and frequent, often requiring the commitment of sizable amounts of capital. The impact of these nonremunerative environmental expenditures on businesses can be significant, and cost recovery possibilities are limited or nonexistent.

Several governmental institutions provide means to reduce or soften the effect of these pollution control expenditures. To a certain extent, the government passes industrial pollution control costs on to the general public by excusing pollution control devices from certain sales, use, and property taxes; by allowing companies to use tax-exempt financing for the expenditures; or by special depreciation allowances. Such programs permit a company to pay lower taxes or financing costs than it normally would if the equipment being purchased were for a manufacturing or other business purpose. In addition, through federal construction grants to municipalities, the cost of treating a company's wastewater can often be reduced if a municipality treats the wastewater.

To put these incentive or cost-reduction programs into perspective, it should be pointed out that they do not significantly reduce the cost of the pollution control investment. They can, nevertheless, affect a company's cash flow and profit position.

Obtaining control equipment is new to most companies, and a considerable body of new and involved tax and financing regulations exists for such equipment. Consequently, company financial managers may not be as familiar with incentive possibilities as they would be with more common business operations.

This publication will alert decision makers to the availability of and qualifications for some of the financing incentives from federal, state, and local governments, and will demonstrate that it is well worth spending time analyzing the special methods of financing pollution control expenditures and the available tax treatments. Obtaining optimum financial and tax benefits could save a company tens of thousands of dollars over the life of the equipment. For example, a *Business Week* article (July 29, 1972, pp. 50-51) calculating the cost savings that tax-exempt pollution control revenue bonds can provide concluded that "over the life of a 20-year, $10-million issue, the typical interest saving is about $3.6 million."

This publication will show the businessman the type of financial analysis that should be accorded any type of pollution control expenditure in an effort to substantially reduce funds expended and to smooth out what could develop into a cash flow trauma. This publication contains a discussion of the tax and financing positions of three hypothetical firms with different management goals but with similar capital expenditures for pollution control.

A separate financial analysis is presented specifically for firms which have a choice of wastewater treated onsite or by a municipality.

The net present value financial analysis technique will frequently be used to quantitatively compare and select alternative tax and financing strategies. This is a very effective and widely used technique which enables the evaluation of future income and costs in terms of present dollars. Using this technique, it is possible, for example, to evaluate a revenue bond issue which might allow for deferred repayments of principal and permit the largest payments at the end of a 20- or 30-year issue. Meanwhile, the company could lower taxes immediately by taking depreciation and using investment tax credits, thus building up cash flow for use in other areas of the business. On that cash flow, earnings could be generated which would help repay the bond principal later. All of these future incomes, costs, and resulting cash flows can be analyzed and combined and the results compared to the results of a similar analysis of an alternate combination of taxing and financing options.

The examples in this publication have been simplified to convey basic problems and techniques for all industries. They by no means exhaust the variety and combinations of available tax and financing strategies relating to pollution control equipment. Often, financing and, to a lesser extent, tax treatment vary by time and by jurisdiction. Consulting the latest tax rulings and legislation relevant to each location is necessary before undertaking the final decision-making process.

ORGANIZATION OF THIS PUBLICATION

The remainder of this publication is divided into six chapters. Chapter II analyzes the standard depreciation tax methods and others which have been established for pollution control facilities. Chapter III examines the costs of different methods of financing pollution control equipment. Chapter IV relates the financing and tax strategies for pollution control equipment to overall company financial strategies in order to select an optimum financial strategy for the equipment. It is particularly concerned with the effects of each of the incentives on a company's cash flow strategy or its profit maximization strategy. Chapter V examines the availability of federal incentives that also require state involvement and examines examples of additional incentive provided by states. Some financing alternatives are, for practical purposes, always available, while others are dependent upon the source's budget. Chapter VI examines the financial benefits of private treatment of industrial wastewater and the costs and benefits of municipal treatment. Chapter VII is a summary chapter.

Chapter II

TAX STRATEGIES

Normally, two types of federal tax benefits exist for plant equipment expenditures. The underlying effects of these benefits are to reduce the taxes payable by a company and to improve the company's cash flow, thus partially offsetting the original cost of the equipment. One set of benefits, depreciation, allows a proportion of the equipment cost to be deducted annually from income as a non-cash expense over a certain guideline period. The period allowed during which the deductions can be taken changes with different depreciation techniques. Accelerated techniques allow the cost of the equipment to be deducted early in the life of the equipment; amortization is the term used to cover depreciation taken over less than the full life of the equipment. Different proportions can be deducted over the full life of the equipment using techniques such as straight-line depreciation, double-declining balance, and sum-of-the-years digits. The depreciation method chosen should conform with a corporation's financial management strategy.

The second type of tax benefit, an investment tax credit, also exists for all types of equipment. It was intended as a special incentive to encourage companies to buy capital equipment and, in effect, reduces the cost of the equipment by providing a permanent tax reduction.

This chapter will compare selected depreciation techniques, including a technique specifically provided for pollution control, considering only the major financial aspects of laws and regulations. The reader should consult specific regulations for more detail.

GENERAL RULES FOR DEPRECIATING POLLUTION CONTROL EQUIPMENT

An analysis of depreciation entails determining the depreciation method to be used and the useful life of the equipment over which depreciation will be taken.

When choosing a depreciation method for pollution control equipment, the normal requirement that a company consistently adhere to one depreciation method is waived. For example, if a company uses the straight-line depreciation method for its other assets, it could still take double-declining balance depreciation for its pollution control equipment.

Similarly, when determining the useful life of the equipment, it is possible, with sufficient justification, to use one asset depreciation range (ADR) for the normal company assets and a different useful life for pollution control facilities. For example, if a company customarily uses a guideline useful life of 12 years (permitted in the 9.5- to 14-year ADR), an 8-year life could be used for the control device if the life of the control equipment were less than that of the normal ADR. Having a shorter useful life may be advantageous in terms of the company's financial management objectives.

RELATIONSHIP OF DEPRECIATION TO TAXES AND CASH FLOW

The tax benefits of annual depreciation/amortization values result from their being accounted for as an expense which does not actually involve any cash outlays in that year by the taxpayer. (The cash outflows that occur in connection with the equipment purchase are covered in chapter III). An expense means a tax saving (as well as lower profits). The tax savings is a net cash inflow to the corporation and is represented by:

$$NCF = TD$$

where NCF = net cash flow
T = the tax rate, expressed as a fraction
D = amount of depreciation/amortization

Positive cash flows (cash inflows) can be reinvested in the business on the productive side of the operation or to reduce the need for obtaining cash from other sources. A short period of depreciation/amortization means faster deductions, tax savings, and cash flow benefits.

NET PRESENT VALUE OF CASH FLOWS AS A DECISION-MAKING TOOL

Since each tax strategy to be compared in this chapter has a distinct cash flow pattern, a method of comparing the cash flows has to be employed. One useful method is to compute the net present value (NPV) of the annual net cash flow (NCF) produced by each strategy throughout the depreciable life of the equipment. This method of comparison compensates for differences in cash flow amounts, for differences in the duration of two strategies, and takes into consideration the time value of money.

A dollar saved today has a greater long-term effect on the financing situation of an enterprise than a dollar saved a year from now. The dollar saved today has the potential of yielding a return (r) if used for profit-making company operations, or if saved. Thus, the present value (PV) of today's dollar that is saved today is

$$PV = 1$$

The present value of a dollar saved a year from now is, on the other hand,

$$PV = \frac{1}{1 + r}$$

where $1 + r$ becomes the "discount factor" which yields a present value of less than 1.

The present value of a dollar saved i years from now is obtained by discounting annually

$$PV = \frac{1}{(1 + r)^i}$$

When the present value of the net cash flow (*NCF*) of a future year is calculated using the discount factor, the resulting cash flow is called discounted cash flow (*DCF*):

$$DCF_i = \frac{NCF_i}{(1 + r)^i}$$

The sum total of all such discounted cash flows over the useful life is the *NPV* of the tax savings:

$$NPV = \sum_{i=1}^{n} DCF_i = \sum_{i=1}^{n} \frac{NCF_i}{(1 + r)^i}$$

where n = total years.

Since in this case *NPV* is the sum of discounted cash inflows (tax savings), the higher the *NPV*, the more attractive the depreciation method when the company financial objective is to minimize cash outflows for the overall pollution control project.

For manufacturing, r, the return on investment, averages about 7.0 percent before taxes. After taxes, this figure is reduced to about 3.5 percent. Therefore, for our illustrative purposes,

$$r = 3.5\%$$

SAMPLE ANALYSIS OF POLLUTION CONTROL INVESTMENT TAX STRATEGIES

An illustration of the use of *NPV* in comparing alternative tax strategies is presented using water pollution control expenditures. As will subsequently be shown, that area of pollution control involves the greatest variety of financing and tax strategies.

An investment figure of $200,000 will be used and, for accounting purposes, an ADR of 9.5 to 14.5 years. From this range, a useful life of 10 years was selected. Salvage value was assumed to be zero.

The analysis will include a discussion of the four writeoff strategies: rapid amortization, straight-line depreciation, straight-line depreciation plus investment tax credit, and double-declining balance depreciation tax strategies. The analysis will be most fully demonstrated under the first section, Rapid Amortization, as the analysis techniques for all are similar.

Rapid Amortization

The Tax Reform Act of 1969 provides for the rapid amortization of certified pollution control facilities over a 60-month period, irrespective of the guideline useful life of the equipment. This amortization is available under certain conditions outlined in Article 169 of the Internal Revenue Code (IRC). The rapid writeoff was provided to encourage capital investment in pollution control. Significantly, a process change, even if it results in lower pollution, does not qualify as a pollution control device and cannot be rapidly amortized.

As originally legislated, the eligibility period for rapid amortization would have expired January 1, 1975. However, additional legislation extended that period for 1 year. Further extensions are currently being considered.

The rapid amortization applies to the first 15 years of equipment life. The portion of the asset value with a useful life of over 15 years can be depreciated by any method under Article 167 and depreciation can be taken immediately on that portion. The rapid amortization can begin the month after installation and continue for a full 60 months, or it can begin in the next fiscal year. For the intervening months until the next fiscal year begins, a traditional depreciation method can be used.

An *additional first year depreciation* (Section 179, IRC) amount of 20 percent of a maximum asset value of $10,000 or a maximum deduction of $2,000 can be taken in the first year of an asset purchase. The "bonus" first year depreciation can be taken if a taxpayer elects to take the rapid amortization or any other method of depreciation. Although not considered a pollution control incentive, the inclusion of this provision is needed for accuracy of calculations and will be incorporated into all the analyses in this chapter.

This illustration will assume that the corporate income tax rate is 48 percent and that the effective date of purchase of the $200,000 waste treatment facility is the beginning of the fiscal year so that the amortization period will be entirely within the next 5 fiscal years. The toal useful life of the equipment is 10 years. Computation of the *NPV* of the $200,000 investment using rapid amortization results in

$$NCF = TD$$

$$= [(.48)\ (200{,}000 - 2{,}000) \div 5] + (.48)\ (2{,}000)$$

$$NPV = \sum_{i=1}^{n} DCF_i$$

$$DCF = \frac{NCF_i}{(1 + r)^i}$$

$$r = 3.5\%$$

$$NPV = \sum_{i=1}^{n} \frac{NCF_i}{(1 + .035)^i}$$

$$NPV = \$86{,}753$$

Table II-1 shows the annual *DCF* calculations and totals (or *NPV*) for a $200,000 piece of equipment written off by the rapid amortization method over 5 years. The effect of the additional first year depreciation (AFYD) is also considered. Table II-1 should be completed for each of the following tax strategies in order to make comparisons.

Straight-Line Depreciation

The basic or most simple form of depreciation involves reducing taxes by an equal proportion of the depreciable amount in each year of the life of the equipment. In this case, the depreciable base reduces to $198,000 by taking the additional first year bonus depreciation of $2,000 (maximum). Using the above formula and table with the $200,000 equipment with a life of 10 years, the *NPV* of cash inflows or tax savings is $79,969.

Table II-1.—NPV *calculation for rapid amortization*

End of year	Depreciable base	Depr. rate	Pre-tax depr. (*D*)	After-tax depr. (*NCF*)	Discount rate (1 + *r*)	DCF [*NCF* ÷ (1 + *r*)]
1	$200,000	AFYD	$ 2,000	$ 960	1.0350	$ 928
1	198,000[1]	20%	39,600	19,008	1.0350	18,365
2	198,000	20%	39,600	19,008	1.0712	17,745
3	198,000	20%	39,600	19,008	1.1087	17,144
4	198,000	20%	39,600	19,008	1.1475	16,565
5	198,000	20%	39,600	19,008	1.1876	16,006
				Total *DCF* = *NPV* =		$86,753

[1] The $2000 maximum additional first year's depreciation reduces the depreciable base.

Straight-Line Depreciation Plus Investment Tax Credit

The investment tax credit has been available on an on-again/off-again basis over the last decade as a special incentive for the business community to purchase capital equipment. The amount traditionally allowed has been 7 percent, although in 1975 it was temporarily raised to 10 percent to help produce a turn-around in the national recession. Because of this history of the investment tax credit, 7 percent will be used for this analysis. In the investment example being used, this tax credit provides a tax savings of $14,000. This figure, adjusted to the *NPV*, should be incorporated into the calculations of the straight-line depreciation *NPV*, since the investment tax credit is allowed for the method. It is adjusted to the *NPV* by dividing it by the discount rate for the first year and adding the result to the *NPV* straight-line depreciation (or $79,969).

By taking the investment tax credit into account, the *NPV* of the straight-line tax strategy increases to $93,495.

Accelerated Depreciation (Double-Declining Balance Combined With Sum-of-the-Years Digits)

This is the most accelerated of the traditional ways to depreciate equipment. Although two methods are used here in combination, they can be used separately and each would be more accelerated than straight-line depreciation.

Double-declining balance provides that each year twice the straight-line rate (in this example that would be 2 X 10 percent) is applied to the declining balance of the equipment after deducting the AFYD. In this case, the first year's depreciation is $41,600 (0.2 X $198,000 = $39,600 plus the $2000 AFYD). In the second year, the 20 percent is taken against the reduced value ($200,000 - $2,000 - $39,600, or $158,400), resulting in $31,680.

The calculation for sum-of-the-years digits is more easily explained by illustration. The first year of a 10-year life is represented by the 10 in the numerator of a fraction, while 55 in the denominator is the sum-of-the-years digits, 1+2+3+. . .10. The first year's amount in this case would be computed by multiplying 10/55 times the initial cost minus the AFYD. In the second year, $198,000 would be multiplied by 9/55.

The quickest method for accelerating depreciation in this case is to use double-declining balance and the $2000 AFYD in the first year and to switch to the sum-of-the-years digits method in the second. When these two methods are used in such a combination and the investment tax credit is included, the *NPV*, or tax savings, for the $200,000 equipment is $97,764.

COMPARISON OF DEPRECIATION METHODS

Figure II-1 is a bar graph showing how the total value of each depreciation method relates to the overall cost of the equipment. From this figure, it is clear that, when trying to minimize cash outflow (by increasing tax savings), the optimum strategy is the double-declining balance and sum-of-the-years digits methods with the investment tax credit and AFYD.

Curiously, the optimum strategy is not the special pollution control tax strategy, rapid amortization. This was introduced in 1969 when the national economy was thought to be in an overheated condition and the investment tax credit was withdrawn. However, because of the high national priority put on pollution control, its expenditures were accorded special treatment through rapid amortization. In 1971, in a new effort to stimulate the economy, the investment tax credit was reinstated and made applicable to all equipment, including pollution control equipment. The tax credit was especially attractive because it never needed to be repaid, whereas rapid amortization really represented only a postponement of taxes. In addition, when the investment tax credit, plus double-declining balance and sum-of-the-years digits depreciation methods and the AFYD was used, process changes made to comply with pollution control regulations could be covered, while they do not meet requirements for rapid amortization (only control devices do). For these reasons, and because rapid amortization and the investment tax credit were made mutually exclusive, rapid amortization has not been used extensively.

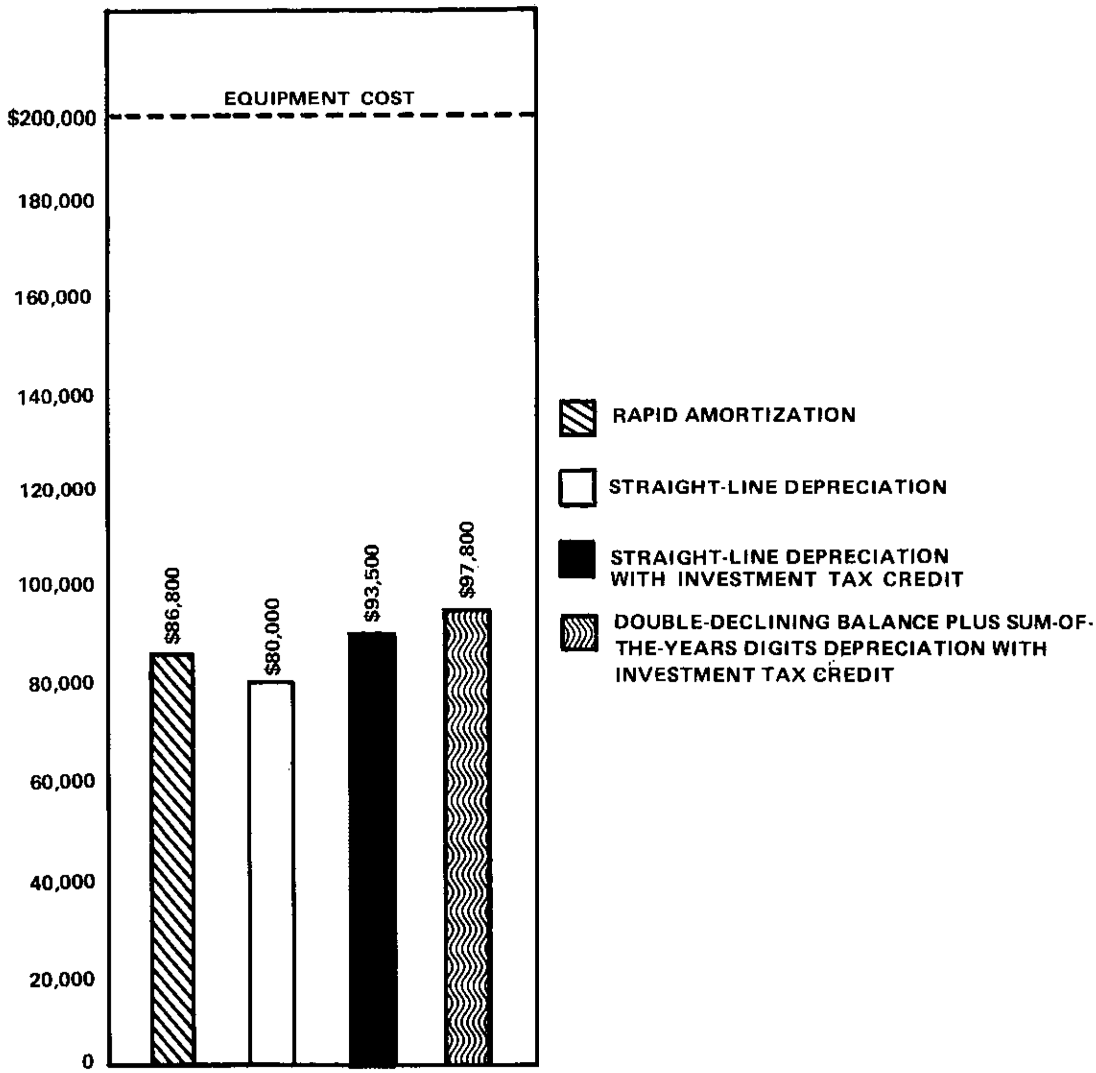


Figure II-1. Net present value of total tax savings through depreciation.

The line graph in figure II-2 indicates the year-by-year after-tax positive cash flows from the various depreciation alternatives. The rapid amortization cash flows are practically level because it was assumed that the equipment was installed at the beginning of the fiscal year. The slightly higher level in the beginning results from the AFYD. A mid-year installation with an election to begin the 60-month amortization period the next fiscal year would have resulted, under optimal conditions, in a higher level in the first year and a level amount over the next 5 years at a slightly lower level.

The high initial level for the last two methods results from taking the investment tax credit and the AFYD.

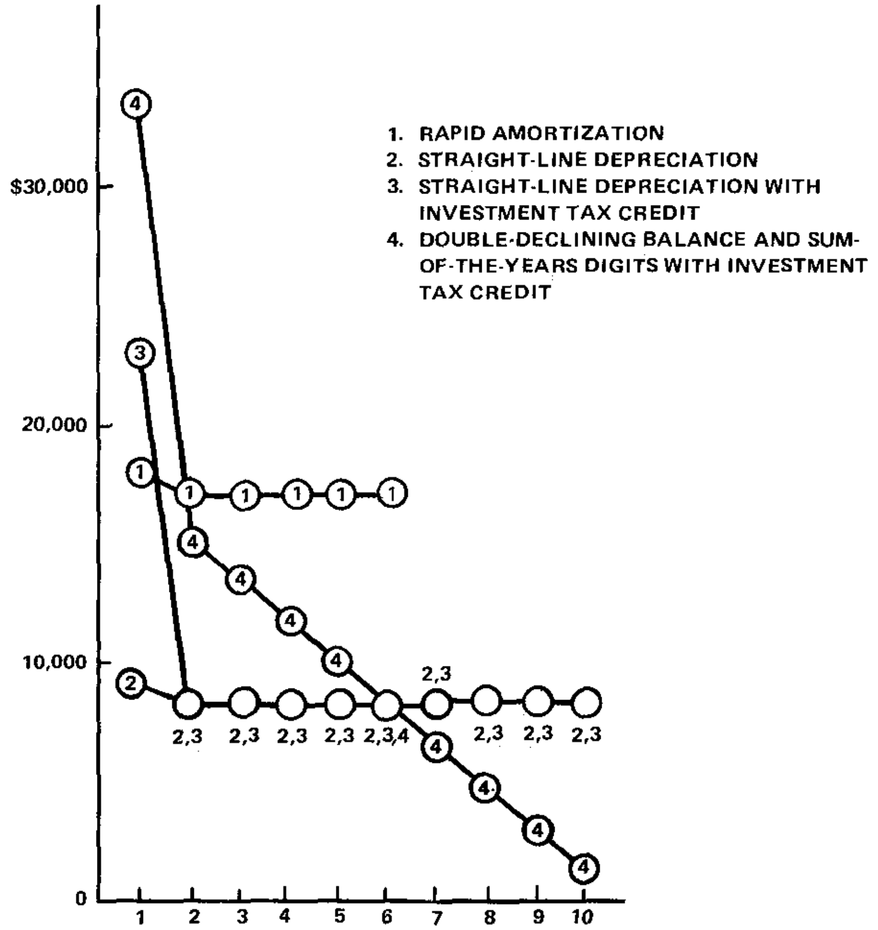


Figure II-2. Year-by-year tax savings (cash flow improvements) through different tax strategies.

ABILITY TO USE INVESTMENT TAX CREDIT (ATTENTION - SMALL BUSINESSES)

A company must have a sufficient level of pre-tax earnings to be able to fully utilize the investment tax credit. This is particularly important to small businesses at a low income level. Taking an investment tax credit which would be greater than the amount of corporate income taxes payable would defeat some of the advantage of investment tax credit. Calculations based on the new corporate tax rates of 20 percent of all income before taxes up to $25,000, 22 percent of the next $25,000, and 48 percent above $50,000 show that a company has to have $63,462 in taxable earnings in order to fully benefit from the $14,000 investment tax credit of our example.

It is true that unused investment tax credit can be carried over into the future, under certain conditions (Section 46b, IRC). However, the *NPV* of an investment tax credit carryover is less than that of the tax credit itself.

SUMMARY

This chapter has demonstrated the large differences in year-by-year cash flows and *NPVs* by using the various depreciation methods. The purpose of using *NPV* was to have a common standard of analysis by which the available depreciation methods for pollution control facilities could be compared. The example used for calculations showed the advantage of the double-declining balance and sum-of-the-years digits method with investment tax credit over all other methods, including rapid amortization. This advantage is increased if the investment tax credit percent is 10 percent instead of 7 percent. The life of the equipment must be over 30 years before another depreciation method becomes superior in this illustration.

In chapter III, the special incentives for financing pollution control equipment will be examined. The differences in values for these financing methods coupled with the results of the analysis just performed will be carried into chapter IV where the tax and financing strategies are combined.

Chapter III

FINANCING STRATEGIES FOR POLLUTION CONTROL INVESTMENTS

Prior to pollution control legislation, when a plant manager made a decision to buy a piece of equipment, and if money was to be borrowed to pay for the equipment, he got in touch with his normal financing source to make arrangements. With the advent of special pollution control incentives, there are not only new sources of funds available, but also lower than normal rates for most sources of financing. This situation requires a whole set of analyses before the best source of funds can be chosen.

In this chapter, each financial source is described and, based on rate and terms, is quantitatively analyzed using net present value (*NPV*) as a tool for evaluating the cash flows. As in chapter II, the example is based on a $200,000 waste treatment system.

In chapter II, the net cash inflow as a result of tax savings was a function of the amount of depreciation and the tax rate. This chapter deals first with the net cash outflow resulting from interest costs of the various fund-raising methods, and subsequently with the loan repayment net cash flow.

A comparison of the net profits with and without the interest costs for pollution control equipment makes it possible to quantify the cash outflow from interest. Net profit, P, and the tax liability, L, can be related to operating parameters by the equations:

$$P = p\ (1 - T)$$

$$\text{and } L = pT$$

where p = annual taxable income
T = the tax rate, expressed as a fraction.

For domestic corporations, the new federal tax rate amounts to 20 percent on taxable income up to $25,000, 22 percent for the next $25,000, and 48 percent on income over $50,000. A tax rate of 48 percent is assumed throughout this analysis.

The annual taxable income is related to the interest expense for the year by

$$p = Q - I$$

where Q = the operating income
I = the interest expense.

Combining the above two equations,

$$P = (Q - I)(1 - T)$$

$$= Q(1 - T) - I(1 - T)$$

and $$L = (Q - I)\,T$$

$$= QT - IT$$

If there was no interest expense during the year, $I = 0$, the above equations would become

$$P = Q(1 - T)$$

$$L = QT$$

Thus, the effect of the interest expense, I, is to reduce the net profit after taxes by $I(1 - T)$. The tax liability is reduced by IT.

If C is the amount of principal that is paid back during a year and I is the interest expense incurred as a result of the loan, the net cash outflow, NCF, is the net of cash outflows and the reduced tax liability:

$$NCF = (C + I) - (IT)$$

$$= C + I(1 - T)$$

The above equation represents the net effect of the load on the company's cash balance during a year. (It must be kept in mind that, in this analysis, the operating costs resulting from the control equipment are not considered. Only the effect of initial investments in pollution control on the company's fiscal position is analyzed here.)

The payment of interest and principal extends through the term of the loan. For long term loans such as those for pollution control expenditures, the term would be more than 1 year. The net cash outflow, NCF_i, during year i is

$$NCF_i = C_i + I_i(1 - T)$$

$$i = 1, 2, - -, n$$

where C_i = principal payback during year i
I_i = interest expense during year i
n = term of the loan in years.

The total effect of the loan on the company's cash flow over time is determined by using the net present value approach which incorporates the time-value of money as described in chapter II.

Thus, the discounted cash flow during year i is

$$DCF_i = \frac{NCF_i}{(1 + r)^i}$$

The sum total of all such discounted cash flows over the terms of the loan is the *NPV* of the loan:

$$NPV = \sum_{i=1}^{n} DCF_i$$

$$= \sum_{i=1}^{n} \frac{NCF_i}{(1 + r)^i}$$

Since *NPV* of loans is the sum of discounted outflows, the lower the *NPV*, the more attractive the loan. The annual discount rate, $1 + r$, as in chapter II, is the after-tax return on investment for the manufacturer, averaging 3.5 percent.

BANK FINANCING

Some commercial banks across the country have announced preferential rates and terms for certified pollution control facilities. However, since these bank programs are quite random, normal installment bank financing rates and terms were used for this analysis of pollution control equipment financing.

The terms and rate suggested here as normal for this type of financing are 5 years and 6 percent annually, with the effective rate of interest being 10.84 annually. The *NPV* for financing the $200,000 waste treatment system through a bank is $208,100, as shown in table III-1. The cash outflows for this financing alternative increase each year because of the bank repayments system. Although the annual payment amounts are the same, the proportion of interest in those payments is higher in the beginning. Since this interest is tax deductible, thus reducing the net cash outflow by approximately half, the net cash outflow is lower in the beginning of the loan.

Table III-1 shows the details of *NPV* calculations for a 5-year bank loan for $200,000, using a 6 percent interest rate; the loan is repaid quarterly. This type of table should be completed for each of the following financing strategies in order to make comparisons.

Table III-1.—NPV *calculation for bank financing*

Year	Repayment interest *I*	Principal *C*	Total annual	Interest x (1 - *T*)	Plus principal = *NCF*	Disc. factor 1 + *r*	*NCF* ÷ (1 + *r*) = *DCF*
1	$21,143	$ 30,857	$ 52,000	$10,994	$41,851	1.0350	$ 40,436
2	16,571	35,429	52,000	8,617	44,046	1.0712	41,118
3	12,000	40,000	52,000	6,240	46,240	1.1087	41,708
4	7,429	44,571	52,000	3,863	48,434	1.1475	42,209
5	2,857	49,143	52,000	1,486	50,629	1.1877	42,629
	$60,000	$200,000	$260,000	Total *DCF* = *NPV* =			$208,100

SMALL BUSINESS ADMINISTRATION COMPLIANCE LOANS

The Small Business Administration (SBA) has historically provided loans to businesses if such loans are not available through normal banking channels and if the applicant meets SBA business size and risk requirements. The funds are provided in three ways: by the SBA guaranteeing a portion up to 90 percent of a bank loan; by participation, in which case the SBA provides a part of the funds and the rest is provided by the bank; and by direct loans, in which case the SBA provides funds on a direct loan basis. All of these so-called regular business loans, in practice, have typical repayment periods of up to 15 years. Direct loans have considerably lower rates than the participation rate or the guaranteed rate; however, such direct loans are frequently not available.

Over the last decade, Congress has passed several significant pieces of consumer and environmental legislation, many of which were expected to significantly impact certain sectors of the economy. Those companies which were expected to be most impacted by the legislation were described as substantially injured. In several instances Congress sought to aid these companies through special loan and other assistance programs of the SBA. These special programs come under SBA's general category of disaster loans, rather than regular business loans. They are similar to regular business loans in that the three types of loans are used by SBA, but they differ in that the repayment period is longer and the direct loans with their lower interest rates are somewhat more available. Therefore, such loan programs should be carefully examined by a substantially injured firm.

Water Pollution Control Loans

The Federal Water Pollution Control Act (FWPCA) legislated that $800 million be made available under the disaster loan category of SBA to small businesses for water pollution control capital expenditures providing the company is substantially injured. The program has been operating since August 1974. An important part of the law is that it is necessary for an applicant to obtain a certification from the appropriate regional office of EPA stating that the equipment is "necessary and adequate" to meet FWPCA regulations.

A company qualifies for SBA water pollution control loans if it is a "small business concern . . . affecting additions to or alterations in the equipment, facilities (including the construction of pretreatment facilities and interceptor sewers) or methods of operation of such concern to meet water pollution control requirement . . . if such concern is likely to suffer substantial economic injury without assistance." Appendix A describes loan application procedures.

Compliance Loans for Other Regulations

In January 1974, the President approved legislation permitting SBA to make loans to any small business concern required to "meet requirements imposed on such a concern pursuant to any Federal law," or any state law enacted in conformity with the federal law. This legislation unified several earlier enactments (except for water pollution control) which had established specific loan programs for each regulatory program. Under the new legislation, SBA can now provide a loan to any eligible company for compliance to any federally-imposed standards (except for water pollution control) which require alterations in its plant, facilities, or methods of operation.

Because the compliance loans are relatively new, it should be made clear to SBA and other financial officials at all steps in the inquiry and application process that inquiries are being made for compliance loans under the disaster fund, rather than for regular business loans.

To be eligible for either of these loan programs, companies must satisfy the SBA definition of small business and be companies which would sustain substantial injury from compliance requirements without the benefit of the loan. Substantial injury has not been defined for either of these loan programs; SBA relies on evidence supplied by the applicant, including proof of the unavailability of loans from commercial sources.

The interest rate for SBA's direct loan bears an interest rate equivalent to the government rate of borrowing. The 1975 rate was 6.5 percent and is used in this illustration. Interest rates for guaranteed loans are generally several percentage points higher than direct SBA loans.

Equal annual repayments were chosen as the principal payback method, and the interest rate was applied to the declining outstanding principal balance of the loan. SBA loans can extend up to 30 years. However, in the example being illustrated here, a 10-year loan term was chosen. Using the 6.5-percent direct loan rate and the 10-year repayment schedule, the *NPV* is $198,846.

INDUSTRIAL DEVELOPMENT BONDS

Government aid is also available to corporate borrowers as a result of the effort to encourage industrial development in general and in some cases to encourage industry to install control equipment on pollution sources.

Federal tax provisions make it possible to finance pollution control equipment at interest rates that are generally lower than usual. Once a state declares that pollution control, or industrial development, serves a public purpose, equipment can be financed with the proceeds of industrial development bonds (IDBs) issued by a municipality or quasi-governmental agency[1]; there is a limit on the amount that can be funded by IDBs for industrial development, but no limit when pollution control equipment is being funded.

Because the interest paid on these bonds is exempt from federal income taxes, IDB buyers are willing to accept an interest rate that may be as much as 25 percent lower than prevailing interest rates on corporate bond issues of comparable quality. The advantages to the company of this alternative are reduced by the added fixed costs of issuing the bonds, resulting in an effective lower limit on the size of issues that can be financed by such means.

[1] Appendix B contains various contractual arrangements a company may have with the government authority through which tax-free financing was obtained.

IDBs are either sold to an institutional investor or a commercial bank and referred to as private placements, or they are sold to the public and referred to as public placements. The costs of issuing public placements are greater than those for private placements because of the high costs of the legal work, advertising, and printing, as well as the fees charged by investment bankers. Consequently, publicly placed IDBs are generally utilized only in multi-million dollar financings; $500,000 is the generally acknowledged floor, or trade-off point.

In many states there have been a considerable number of privately placed IDBs issued for amounts less than $500,000. In the case of privately placed IDBs, there are also costs resulting from the fees for bond counsel, application fees for the industrial development agencies, and other administrative expenses. However, they are frequently considerably below these of publicly placed issues. The trade-off point or minimum practical size varies from state to state, and even within a state.

IDB financing is available in all but a very few states. Most states require a municipal, county, or regional development authority or corporation to serve as the actual issuer of the bonds. While such authorities do not exist in all locations, it is generally possible to create one. However, the expenses involved in such an effort would be prohibitive for a single relatively small borrowing.

There have recently been efforts by the Connecticut Development Authority, the New York State Job Development Authority, and other governmental agencies to eliminate the handling costs that preclude the use of such revenue bonds for small borrowings. In some instances, the borrowing power of state authorities was used for large offerings undertaken on behalf of several companies; the economies of scale yielded reduced financing costs for the individual companies.

For our example of IDB financing, the terms include a 6-percent interest rate with an initial underwriting cost of 2 percent. The repayment period is 15 years and the repayment schedule is as follows: 8 percent of principal annually during years 5 through 14, and the remaining 20 percent of the principal during year 15. In order to enter the 2-percent underwriting expense into the *NPV* calculations, the amount is added to the repayment interest amount for year 1.

As a word of caution about tax-free status, it is prudent to obtain the advice of counsel. There are a number of stipulations about the type of facilities qualifying for tax-exempt financing (see appendix C).

The *NPV* of cash outflows for the tax-free financing method using the terms described in the $200,000 example is $195,600.

LEASING

Leasing involves outside ownership of the equipment but permits the company to use the equipment for regular fees, which are expensed. In terms of cost comparisons, leasing fees should be compared to the depreciation and tax credits the company would have had if it purchased the equipment.

Leasing is attractive when companies cannot benefit from the tax credits and deductions of the equipment, or when companies prefer not to show long-term debt on their balance sheets. The latter becomes a preference when a bank limits company debt, or when the company prefers to show a low debt structure. Whether this form of accounting will be allowed to continue will depend on accounting standards boards. It is currently being studied by the Financial Accounting Standards Board.

However, the Internal Revenue Service (IRS) has issued many rules which must be adhered to for a leasing financing arrangement to be a true lease and not a disguised sale. Two rules are most critical for pollution control. At the termination of the lease, it must not be impossible or impractical for the lessor to remove the property. Secondly, where property is acquired specifically for the lessee, the IRS may contend that the property has no value to anyone other than the lessee at the end of the term, thus encouraging the lessor to abandon the property to the lessee. These are severely limiting restrictions as far as pollution control leasing is concerned since the equipment is often tailored to a source and not transferable to other sources and since both air and water pollution control equipment often become so interwoven with real estate that removal is impractical.

In addition to the difficulties in qualifying for a lease, leasing is more costly over the long run than any of the other alternatives discussed here. For these reasons, less than 10 percent of all pollution control equipment is leased, and a detailed analysis is therefore not included in this manual.

COMPARISON OF FINANCING METHODS

Figure III-1 is a bar graph of the net present values of the negative cash outflows in financing the $200,000 cost by the three alternatives. The graph indicates the superiority of the tax-free method of financing pollution control equipment under the parameters selected for the illustration. There is a 10-percent difference between the best and worst selection.

Figure III-2 shows the great differences in year-by-year cash outflow that result from the three financing strategies. The conventional bank loan, for example, leads to much higher outflow during the first 5 years than either of the other strategies. Conversely, a bond issue has the lowest cash outflow for an extended period. However, depending on the payoff method chosen for the bond, full repayment of principal at the end or a sinking fund will be required. In the first instance (illustrated), high cash outflow is generated in the final year due to the ballooning effect.

Now that the financing and tax strategies have been described and analyzed, we are prepared to compare the alternatives for selection purposes. In order to make a selection, the objectives by which companies are managed must be analyzed, as they impact possible combinations of the tax and financing alternatives. These will be discussed in chapter IV.

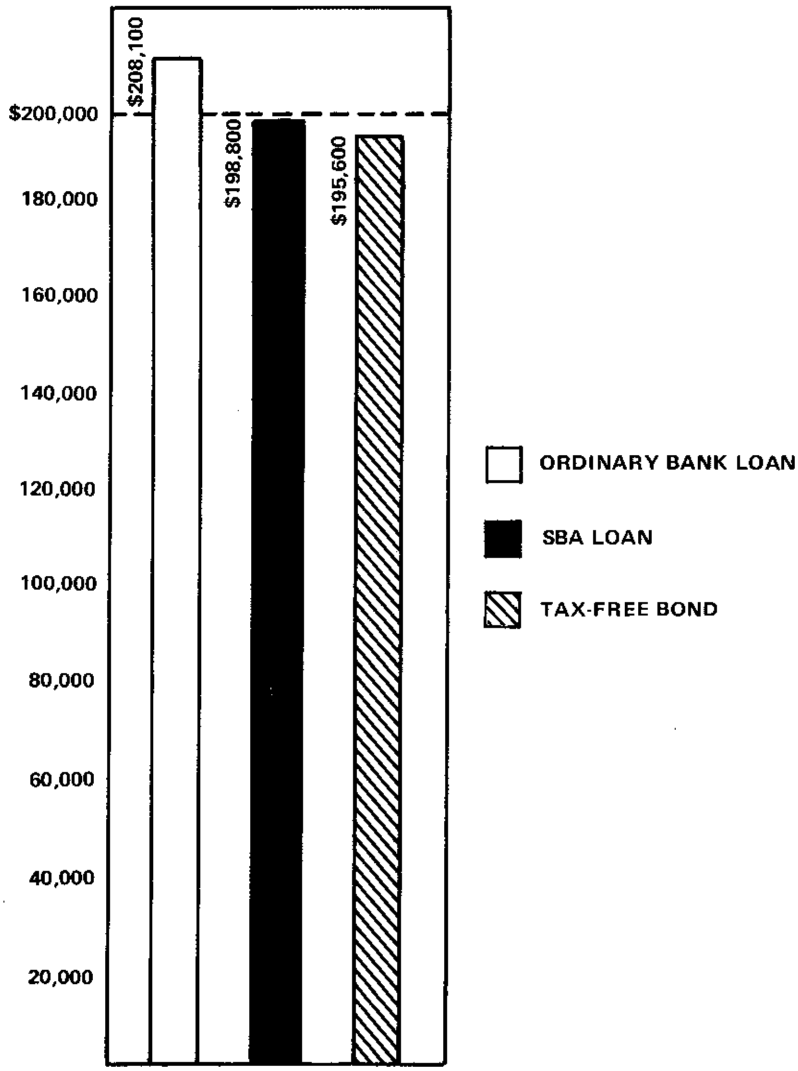


Figure III-1. Net present values of cash outflows from financing alternatives.

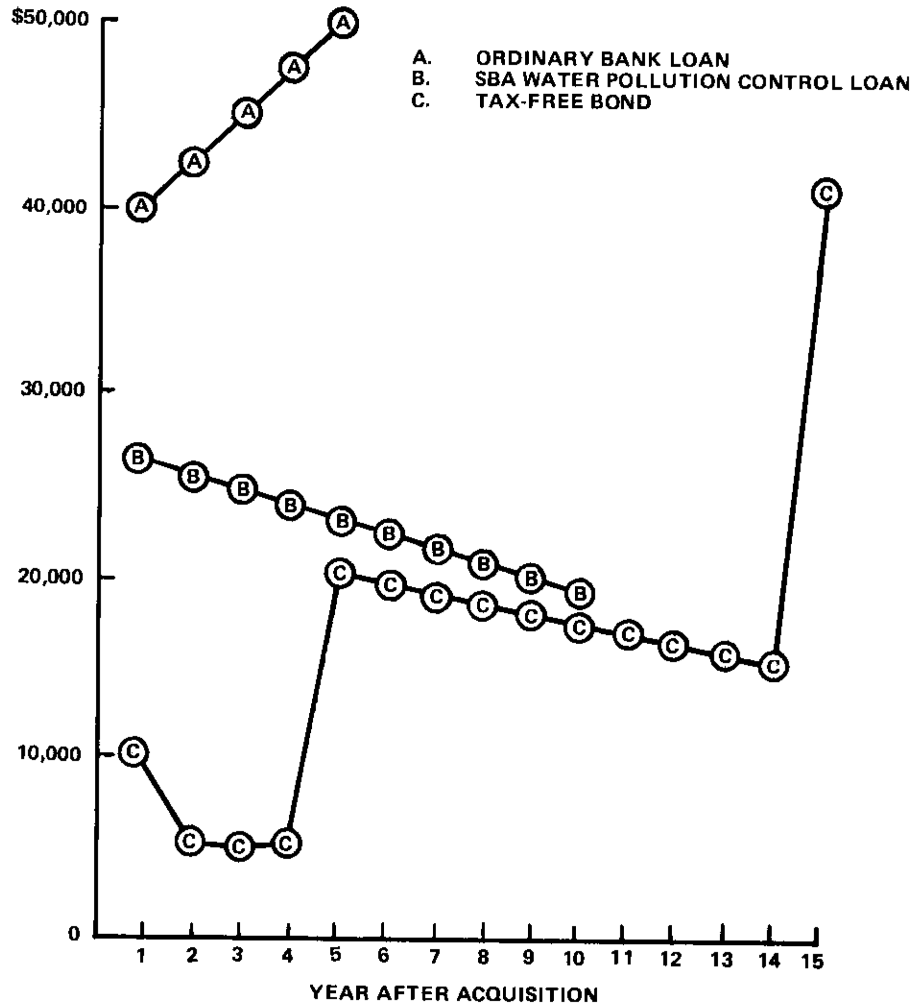


Figure III-2. Year-by-year cash outflow from different financing strategies.

Chapter IV

OPTIMUM FINANCIAL STRATEGY FOR POLLUTION CONTROL

No two manufacturers face the same financial problems, nor exactly the same management objectives. However, to demonstrate the effects of combining the various tax and financing strategies, we have selected three business situations involving different management objectives that might exist in a manufacturing operation. We will show how different combinations of tax and financing affect each situation.

The data from the calculations discussed in chapters II and III will be used here to determine the appropriate financing and tax strategies for a given set of company management objectives. The data is capsulized in table IV-1, which contains the price and life of the hypothetical pollution control equipment and the tax status of the companies, as well as the key characteristics of three financing strategies.

First let us look at the manufacturer who has enough resources and stability to concentrate on maximizing long-term profit. For him, a financial management decision regarding tax and financing strategies would be based on finding the combination with the lowest net present value (*NPV*). The computation of *NPV* for each of the 12 combinations (4 tax and 3 financing strategies) will be necessary. The combination illustrated in table IV-2 is rapid amortization and commercial bank financing. This combination was chosen since the illustrations in chapters II and III contained those strategies. The figures in table IV-2 are identical to the last columns in the earlier *NPV* illustrations for each separate strategy. Note that the term cash inflows is used to represent the tax savings of rapid amortization, and the term cash outflows is used for the financing costs of the commercial bank loan strategy.

Table IV-3 shows the net *NPVs* for all 12 combinations of tax and financing strategies. Since the financial strategy in this case is to minimize the long-term profit impairments of the strategies, the optimum financial strategy is to choose the tax and financing strategy associated with the lowest *NPV*, indicated by the boxed figure. In this instance, optimality ($97,800) is achieved by using the double-declining and sum-of-the-years digits depreciation method along with a tax-free bond (strategies 3 and C).

The numbers for all combinations of strategies, as shown in table IV-4, were computed for those managers who are concerned about short-term profit impairment (*STPI*) because, for example, they may have a short-term need to demonstrate the strongest net income statement to lenders or stockholders.

Table IV-1.—*Illustrative financial characteristics of pollution control equipment for manufacturers*

1. Equipment Characteristics	
Investment cost	$200,000
Salvage value	0
Useful life	10 years
2. Tax Status	
Corporate income tax rate	48 percent
Investment credit	7 percent
Additional first year's depreciation	$2,000
Effective cost-of-capital rate	3.5 percent annually
3. Financing Terms	
(a) Ordinary bank loan	
Stated interest rate	6 percent annually
Effective interest rate	10.84 percent annually
Repayment period	5 years
(b) SBA water pollution control loan or compliance loan	
Interest rate	Weighted average treasury rate
Present treasury rate	6.5 percent
Payment period	10 years (could be as long as 30 years, but practically may not be more than life of equipment)
(c) Tax-free bond	
Interest rate	6 percent
Initial cost of obtaining loan	2 percent of capital
Repayment period	15 years
Repayment schedule	8 percent of principal annually during years 5 through 14; 20 percent of principal during year 15 (balloon)

Table IV-2.—*Net* NPV *after combining cash inflows and outflows using rapid amortization and bank financing*

Year	*NPV* of year-by-year cash inflows	*NPV* of year-by-year cash outflows
1	$19,293	$ 40,436
2	17,745	41,118
3	17,144	41,708
4	16,565	42,209
5	16,006	42,629
	$86,753	$208,100

NPV cash outflows	$208,100
Less *NPV* cash inflows	86,753
Net *NPV*	$121,347

Table IV-3.—*Comparison of long-term profit impairment resulting from different tax and financing strategies*

Useful life = 10 years
Investment cost: $200,000

Tax strategy[1]	Financing strategy		
	A. Conventional bank loan	B. SBA loan	C. Tax-free bond
1. Straight-line depreciation	$128,100	$118,800	$115,600
2. Straight-line depreciation with investment credit	114,600	105,300	102,100
3. Double-declining balance depreciation plus sum-of-the-years digits with investment credit	110,300	101,000	97,800
4. Rapid amortization for pollution control equipment	121,300	111,200	108,800

[1] Also includes effect of additional first year depreciation, Section 179, Internal Revenue Code.

Table IV-4.—*Comparisons of short-term profit impairment resulting from different tax and financing strategies*

Useful life = 10 years
Investment cost: $200,000

Tax strategy[1]	Financing strategy: A. Conventional bank loan	B. SBA loan	C. Tax-free bond
1. Straight-line depreciation	$57,700	$47,700	$53,400
2. Straight-line depreciation with investment credit	43,700	[33,700]	39,400
3. Double-declining balance depreciation plus sum-of-the-years digits with investment credit	64,600	56,900	62,600
4. Rapid amortization for pollution control equipment	75,700	68,000	73,700

[1] Also includes effect of additional first year depreciation, Section 179, Internal Revenue Code.

The figures were derived by adding each year's depreciation amount (D) to the interest expense (I) and multiplying the result by $(1 - T)$. These computations were performed for the first 3 years of each combination. Thus the formula for *STPI* of one of the combinations is

$$STPI = (D_1 + I_1)(1 - T) + (D_2 + I_2)(1 - T) + (D_3 + I_3)(1 - T)$$

The boxed figure in table IV-4 is the optimal strategy for *STPI* and results in the use of straight-line depreciation plus the investment tax credit and a Small Business Administration (SBA) loan.

For table IV-5, the financial management situation is that of a manufacturer with weak working capital. He needs pollution control equipment, but cannot "afford" it, either now or in the foreseeable future. Clearly, the situation calls for the lowest possible cash outflow, year by year, over the life of the investment. The strategy analysis for this situation is accomplished by determining the year-by-year net cash outflows for each combination of tax and financing strategy and choosing that combination which maintains the lowest profile with the lowest peak outflow in any one year.

Table IV-5.—*Comparisons of peak cash drains in any one year resulting from different tax and financing strategies*

Useful life = 10 years
Investment cost: $200,000

Tax strategy[1]	Financing strategy		
	A. Conventional bank loan	B. SBA loan	C. Tax-free bond
1. Straight-line depreciation	$41,100(5)[2]	$17,300(1)	$41,200(15)
2. Straight-line depreciation with investment credit	41,100(5)	16,600(2)	41,200(15)
3. Double-declining balance depreciation plus sum-of-the-years digits with investment credit	40,500(5)	19,000(10)	41,200(15)
4. Rapid amortization for pollution control equipment	31,400(5)	23,400(6)	41,200(15)

[1] Also includes effect of additional first year depreciation, Section 179, Internal Revenue Code.
[2] Indicates year after acquisition during which stated peak cash drain is reached.

The boxed figure $16,600(2) in table IV-5 means that the peak net cash outflow in any one year was $16,600 and occurred in the second year. This was accomplished using straight-line depreciation plus investment tax credit tax strategy, and an SBA loan. To arrive at the figures, table IV-2 was used, and a column was added to the right to indicate the net cash outflow for each year.

Of course, few business financial decisions are ever made on the basis of only one objective; a number of objectives are usually sought with varying degrees of intensity, and compromises are reached. For example, a manager may be particularly concerned with having the least *STPI* but also be concerned with the long-term profit picture. In that case, he might choose straight-line depreciation with investment tax credit, plus tax-free bond financing. Although this was not the most advantageous combination under either management objective, it was second under both and by a fairly small margin in each case, as shown in table IV-6.

Table IV-6.—*The five most advantageous strategy combinations by management objective ranked in order*

Least long-term profit impairment	Least short-term profit impairment	Least cash drain in any one year
3 + C = $ 97,800	2 + B = $33,700	2 + B = $16,600
3 + B = 101,000	2 + C = 39,400	1 + B = 17,300
2 + C = 102,100	2 + A = 43,700	3 + B = 19,000
2 + B = 105,300	1 + B = 47,700	4 + B = 23,400
4 + C = 108,800	1 + C = 53,400	4 + A = 31,400

CODE:

Tax Strategies

1. Straight-line depreciation
2. Straight-line depreciation with investment credit
3. Double-declining balance depreciation plus sum-of-the-years digits with investment credit
4. Rapid amortization for pollution control equipment

Financing Strategies

A. Conventional bank loan
B. SBA loan
C. Tax-free bond

SUMMARY

Figure IV-1 clearly demonstrates why this analysis is so important. It shows the results of an *NPV* analysis for one of the management objectives, minimizing long-term profit impairment. If the pollution control facility in our example were financed by an ordinary bank loan (a fairly traditional choice) and rapid amortization taken, the effective cost of a $200,000 investment would have been $121,300. A tax-free bond with an investment tax credit and double-declining balance and sum-of-the-years digits depreciation resulted in an effective cost of $97,800, a savings over the former plan of $23,500. Therefore, it is well worth devoting considerable cost in order to explore the various alternatives available for making the optimum financial decision.

Caution

The conclusions derived in this chapter are based on assumptions about costs, and about each of the tax strategies and financing strategies discussed in the previous chapters. All assumptions should be checked against prevailing conditions when a final analysis is made, and new figures should be determined when those conditions change assumptions.

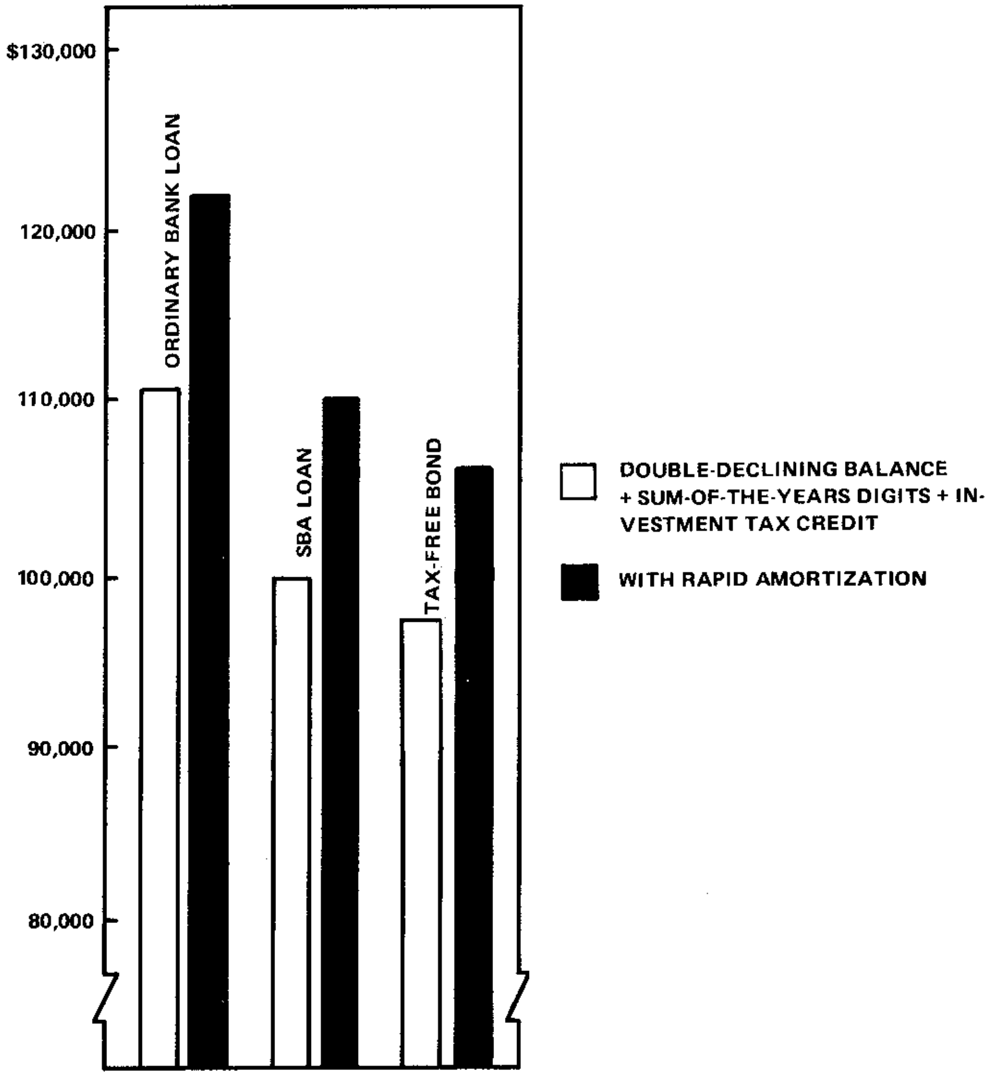


Figure IV-1. Long-term profit impairment from various financing and tax alternatives.

Chapter V

STATE FINANCING AND TAX INCENTIVES

In the preceding chapters, nationally-available federal incentive programs were discussed; these included the federal tax programs and the Small Business Administration (SBA) programs, the availability of which is limited only by funding levels.

Although industrial development bonds (IDBs) are federally allowed and regulated programs, each state must pass enabling legislation so that IDBs can become available to companies within the state. Nearly all 50 states have passed such legislation or have other programs which accomplish a similar objective. Therefore, when a choice analysis such as has been outlined is performed, it is the relevant state laws as well as federal law that determines certain costs and conditions of industrial development financing.

In addition to IDBs, there are a number of other state programs which permit additional costs savings for pollution control equipment. State financing programs other than IDBs include state-backed loan guarantees and state support of municipal waste treatment facilities through bonds or state grants.

State tax regulations offering incentives for pollution control include real and personal property tax exemptions, tax exemptions on the purchase of pollution control equipment, tax credits, accelerated depreciation, and other programs. If choices are necessary, an analysis similar to that described above should be done.

Although state support of municipal waste treatment facilities may not be considered directly relevant to industries, it will be shown in chapter VI that it becomes an important aspect of analysis for those companies with industrial water pollution. Under the 1972 Federal Water Pollution Control Act, the federal government will grant 75 percent of construction costs to eligible municipal waste treatment projects. It is the financing of the remaining 25 percent that creates differences in costs between, and even within, states for industrial and residential treatment plant users.

A particular financing program of the state in which the company is located should be included in a choice analysis among the financing alternatives.

Since this chapter is intended to alert a company's financial decision-maker to nonfederal incentive programs, five states have been chosen to demonstrate the variety and similarities to be found from state to state. It should be noted that most incentives of all states must be applied for and are not automatically provided.

ALABAMA

Alabama has enabling legislation to permit municipalities and local nonprofit development corporations to issue IDBs, thus permitting tax-free financing of the pollution control capital programs of a corporation.

Alabama provides a wide variety of tax exemptions for pollution control equipment. It allows a deduction, for purposes of computing state corporate income taxes, on "all amounts invested in devices, parts of devices, systems or facilities used or placed in operation in the State of Alabama . . . primarily for the protection of the public and the public interest through the control, reduction, or elimination of air and water pollution." This law results in a 1-year depreciation writeoff of pollution control facilities or the election of a customary depreciation method for state tax purposes.

The same types of pollution control facilities described above are also exempt from the ad valorem tax. All equipment and materials to be used in the control of air and water pollution are exempt from sales taxes, and the storage, use, or consumption of all equipment and materials for air and water pollution control purposes is exempt from the Alabama use tax. In addition, the assessed value of pollution control equipment can be deducted from the assessed corporate shares, thus reducing the base on which the ad valorem tax is computed.

CALIFORNIA

California has an IDB program, supports municipal water treatment facilities, has rapid amortization tax provisions, and has sales or use tax exemptions for all new pollution control equipment.

The rapid amortization provision closely follows the federal tax provisions for rapid amortization, which are described in chapter II of this manual. The equipment's value (less the value of recovered materials and excluding land, or buildings not related to pollution control) can be deducted from state corporate income tax over 60 months. The equipment must be for plants in operation before January 1, 1971 and must be installed before January 1, 1976 or as extended; information about the installation date can be obtained from the California Franchise Tax Board. The facilities must also be certified by the appropriate state pollution control agency.

As will be explained later, wastewater treatment projects qualifying for federal funds can receive 75 percent of the funding from the federal government. The remaining 25 percent must be derived from local or state bonds or grants. The California Water Bond Law of 1974 raised funds from which grants can be made for the next 12-1/2 percent. California will also make loans with liberal repayment conditions to municipalities that have difficulty floating their own issues for the last 12-1/2 percent of construction cost. Thus, one municipality could assess lower costs to an industry than another municipality where the local loan or bond has less liberal repayment terms.

As with the federal share of construction grants, industry in California must repay their proportionate share of the state-financed portion of the construction costs. The state also has regulations guiding the municipality in recouping annual operating and maintenance costs.

MISSOURI

Missouri provides for the use of municipal general obligation or revenue bonds for industrial development purposes, namely to expand or upgrade industrial plants and therefore to finance pollution control equipment.

Tax incentives include a sales and use tax exemption for pollution control facilities. A general property tax exemption for pollution control equipment is not provided by legislation; however, control equipment financed by IDBs is municipally owned and consequently requires no property tax.

Under various chapters of the Missouri Water Pollution Law, grants can be made for municipal treatment works. The state can grant up to 25 percent of the construction cost for projects which also qualify for federal aid. The state requires a cost recovery system from the users whereby all costs are recovered, including interest, depreciation for future replacement, and maintenance and operation.

NEW YORK

New York State has several tax incentives and financing programs for pollution control facilities, including two of the largest public bond issues in the United States for municipal sewage treatment plants. The tax incentives involve sales, property, and corporate income taxes for qualified pollution control equipment. A revenue bond financing capability for corporations also exists.

Pollution control equipment and utilities are exempt from state and local sales taxes except for those of New York City.

Local municipalities are given the power by the state to excuse pollution control facilities from real estate taxation and special ad valorem levies.

An unusual feature of New York State's tax incentives is its 1-year depreciation provision. Corporations can deduct the full cost of pollution control facilities in 1 year against their state corporate income taxes. For those who decide against the 1-year depreciation, a 1-percent tax credit is allowed on state corporate income taxes payable.

Large corporations can finance their pollution control facilities located in New York State by means of industrial development (revenue) bonds. Small corporations can request financing for pollution control facilities from the New York Job Development Authority. A 1973 bond issue by the Authority is currently serving as a source of funds to make low interest, long-term loans for up to 90 percent of the value of the pollution control equipment. Future funding levels have not yet been determined.

Municipalities in New York can obtain a considerable amount of grant assistance from the state government for construction and for operating and maintenance costs of water treatment facilities. Under a $1.15 billion 1972 Environmental Quality Bond Act, $750 million was designated for municipal construction grants to provide 12.5 percent of construction costs on top of a 75-percent federal grant. However, eligible construction costs, by state definition, disallow collection systems. Thus the local government can obtain 75 percent for collection system (since the federal government does fund collection systems) and 87.5 percent for the remainder of the entire waste treatment facility. New York has another fund from which grants are made to municipalities for one-third the costs of eligible operating and maintenance costs.

WISCONSIN

Wisconsin has several tax incentives. Statute 70.11 (21) of Wisconsin exempts the air and water pollution control equipment of income producing properties from general property taxation. In addition, pollution control equipment was exempted from sales taxes as of 1973. Companies may deduct from the Wisconsin corporate income tax all of the cost of depreciable air and water pollution control equipment in 1 year. Or, if a company so desires, the cost of pollution control equipment can be amortized over a period of 5 years. The election of either method of depreciation cannot be changed once one is selected.

Wisconsin also allows that the cost of depreciable pollution control equipment, less any federal depreciation taken, can be deducted from gross personal adjusted income.

In addition to having an IDB program for corporations as a financing incentive, state-assisted financing and grant programs are available for municipalities in Wisconsin. The percent the state will grant varies, but the municipality cannot receive more than a total of 80 percent from all grant sources.

SUMMARY

From these examples, it is clear that states influence the terms of IDBs in the optimal choice analysis in the earlier chapters. The states also add incentive programs of their own which further lower pollution control costs. The reader is cautioned to obtain a current copy or interpretation of a state law or regulation, and to discover the funding levels and priorities of a loan program before selecting a course of action. Some sources for this information are included in appendix D.

The emphasis in the analysis thus far has been on a firm's capital costs. In chapter VI, municipal charges imposed by municipalities for treatment of industrial wastewater will be discussed and optimization of financial strategies for water pollution control costs will be analyzed. This requires an analysis of the costs of both municipal waste treatment and private treatment.

Chapter VI

FINANCIAL DECISION-MAKING ANALYSES FOR MUNICIPAL VERSUS PRIVATE TREATMENT OF WATER

The analyses completed in the earlier chapters were for the capital costs of air and water waste treatment systems. Companies needing to control air pollution emissions must undertake the full responsibility of control themselves. In many instances, companies with waterborne wastes have the choice of treating their process, sanitary, and cooling wastes themselves (on-site treatment) or turning the chore over to the municipality, after any prescribed pretreatment, by sewering their wastes. Economics play an integral part in this decision and the economics of the past are changing considerably.

Tying into municipal treatment facilities will have to be carefully analyzed for each new discharge source, and many established companies may find it necessary to reconsider their options in the near future. Costs for most companies for municipal or for on-site treatment will be higher than they may have experienced in the past because:

Municipal

- Industry will now have to pay pro-rated costs of the treatment performed by municipalities, which in most cases is more than previously paid to the municipalities.
- Pretreatment costs for municipal discharges will be higher due to pretreatment requirements.

On-Site

- Effluent limitation requirements are more stringent than before.

The decision about tying into municipal treatment facilities is largely guided by the types of pollutants a company would be discharging into the facility. Incompatible wastes have the potential to pass through without adequate treatment or they might interfere with municipal treatment facilities. The federal regulations now require that incompatible wastes be pretreated by companies before discharging to a municipal facility. Each pollutant must be pretreated to the same level as the effluent limitation set for the stream discharging of that pollutant. Therefore, pretreatment costs for an incompatible pollutant are equal to full private treatment costs for that pollutant.

Compatible wastes are those which the municipal plant is designed to treat and substantially remove from the waste stream. For most organic or suspended solids, pretreatment of compatible wastes is not required before the wastes are discharged to a municipality unless there are surges in flow or pollutant concentrations which upset or reduce the efficiency of the municipal plant.

Under the Federal Water Pollution Control Act (FWPCA), all recipients of wastewater treatment plant construction grants must charge industry its proportionate share of initial capital and annual operating costs for the treatment and/or conveyance of discharged wastes. These costs may be determined on the basis of strength or volume characteristics of the wastes. Incompatible wastes which have already been adequately treated by a company may be charged, for example, on a volume basis, while the costs for treating compatible wastes may be charged according to their strength (concentration) characteristics. The charges on industry for proportionate capital costs are referred to as industrial cost recovery charges, while the charges for operating costs are referred to as user charges. Both of these costs together are referred to here as municipal costs.

Before the 1972 amendments to the FWPCA, there had been an outright, but comparatively small, construction costs grant system through which Federal funds were apportioned to municipalities. The 1972 amendments continued the grant concept at a significantly increased dollar level and increased to 75 percent the eligible fraction of total municipal treatment construction cost. The amendments also required municipalities to recover, through charges, the capital costs in addition to the formerly required operational costs attributable to the industrial proportion of the Federal grant.

To implement industrial cost recovery, a general wastewater rate is established by the municipalities. The rate is computed by dividing the applicable construction costs by the design waste volume and dividing that figure by the repayment period (municipal plant life—maximum 30 years). Once the wastewater rate is established for industrial cost recovery, each industry can decide whether to be charged a variable amount each year on the basis of maximum flow, or a fixed amount each year on the basis of a reserved capacity. A charge for maximum flow (typically a 4-week peak period) entails amounts in direct proportion to each year's maximum discharge, whereas a charge for reserved capacity will be constant even if there is no discharge for a given year.

In addition, since the 1972 amendments:

- Industry's share of these capital costs must be recovered in 30 years, or less if the facility's intended useful life is less.
- No interest is charged on the federal portion of the capital costs.
- Municipal costs for large users (typically industry) no longer include quantity discounts. Savings from economics of scale must be shared by all users.

- Companies and industries with similar waste characteristics can be classed together and the class assessed at a single rate to facilitate administration of the program.

- Each user of more than 10 percent of the municipal volume must sign a letter of agreement with the municipality saying that the user agrees to pay that portion of the grant allotable to the treatment of its wastes.

- Should another industrial user leave the municipal system, the remaining industries are not responsible for that industry's Federal industrial cost share.

CAUTION: The 0- to 25-percent construction cost portion raised by the municipality need not conform to the above regulations.

Municipal costs should theoretically be lower than the company costs to treat the same wastes because of two factors:

- The economics of scale that should be available from the large size of the municipal treatment system.

- Municipal treatment standards which are slightly less stringent than those which private dischargers face.

On the other hand, the actual costs for municipal treatment could be higher where the source has substantial quantities of incompatible wastes or has to extend sewers a considerable distance to join the municipal system.

The waste discharge decisions open to management can readily be comprehended by table VI-1, which shows the type of waste and the control possibilities from which the choice can be made.

Table VI-1.—*Control strategy vs. type of wastewater*

Type of waste	Total on-site treatment and discharge to surface water	Pretreat and discharge to sewer	Direct discharge to sewer
Compatible			
Incompatible	[1]	[1]	Not allowed
Mixed			Not allowed

[1] A comparison between these technical alternatives will always show a preference for on-site treatment and discharge to surface water (assuming one time sewer connection charges and piping to stream are equal) because, for incompatible wastes, on-site and pretreatment costs are identical.

The economic choice to be examined in the following illustration is between (1) the pretreatment and discharge to sewers of mixed wastes and (2) total on-site treatment of mixed wastes.

NET PRESENT VALUE ANALYSIS

In order to compare the costs of private and municipal treatment, and continuing to use the earlier illustration, operating and maintenance costs have to be added to the effective equipment costs computed at the end of chapter IV:

effective equipment cost (*NPV*)

plus *NPV* of operating costs

equals Total Effective Equipment Cost for a Private Treatment Facility.

The municipal cost elements to include in the financial analysis are as follows:

effective municipal industrial cost recovery and user charges (*NPV*)

plus *NPV* of pretreatment capital and operating costs for incompatible pollutants

equals Total Effective Pollution Control Cost for Using a Municipal Facility.

Because of the complexity of this analysis and to avoid repetition of the preceding portions of this publication, we will limit this discussion to one of the three financial management strategies discussed in chapter IV. Of the three, we have chosen the management objective of maximizing long-term profit, the analysis of which is primarily a net present value (*NPV*) analysis. This method, incidentally, is the one used most frequently by EPA in economic impact studies.

In developing an *NPV* for the two treatment alternatives, i.e. pretreatment versus total on-site treatment, we must take into account the differing useful lives of the technical alternatives. The industrial cost recovery guidelines issued by EPA specify municipal plant cost recovery from industrial clients for the shorter of 30 years or the life of the municipal equipment. We have chosen a life of 20 years in the following example. Because the preceding discussion of treatment cost used a life of 10 years for the equipment, it will be necessary in the computation to show the effect of buying new treatment equipment after 10 years. At the end of 20 years, both the municipal equipment and the second treatment will be fully depreciated.

(In comparing *NPVs* for varying depreciation range equipments, it is necessary to extend the analysis to the point where both depreciated values are zero. This is accomplished by renewing the shorter-lived equipment enough times so that its depreciated value and that of the longer lived equipment are equal. An *NPV* comparison can then be made.)

The following analysis assumes that both sets of on-site equipment will be depreciated and financed by the same methods which were superior in the long-term profit analysis of chapter IV; i.e. double-declining balance and sum-of-the-years digits depreciation with investment tax credit and a tax-free pollution control bond. The terms of the two tax-free bonds will be repayments of 10 percent of the principal in 1 through 10 years and again in years 11 through 19 for the second on-site system.

Table VI-2 shows how the *NPV* for the on-site treatment plant alternative was derived.

Table VI-2.—NPV *of 20-year on-site treatment plant*

	A	B	C	D	E[1]	F[2]	G
Year	O&M	Yearly depreciation	Interest payments	Principal payments	After-tax negative cash flow	After-tax positive cash flow	Discounted cash flow $(E\text{-}F) \div (1+r)^i$
1	$20,000	$41,600[3]	$22,000[4]	$ 20,000	$41,840	$33,968	$ 7,606
2	20,000	31,680	10,800	20,000	36,016	15,206	19,427
3	20,000	28,160	9,600	20,000	35,392	13,517	19,730
4	20,000	24,640	8,400	20,000	34,768	11,827	19,992
5	20,000	21,119	7,200	20,000	34,144	10,137	20,213
6	20,000	17,599	6,000	20,000	33,520	8,448	20,395
7	20,000	14,080	4,800	20,000	32,896	6,758	20,544
8	20,000	10,560	3,600	20,000	32,272	5,069	20,658
9	20,000	7,040	2,400	20,000	31,648	3,379	20,742
10	20,000	3,520	1,200	20,000	31,024	1,690	20,795
11	20,000	41,600[3]	22,000[4]	20,000	41,840	33,968	5,315
12	20,000	31,680	10,800	20,000	36,016	15,206	13,679
13	20,000	28,160	9,600	20,000	35,392	13,517	13,892
14	20,000	24,640	8,400	20,000	34,768	11,827	14,077
15	20,000	21,119	7,200	20,000	34,144	10,137	14,233
16	20,000	17,599	6,000	20,000	33,520	8,448	14,362
17	20,000	14,080	4,800	20,000	32,896	6,758	14,466
18	20,000	10,560	3,600	20,000	32,272	5,069	14,547
19	20,000	7,040	2,400	20,000	31,648	3,379	14,606
20	20,000	3,520	1,200	20,000	31,024	1,690	14,645
				$400,000	Total *DCF* = *NPV* =		$323,924

[1] $(A + C)(1 - T) + D$.

[2] BT + 10 percent investment tax credit ($20,000) for year 1 and for year 11.

[3] Includes additional first year's depreciation of $2,000.

[4] Includes 5-percent underwriting expense for bond issue.

The analysis of the municipal treatment plant alternative includes the pretreatment costs plus the municipal costs to be paid by the manufacturer. The size, capital, and operating characteristics of the municipal treatment plant directly influence the fee charged for treatment. The type and volume of incompatible wastes influence the pretreatment costs. This analysis assumes a municipal treatment plant capable of handling 16 million gallons per day (MGD). At an approximate capital cost of $1.2 million per MGD, the total plant cost would be approximately $19 million. For illustrative purposes, it is assumed that the manufacturer contributes 2 percent of this total flow or 0.32 MGD.

In addition, it is assumed that:

- Seventy-five percent of the construction cost is provided by federal grant at no interest and requires industrial cost recovery.

- Twenty-five percent (the local/state share) is raised through a tax-exempt bond issue at 6 percent and also requires industrial cost recovery.

- The municipal plant requires the manufacturer to have pretreatment equipment, which is $100,000 over the 20-year period and is financed by a 6-percent tax-free loan and depreciated by the double-declining balance and sum-of-the-years digits plus investment credit method.

- The operating and maintenance costs (O&M) incurred by the plant for the pretreatment facility is 10 percent, or $10,000 per year.

The municipal costs for the plant thus consist of the following costs:

- Two percent (percentage contribution to the total municipal flow) of 75 percent of $19 million over 20 years, which equals $14,250 per year (to repay the federal capital proportion, i.e., industrial cost recovery).

- Two percent of 25 percent of $19 million plus yearly interest of 6 percent on the unpaid balance to repay the local/state capital proportion, which equals $10,450 in year 1 and decreases to $5,035 by the 20th year.

- Yearly municipal O&M (2 percent of $760,000) which equals $15,200.

In order to make a comparison with on-site treatment costs, the following must be added to the municipal costs:

- The *NPV* of the pretreatment capital costs after cash flow considerations from depreciation and financing costs.

- Pretreatment O&M of $10,000.

This example of the costs resulting from using a munipical treatment system with required pretreatment is further illustrated in table VI-3.

When comparisons are made between table VI-2 (the *NPV* of 20-year on-site treatment plant) and table VI-3 (the *NPV* of charges for 20-year municipal treatment cost recovery system), the financial choice is to treat wastewater on site. Obviously this is an illustrative finding based on the parameters of our hypothetical plant. It would not be prudent to extend the implications of this simplified example to industry in general.

A number of cost elements could not be quantified and incorporated into the analysis, such as costs to extend sewers to a stream or to the public treatment system. A number of assumptions were made in the illustrated case that can change from situation to situation. For example, the 25-percent state/local portion of the construction cost portion could be raised through a local or state bond issue, or a state grant, or a combination of the two. Generally, local or state loans or bond issues must be repaid over the years with an interest payment as was assumed in this analysis. However, grants for treatment plant construction costs do not usually require repayment. Thus, the peculiarities of each state's program for financially assisting municipal waste treatment systems must be incorporated into the financial analysis.

With appropriate adjustments as needed, the analysis in this chapter can serve as a management guide to completing a more definitive analysis based on specific plant situations and company financial posture and goals.

Table VI-3.—NPV *of charges for 20-year municipal treatment cost recovery system*

	A	B	C	D	E	F	G[1]	H[2]	I
Year	Federal portion user charge	Local state portion	Treatment and pretreatment O&M	Depreciation	Interest	Principle	After-tax positive cash flow	After-tax negative cash flow	Discounted cash flow $(H\text{-}G) \div (1+r)^i$
1	$14,250	$10,450	$25,200	$11,800	$11,000		$15,664	$31,668	$ 15,463
2	14,250	10,165	25,200	8,820	6,000		4,234	28,920	23,045
3	14,250	9,880	25,200	8,355	6,000		4,010	28,772	22,334
4	14,250	9,595	25,200	7,891	6,000		3,788	28,623	21,643
5	14,250	9,490	25,200	7,427	6,000		3,565	28,564	25,052
6	14,250	9,025	25,200	6,963	6,000		3,342	28,327	20,825
7	14,250	8,740	25,200	6,499	6,000		3,120	28,179	19,696
8	14,250	8,455	25,200	6,034	6,000		2,896	28,031	19,088
9	14,250	8,170	25,200	5,570	6,000		2,674	27,882	18,495
10	14,250	7,885	25,200	5,106	6,000	$ 8,000	2,451	35,734	23,595
11	14,250	7,920	25,200	4,643	5,520	8,000	2,229	35,503	22,790
12	14,250	7,315	25,200	4,178	5,040	8,000	2,003	34,939	21,648
13	14,250	7,030	25,200	3,710	4,560	8,000	1,782	34,541	20,805
14	14,250	6,745	25,200	3,249	4,080	8,000	1,560	34,134	19,988
15	14,250	6,460	25,200	2,786	3,600	8,000	1,337	33,745	19,214
16	14,250	6,175	25,200	2,321	3,120	8,000	1,114	33,347	18,464
17	14,250	5,890	25,200	1,857	2,640	8,000	891	32,950	17,744
18	14,250	5,605	25,200	1,393	2,160	8,000	669	32,552	17,050
19	14,250	5,320	25,200	929	1,680	8,000	445	32,154	16,383
20	14,250	5,035	25,200	465	1,200	20,000	223	43,756	21,794
							Total *DCF* = *NPV* =		$400,557

[1] TD + 10% investment tax credit ($10,000) for year one.

[2] (A+B+C+E) (1 - T)+F

Chapter VII

SUMMARY

In this era of special financing and tax programs associated with a multiplicity of environmental, health, and welfare regulatory laws, it is important to perform a financial analysis of the costs associated with these regulations with as much zeal as goes into the technological analysis of the needed equipment.

There are a number of new financing and tax alternatives specially designed for pollution control expenditures that can have financial consequences amounting to tens of thousands of dollars. Many of the laws covering these alternatives require that once a financial decision is made it cannot be changed, or can be changed in only one direction. Even if it can be changed, the cost of change would be prohibitive later in the program. Some alternatives are exclusively for pollution control capital costs or for process changes which also reduce pollution, while others indirectly affect costs for operating and maintenance.

The following financial information should be analyzed as a minimum before pollution control expenditure decisions are made:

1. Calculate the year-by-year cash inflows and the present values for each available choice of depreciation.

2. Determine the most effective combination of rate and term of loan for all debt financing of pollution control investments. Calculate the negative cash flows involved and their net present values.

3. Select the management objective by which you would want to judge the financial impact of the investment in equipment; for example, lowest short-term profit impairment, least cash drain, least long-term profit impairment, etc. Compare the results of combining the various financing and depreciation alternatives considered in steps 1 and 2 against the management objectives and select the combination best suited to your company needs.

4. For those with industrial wastewater, determine what the municipality's charge will be for processing wastes, estimate the capital expenditure and operating costs necessary for any pretreatment expense, and determine a present value for the municipal and pretreatment costs.

5. Compare the present values and year-by-year effects of step 4 against the selected financial management objectives and compare the results to on-site treatment capital and operating costs. This will provide a financial basis for choosing between using a municipality's wastewater system or investing in a private treatment facility.

This analysis presumes that the legal and tax restrictions of each financial alternative are fully understood by the analyst before the present values and cash flows are calculated. In addition, any state and local technical restrictions which may preclude a manufacturer from having freedom of choice must have been determined.

Figure VII-1 is a flow chart for the analysis needed in choosing the optimum financial strategy for pollution control. The factors entering the municipal versus private treatment decision process are shown at the right of the broken line.

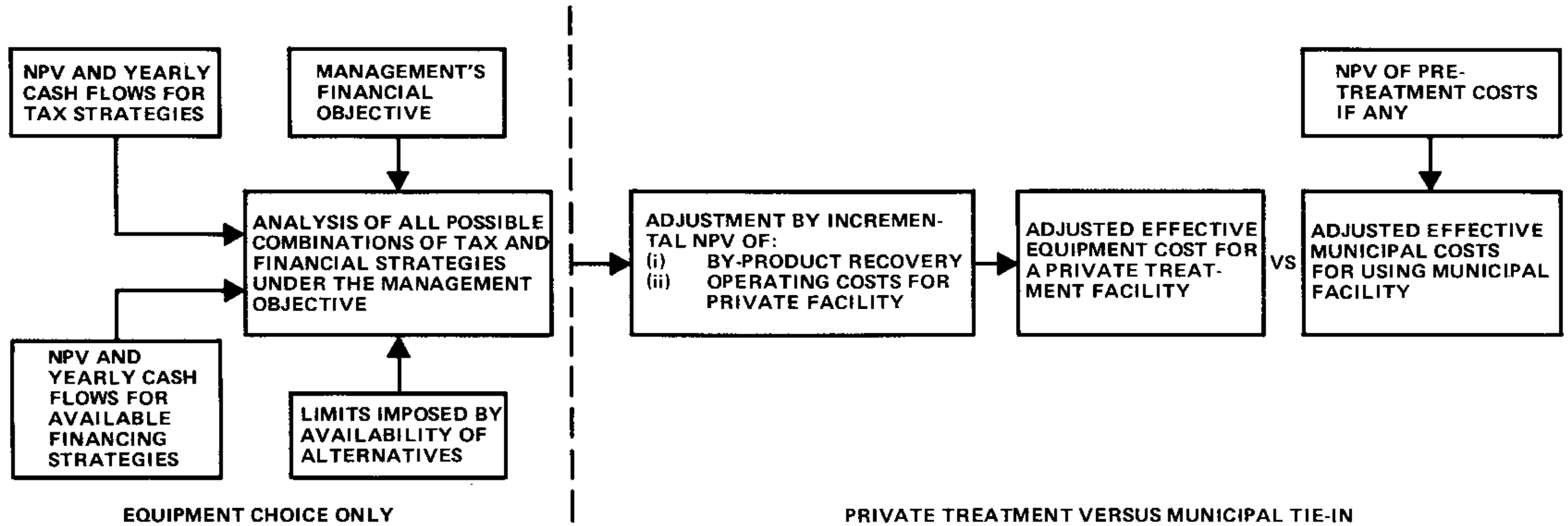


Figure VII-1. Guide to management for choosing the optimum financial strategy for pollution control.

Appendix A

SBA WATER POLLUTION CONTROL LOAN APPLICATION PROCEDURES

WHO IS ELIGIBLE

Section 8 of the Federal Water Pollution Control Act (FWPCA) authorizes the Small Business Administration (SBA) to make loans to assist any small business concern in effecting additions to or alterations in the equipment, facilities, or methods of operation of such concern to meet water pollution control requirements under the FWPCA, if the concern is likely to suffer substantial economic injury without assistance. SBA has defined a small business in standards that are available at any SBA field office. In essence, the applicant must be an independently owned and operated small business, not dominant in its field, and must meet employment or sales size standards established by SBA. In addition, a small concern may be eligible for a loan if its requirement for a loan is a result of engaging in one of the following activities:

- The business has an effluent discharge requiring a National Pollution Discharge Elimination System (NPDES) permit under Section 402 of the FWPCA.
- The business emits discharges through a sewer line into a publicly owned treatment works, and the city or town requires the treatment of waste discharge.
- The business plans to discharge into a municipal sewer system through the construction of a lateral or interceptor sewer.
- The business is subject to the requirements of a state or regional authority for controlling the disposal of pollutants that may affect groundwater.
- The business is subject to Corps of Engineers permit for disposal of dredged or fill material.
- The business is subject to Coast Guard or state requirements regarding the standard of performance or marine sanitation devices controlling sewage from vessels.
- The business is implementing a plan to control or prevent the discharge or spill of oil or other hazardous substances.

SMALL BUSINESS SIZE

Note that only small businesses are eligible for relief under the provisions of the FWPCA. Before you go to the time, trouble, and expense of preparing applications, be very sure of your size classification. If there is any doubt about the classification of your business, see Part 121.3-10 of the Small Business Administration Rules and Regulations or contact your local SBA office to determine the applicable employee or sales standard.

WHAT COLLATERAL IS NECESSARY

The applicant must be in sound financial condition and give reasonable assurance that the loan will be repaid. The applicant must pledge whatever collateral or give such guarantees as he can. When the SBA loan is used to acquire fixed assets, these must be pledged as security.

Personal and/or business assets should be used to the greatest extent possible, but it is not expected that they will be needed to the point of curtailing working capital or reserve requirements.

EPA'S TECHNICAL REVIEW

Before the SBA will review your eligibility for these loans, your credit information, or your ability to repay the loan, EPA must perform a technical review of the application to determine that the proposed additions or alterations are necessary and adequate to comply with one or more applicable standards.

You can obtain this review by submitting two copies of the application for Statement of Compliance to the EPA Regional SBA Coordinator. Processing time at EPA should generally not exceed 45 working days from the time a complete application is received.

The review by EPA may result in one of three distinct determinations:

- Approval: A written statement will be provided to you attesting to this, with a copy sent directly to the appropriate SBA office.

- Conditional Approval: Some of the items were acceptable and some were not. A copy of the conditional approval will be sent to the appropriate SBA office. Appeal of the rejected portion may be made without prejudice to the approved portion. You may use a conditional approval to secure a loan.

- Disapproval: You may make an appeal within 60 days directly to the EPA Deputy Administrator in Washington, D.C.

The EPA review is for technical purposes. Do not send detailed company financial and credit data to EPA. EPA may empower states to conduct this review and to issue statements.

WHEN TO APPLY TO EPA

Applications to EPA should be made after a permit or other official notification containing requirements is issued to or placed upon you by EPA, Corps of Engineers, Coast Guard, state, municipal, or regional management authority. These requirements will specify certain conditions or schedules to be met; only after these requirements are known can the determination of necessity and adequacy be considered.

WHAT MUST AN APPLICATION INCLUDE

An application to EPA need not be in any particular form but it must include the following:

- Name of applicant
  Mailing address
  (Address of affected facility, if different, from above)

- Signature of owner, partner, or principal executive officer requesting the Statement of Compliance

- Standard Industrial Classification (SIC) number for business for which an application is being submitted (see Standard Industrial Classification Manual, 1972 edition, or describe the type of business activity if SIC is not known)

- Description of process or activity generating the pollution to be abated by additions, alterations, or methods of operation covered by application

- Specific description of additions, alterations, or methods of operation covered by the application. This would include, where appropriate:

  - Summary of construction to be undertaken

  - Listing of major equipment to be purchased or utilized in operation

- Purchase of any land or easements necessary to operation of facility

- Other items deemed pertinent (information considered as a trade secret shall be identified as such)

- Declaration or requirement(s) for compliance for which alterations, additions, or methods of operations are claimed to be necessary and adequate

- If you have received a permit from a State Water Pollution Control Agency within the preceding 2 years, and the permit was not an NPDES permit issued under the federal act, and where the permit relates directly to abatement of discharge for which statement is sought, a copy of the permit should be included.

- Any written information from a manufacturer, supplier, or consulting engineer, or similar independent source, concerning design capabilities of the additions or alterations covered by the applications. This would include warranties or certifications obtained from or provided by such sources which would bear upon design or performance capabilities. (Requirement may be waived if there is no independent source for the information described).

- Estimated schedule for construction or implementation of alterations or methods of operation

- Estimated cost of alterations, additions, or methods of operation and, where practicable, individual costs of major elements of construction to be undertaken

- Information on previously received SBA loan assistance for a facility or method of operation; description and dates of activity funded

- NPDES permit number, if applicable

SBA'S FINANCIAL REVIEW

The EPA approval or conditional approval should be submitted to the appropriate SBA office with the completed SBA loan application. Once SBA has received your complete application package, you should plan for a review time of about 4 weeks.

FURTHER INFORMATION

For further information, contact either the EPA regional or SBA district office. The EPA regional office will also be able to provide you with a copy of the regulations that were developed for this program, which should help you in preparing your application for technical review.

Appendix B

TYPES OF CONTRACTUAL ARRANGEMENTS BETWEEN GOVERNMENTAL AUTHORITIES AND INDUSTRIES ACQUIRING TAX-FREE FINANCING

Depending on the state, a borrower utilizing the industrial development bond program may deal with a township, city, town, county, village, or borough; a quasi-governmental authority; or a state. Also, the sources which loan the funds to the authority to be lent to the borrower may be a bank, the public at large, or some other institutional investor who can benefit from the tax-free income. Just as variable are the agreements between the authority and the company installing pollution control equipment, particularly in the manner of interest and principal repayments.

The interest and principal repayment schedule utilized by the borrower in the example in this manual is essentially similar to many bond indentures. That is, equal interest payments are paid each year, but the borrower pays different amounts of principal into a type of sinking fund during the life of the financing. The sinking fund plus earned interest is used as the repayment source at the end of the term of the financing. As is typical in most situations, there is a lien on the property being financed and/or a guarantee by the borrower. At the end of the financing period, the borrower purchases the facility from the authority at nominal consideration, which must be less than fair market value. The borrower is treated as the owner for tax purposes during the financing period, even though legal title is in the authority. The borrower can take depreciation and investment tax credits.

It is also possible for the relationship between the governmental authority and the industry to be structured as an ordinary financing lease, with lease payments deducted by the business as rental payments. In this case, the lessee does not have the privilege of taking depreciation and the investment tax credit. The payments would be even over the lease life. The authority retains title at the end of the financing. This relationship does not occur often because of difficulty in meeting the same lease tests described in chapter III.

Another possibility is to establish the relationship as an installment sale with title going to the buyer at the end of the installment period. This system would have equal payments and allow the purchaser to take depreciation and the investment tax credit.

The last method is for the government agency to issue a bond, the proceeds of which are reloaned to several companies. Each company negotiates its own terms and signs a loan agreement or note. The borrower is entitled to depreciation and the investment tax credit.

Appendix C

IRS DEFINITIONS AND ALLOCATIONS OF POLLUTION CONTROL EQUIPMENT UNDER THE IDB PROGRAM

For the financing of equipment to be tax exempt under the industrial development program, it must meet many tests [Treasury Regulations Section 1.103-8 (a) and (g)].

In mid-1975, the Internal Revenue Service (IRS) promulgated regulations which define pollution control equipment for industrial development bond (IDB) financing and which allocate its costs where the equipment also performs a function other than pollution control. Since the regulations were not finalized at the date of this printing, the reader should refer to the regulations as they are adopted after public comment has been considered, particularly for the more controversial regulations.

The regulations are listed below and several are followed by examples:

- "The property must in whole, or in part, abate or control water or atmospheric pollution or contamination by removing, altering, disposing or storing pollutants, contaminants, wastes or heat." The term pollutant only applies to materials or heat discharges which definitely result in water or atmospheric contamination. This definition excludes "the release of materials or heat which would endanger the employees . . . in which such property is used," for example, as determined under the OSHA program.

- The property must be "of a character subject to allowance for depreciation . . . or land."

- "The jurisdictional agency must certify that the facility, as designed, is in furtherance of the purpose of abating or controlling pollutants, or the facility will meet or exceed the appropriate regulations in effect at the time of issuance."

- Property does not qualify if used to avoid the creation of pollutants. For example, the installation of a new boiler which reduces pollution by more efficient combustion than the replaced boiler does not qualify. Likewise, equipment that removes potentially polluting sulfur from fuel does not qualify. However, equipment which handles or treats the removed sulfur does qualify. This is one of the more controversial regulations.

- Property does not qualify if it processes material or heat that was a pollutant, but is not upon reaching the process in question. The property must be "a unit which is discrete and which performs . . . one or more of the (pollution control) functions . . . and which cannot be further reduced in size without losing one of such characteristics." For example, consider pollutants converted in a first step to a nonpollutant chemical which is subsequently processed to make it saleable. The equipment of the first step qualifies; equipment in the subsequent steps does not qualify. The equipment in the first step is the smallest unit of property which functions to control pollution. In addition, by the time the material reaches subsequent steps it is no longer a pollutant.

- Property also does not qualify if the polluting materials were customarily controlled for other reasons. For example, a water system which discharges heat from cooling a turbine does not qualify since turbines require cooling to operate at peak efficiencies.

In addition to the above tests, an exempt issue requires that 90 percent or more of the proceeds must be used for pollution control equipment. Therefore, up to 111 percent of the pollution control costs, if exactly known, may be borrowed.

The second major component of the regulations concerns the allocation of property costs which controls pollution and serves a purpose other than the control of pollution. Allocations are necessary since it is only the cost of the pollution control portion which qualifies for the financing. The following ratio should be applied to the property cost to determine what costs do not qualify:

$$\frac{Y}{C + E}$$

where Y = present value of estimated economic benefits to be realized over the life of the equipment, such as "gross income or cost savings resulting from any increase in productivity or capacity, production efficiencies, the production of a byproduct, the extension of the useful life of other property . . . (and) savings resulting from the use, reuse, or recycling of items recovered."

C = present value of payments (excluding interest and minus salvage value) for acquiring the property, i.e., capital costs

E = present value of all expenses, including interest, incurred during the operation of property.

Present values are computed using a 12-1/2 percent discount rate (r).

Appendix D

SOURCES OF INFORMATION ABOUT STATE POLLUTION CONTROL INCENTIVES

The Industrial Development Research Council (Conway Research Inc., Peachtree Air Terminal, 1954 Airport Road, Atlanta, Georgia) publishes a list of pollution control incentives available by state.

The National Association of State Development Agencies (Suite 203, 1925 K Street, N.W., Washington, D.C.) maintains a list of the directors of state development agencies. These directors can provide details about state financing programs relevant to pollution control, as well as some tax information.

State departments of revenue and taxation should be consulted for details about state tax exemption and credit programs specifically for pollution control.

Information about state municipal wastewater construction grants (including eligibility, funding level, and priorities for grant approval) can be found in the water quality office in either a state health department or a state environmental department.

In addition to requesting a copy of the laws and any helpful supporting information, the names of other authorities who will need to be contacted should be requested. This is especially true for those seeking information on how to proceed when interested in industrial development bonds, also referred to as pollution control or municipal revenue bonds.

U.S. ENVIRONMENTAL PROTECTION AGENCY • TECHNOLOGY TRANSFER