ENVIRONMENTAL PROTECTION AGENCY
TECHNOLOGY TRANSFER SEMINAR

LITTLE ROCK, ARKANSAS—JANUARY 16-18, 1973

UPGRADING EXISTING POULTRY PROCESSING FACILITIES TO REDUCE POLLUTION

CHOOSING THE OPTIMUM
FINANCIAL STRATEGY FOR POLLUTION CONTROL

J. A. Commins & Associates, Inc. Fort Washington, Pennsylvania 19340

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PREPARED FOR THE
ENVIRONMENTAL PROTECTION AGENCY

by

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FOREWORD

This report was especially prepared for the EPA Technology Transfer Seminar for Poultry Processors. The contents of the report have been designed for managers who contribute to the financial decisions on pollution control equipment. The quantitative aspects of the report are intended to provide guideline approaches useful in calculations to develop comparitive values of the financial alternatives available for pollution control equipment and expenditures.

The laws and techniques used throughout are applicable to any air or water pollution situation for any industry. To lend more precise applicability, the report has been tailored to the poultry processors and some common attributes of their plants.

The major pollution situation referred to is waste water because we are considering primarily the processing and not the rendering phase of the business, although much of what is said here is also applicable to air pollution control costs. When a waste water system is referred to it will mean any processing waste water system which could, where feasible, be used for feedlot or rendering wastes in a vertically integrated company.

The analysis is applicable to processors with their own treatment facilities and to those connecting with the municipal system. Of all federally inspected processors in the United States in 1970, 63% were tied into a municipal system while 30% had private treatment facilities. The remaining 7% had no treatment. In the South Central and South Atlantic regions the percentage of processors using municipal waste facilities increases from 63% to 67%. The percentage of processors with private facilities slightly decreases for the south from 30% to 27%. The data does not show whether the present mix was derived because of the advantage of user charges. Nor does it show whether each processor had the physical choice of both options. Facing higher user charges in the future, brought about by the Federal Water Pollution Control Act, and new standards for private treatment, the whole mix is subject to the possibility of major swings.

The reader should regard the illustrative situations used in this presentation as necessarily simplified, representative examples that by no means exhaust the variety of available alternative tax and financing strategies, particularly those relating to pollution control equipment. Consultation with the latest tax rulings and legislation is necessary before undertaking the final decision making process.

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INTRODUCTION

As the 1970's proceed, environment-related management decisions will be more complex and frequent. The impact on businesses of non-productive environmental expenditures can be significant where by-product recovery is limited or non-existent. It is clear from the provisions of the Water Pollution Control Act coupled with the existing Clean Air Act, that industry must commit sizable capital to meet the environmental standards the nation has set.

Many governmental institutions have shown a form of compassion for these necessary expenditures by providing means of reducing or softening the financial expenditures for pollution control. There exists a mild governmental practice of spreading some of industries' pollution control costs over the general public in place of just the company, and, to some degree, its customers. This is accomplished by excusing pollution control devices from certain sales, use and property taxes, by allowing tax-exempt financing by the company of the expenditures, or through adjustment in company income taxes by the addition of special depreciation alternatives. All of these programs involve a company paying lower taxes than they normally would have to pay if that equipment was for some other manufacturing or service purpose.

To put these incentives or cost reduction practices into perspective, it should be pointed out that these incentives do not pay for the pollution control investment nor do they overwhelmingly reduce the cost.

They can, however, have a pronounced effect on cash flow and profit positions depending on what alternatives are selected. Because procurement of control equipment is a relative unique business occurrence, and because of a considerable body of new and involved tax and financing regulations for such purposes, it is likely that company financial managers are not as familiar with the many possibilities as they would be with the more common business operations.

This report will demonstrate that it is well worth spending time in analyzing the unique added methods of financing pollution expenditures and their equally unique tax treatment. It will alert decision makers as to the availability of, and qualifications for some of the financing incentives that federal, state and local governments have made available.

Obtaining the optimum financial and tax incentives for your company could save tens of thousands of dollars over the life of the equipment. For example, a recent Business Week article (July 29, 1972 pp. 50-51) demonstrated the cost savings that tax exempt pollution control revenue bonds can provide. "Over the life of a 20 year $10 million issue, the typical interest saving is about $3.6 million." Some revenue bond issues allow for deferred repayments of principal and permit the largest payments at the end of a 20-30 year issue. Meanwhile, the company can take depreciations and use investment tax credits which lower taxes. Thus, it can build up a cash flow which is used in other areas of the business. On that cash flow, earnings are generated which help to repay the bond principal at the later time.

The emphasis of the report thus far has centered on equipment purchases. Poultry processors with their own waste treatment facilities, and any processor-renderer with air pollution control equipment, will find the equipment emphasis appropriate. Those poultry processors whose waste becomes part of the municipal system will find the equipment analysis pertinent only if pre-treatment of wastes requires capital expenditures. The municipal treatment users, who already pay charges, are expected to face increased user charges under the 1972 Federal Water Pollution Control Act, where federal funds are used for construction of the municipal treatment facility.

Once the EPA publishes its system of user charges (April, 1973), poultry processors and others will then be able to analyze whether it would be financially preferable to make a capital equipment investment for their own private treatment facilities, or whether being hooked into municipal treatments system is better. There may be regulations, however, that might preclude the exercise of the results of such a decision. Presently, there is little that can be said quantitatively with respect to the preference of a user charge versus private treatment decision because of the anticipated changes in rates. This report will indicate, however, how to proceed with an analysis once the permissibility and costs of using municipal facilities are more adequately defined.

Management Summary and Guide

We have noted that there are a number of new unique alternatives that have sizable differing financial consequences amounting to tens of thousands of dollars. Many of the alternatives require, by law, that once a financial decision is made it can't be changed, or changed in only one direction. Others are final in that it would be prohibitively costly to change later on in the program. Therefore, the following financial information should be analyzed as a minimum before an equipment decision is made.

1. Determine for all debt financing of pollution control investments, the most effective combination of rate and term of the loan. Calculate the negative cash flows involved and their net present values.
2. Calculate the year-by-year cash inflows and the present values for each available choice of depreciation.
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, long-term profit impairment, etc. Compare the combinations of financing and depreciation values calculated in steps 1 and 2 against the established management objective, and select the combination best suited for your company needs.
4. Determine what the municipality's user charge will be for processing wastes and estimate the capital

expenditure necessary for any pre-treatment facility. Calculate the present values for the treatment expense and a present lease value for the user charge payment.

5. Compare the values and year-by-year effects of step 4, and steps 1 through 3, against the selected financial management objective. This will allow you to make a choice between whether to plug into a municipality's waste water or invest in a private treatment facility, from a financial point of view.

This analysis presumes that the legal and tax implications of each financial alternative are fully understood by the analyst in order that present values and cash flows can be calculated. Likewise, the analysis does not include the legislative and technical matters which may preclude a poultry processor from being able to have the freedom of choice.

Organization of the Report

The report is divided into five chapters. Chapter I describes the standard depreciation methods and those which have been established for pollution control facilities. Chapter II examines the costs of different methods of financing pollution control equipment. Chapter III relates the financing and tax strategies to the normal financial strategies of a company. In other words, how do the incentives correspond to a company's maximum cash flow strategy or its profit maximization strategy, etc? Chapter IV is a look at the availability of the various financing alternatives already discussed, both from the federal government and from the five southern states in which the greatest amount of poultry processing takes place. Some financing alternatives are for practical purposes always available, while others are dependent upon the source's budget. The last chapter examines the combination of the first four sections as opposed to the alternative of a user charge system. This analysis sets up a basis for decision when the costs of the Federal Water Pollution Control Act become predictable.

CHAPTER I

DEPRECIATION

Many pollution control acquisition incentives are in the form of special depreciation provisions. Sometimes, these provisions are called "rapid amortization", except that the amortization period bears no relation to useful life as in the case of strict depreciation. The underlying effect of any type of depreciation is on the taxes payable by a company and its cash flow. Normally, there exist two general kinds of depreciation incentives for any kind of equipment. One set of depreciation methods provides an annual deduction from income as a non-cash expense over a certain guideline period. The timing of deduction selection changes with different depreciation techniques. In other words, large portions of the cost of the equipment can be deducted early in the life of equipment by using one technique, or equal proportions are deductable over the life of the equipment, using another technique. This gives rise to the familiar terms: straight-line depreciation, double-declining-balance, sum-of-the-years'-digits, etc.

Another kind of equipment depreciation factor exists for all types of equipment, and that is an incentive to actually buy equipment; called an investment tax credit (Sections 46-48, 50, Internal Revenue Code). This provision, in effect, actually reduces the cost of the equipment because it gives a permanent tax credit. All the different depreciation methods noted previously, allow a corporation to adjust its depreciation schedule to conform with its financial management strategies.

To add an incentive for the purchase of pollution control facilities, the IRS permits a pollution control facility to be amortized over a period of 60 months (Section 169, IRC). Since the 60 month period may have no relationship to the actual life of the equipment, which could last 120 to 200 months, the incentive is called rapid amortization.

Depreciation involves consideration of both method and useful life. The ability to take any method of depreciation for pollution control facilities is not precluded because of the method a company customarily uses. The normal requirement for consistent adherence to class depreciation method is waived. For example, if a processor uses a food manufacturing Asset Depreciation Range, into which all the assets customarily fall, and he uses the straight-line depreciation method, he could still take double-declining depreciation for the pollution control equipment.

Another nuance is that when an asset class depreciation range is used, a different useful life can be used for pollution control facilities upon sufficient justification. For example, if a processor customarily uses a guideline useful life of 12 years (permitted in the 9.5 to 14 year ADR), he could use 8 years for the control device if he could substantiate. This may be advantageous if the life of the equipment is less than that of the normal asset range.

Relationship of Depreciation to Taxes and Cash Flow

The financial strategy supporting the rapid amortization plan is a good entry into the methods of analysis for evaluating which depreciation, amortization and/or investment tax credit method to use. The incentive is that depreciation/amortization is an expense which does not actually involve any cash outlays by the taxpayer. The lower profits from the expense before taxes means a tax savings. The tax savings is a net cash inflow to the corporation and is represented by:

NCF = D T

where NCF = net cash flow

and D/A = amount of depreciation/amortization

T = the tax rate, expressed as a fraction

Positive cash flows (cash inflows) are able to be reinvested in the business for the productive side of the operation or to reduce the needs for obtaining cash from other sources. A shortened period of depreciation/amortization means larger deduction, larger tax savings and more cash flow.

Net Present Value

An analysis of this net cash flow through the depreciable life of the equipment will yield a Net Present Value. The total effect of depreciation on a company's cash flow is determined by using the present value approach which utilizes 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, because the dollar that was saved today has the potential of yielding a return if invested or saved. Thus, at the end of the year, the future value of today's dollar is,

$$FV = 1 + r$$

where, r = yield (interest earned) on one dollar.

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

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

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

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

Thus, the present value of the net cash flow during year i, termed discounted cash flow, DCF, is,

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

The sum total of all such discounted cash flows over the useful life is the net present value, NPV, of the tax savings:

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

Since NPV is the sum of discounted cash inflows (tax savings), the higher the NPV, the more attractive the depreciation method. The annual discount rate, r, is termed the after-tax return on investment for the enterprise.

For a poultry processor, the cost of capital (this is the same as the return if funds are reinvested) before tax is estimated to be about 7%. After taxes, this figure reduces to about 3.5%. Therefore,

$$r = 3.5 \text{ percent.}$$

The effect of the net present values from each method of depreciation is to reduce the effective cost of the capital expenditure necessary for the pollution control facility.

Water Pollution Control Investment for Poultry Processors

At this time no one can be quite sure as to what will be the best practicable or the best available control technology for poultry processors or any other industry. For illustrative purposes, we are going to use an average investment figure that has been surveyed for extended aeration systems. The range of investment figures to install extended aeration systems was $149,000-$424,000. The estimate to be used in the depreciation calculations which follow, and in the remainder of the report, is $200,000.

The Asset Depreciation Range, for accounting purposes, of equipment used in the food manufacturing industry into which poultry processing usually falls, is 9.5 to 14.5 years (Section 167, IRS Code). We will select a 10 year life based on the reasoning that excessive wetness of the process leads to a shortened life. Salvage value is assumed to be zero.

Rapid Amortization

The Tax Reform Act of 1969, provides for 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. The accelerated writeoff was provided to encourage capital investment in pollution control. Note that a process change, even if it results in lower pollution does not qualify as a pollution control device, and such costs cannot be rapidly amortized.

The rapid amortization applies to the first fifteen years life of the equipment. The asset portion value over fifteen years can be depreciated by any method under Article 167 and depreciation taken immediately on that portion. The rapid amortization can begin in the month after installation and continue for a full 60 months, or it could 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 this provision is not considered a pollution control incentive, its inclusion is needed for accuracy of calculations.

For simplistic purposes it will be assumed that the effective date of purchase of the $200,000 extended aeration system is the beginning of the fiscal year and that the corporate income tax rate is 48 percent. Computation of the net present value of the $200,000 investment using rapid amortization results in,

$$\text{Yearly Cash Flow} = T\ D$$

$$= (.48)\ (\$40{,}000)$$

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

$$DCF = \frac{NCF_i}{(1 + r)^i} \qquad r \quad 3.5\%$$

$$NPV = \$87{,}649$$

Straight Line Depreciation

The base or most simple form of depreciation involves taking an equal proportion of 10 percent for each year of the 10 year life of the depreciable base under the appropriate poultry processing depreciation class. In this case, the depreciable basis could have been reduced to $198,000 by taking the additional first year bonus depreciation of $2,000 (maximum), but the point of emphasis is to have the straight line method serve as a base. Using the above formula with the $200,000 basis, the NPV of cash inflows is $79,839.

Investment Tax Credit

The Internal Revenue Service (Sections 46-48, 50) allows an investment tax credit of 7 percent of the equipment cost to be applied to the reduction of corporate income taxes payable. Investment tax credit is a special incentive for the business community to purchase capital equipment. This tax credit is a full and direct tax savings of $14,000 in this example. This figure, adjusted by the NPV, should be added to the straight line depreciation NPV, since the investment tax credit is allowed for that method. The resulting NPV is $93,495. Also taken into account in this calculation, is the NPV of the after-tax additional first year depreciation. There is a special caution on investment tax credit. Rapid amortization and investment tax credit are mutually exclusive. A choice between the two must be made at the outset.

There are also many other details of these amortization and tax credits laws which are too detailed or peripheral to present here and do not change the essence of the calculations.

Double-declining Balance Depreciation

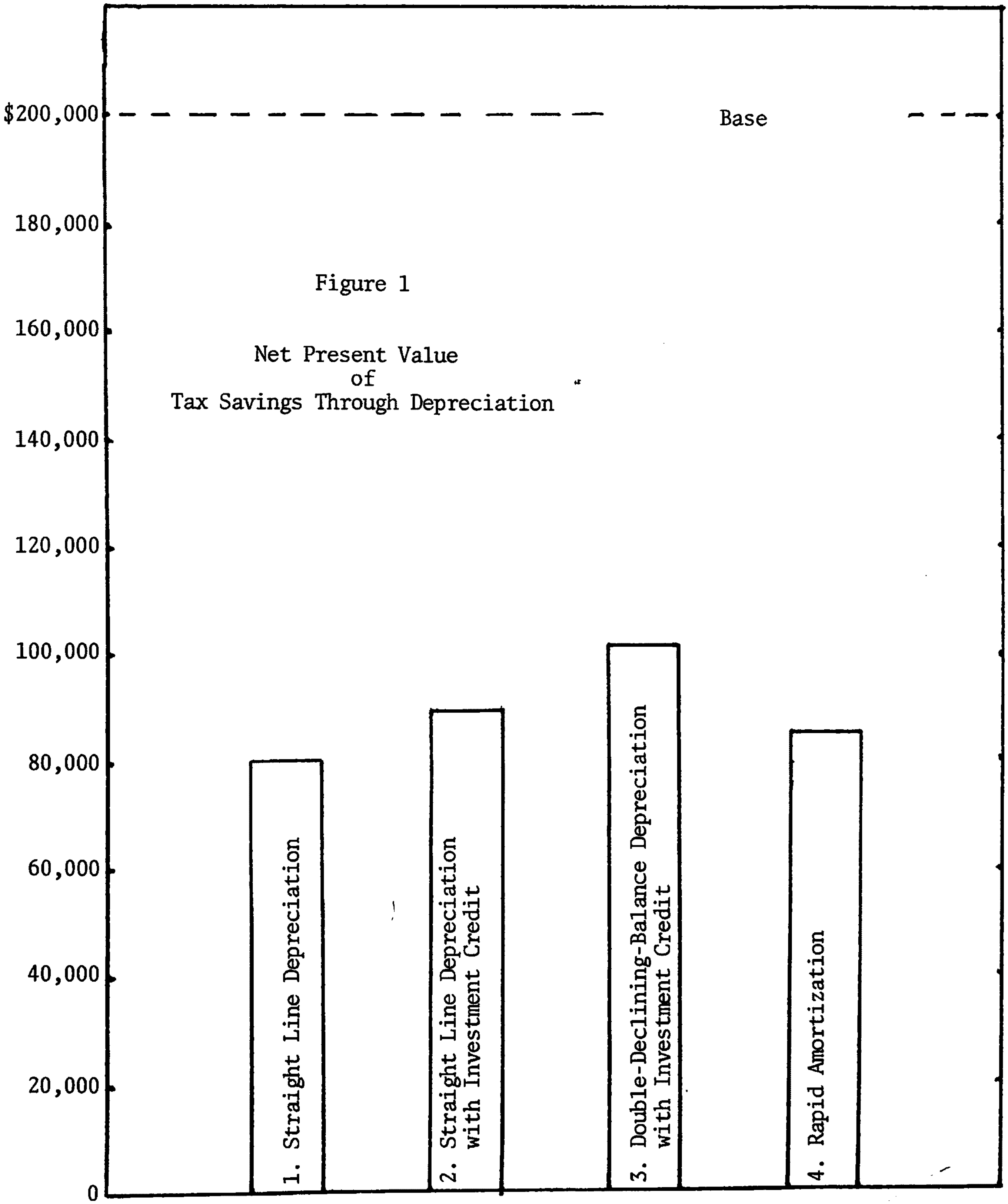
The double-declining balance method is the quickest allowable way, except for the aforementioned special rapid amortization of depreciating equipment through its useful life. The calculation provides that in each year, 20 percent of the remaining asset balance can be deducted. In our case, the first year's depreciation is $41,600 (.2 x $198,000 = $39,600 plus $2,000). In the second year, the 20 percent is taken against ($198,000 → $39,600) or $158,400, resulting in a figure of $31,680.

When year-by-year cash flows are discounted using the rate of return, the NPV for the $200,000 equipment using double-declining depreciation becomes $106,697.

There is, of course, another depreciation method called, "sum of the years digits", which has results between the straight line and double declining methods.

Depreciation Comparisons

Figure 1 is a bar graph of how the value of each depreciation method relates to the overall cost of the equipment. The values are less


$200,000
180,000
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
Base
Figure 1
Net Present Value of Tax Savings Through Depreciation
1. Straight Line Depreciation
2. Straight Line Depreciation with Investment Credit
3. Double-Declining-Balance Depreciation with Investment Credit
4. Rapid Amortization

than the base cost because of the cost-offsetting earnings from the cash generated by the tax savings from depreciation.

Limiting the consideration to net present value, the optimal strategy in our example is the double-declining balance method accompanied by the investment tax credit and additional first year depreciation. The fact that this form of depreciation is favored over the special pollution control rapid amortization makes one question how the situation arises. When the rapid amortization provision was enacted into law, the investment tax credit, which is historically an on-and-off type of tax incentive, was not in effect. Later on, the investment tax credit became effective for equipment installed after March, 1971. Economic resurgence was the major consideration when the investment tax credit was reinstated, and not how it would relate to the rapid amortization method.

The investment tax credit plus double-declining preference is accentuated first by the fact that process changes made to comply with pollution control regulations do not meet requirements for rapid amortization (only control devices do), and secondly, by the fact that the investment credit, per se, never needs to be repaid whereas rapid amortization really represents only a postponement of taxes.

Figure 2 graphically shows the year-by-year after-tax positive cash flows from the various depreciation alternatives. The difference between the #1's and #2's is the additional tax investment credit and additional first year bonus depreciation taken in the first year of the #2's.

The rapid amortization plan cash flows #4's are practically

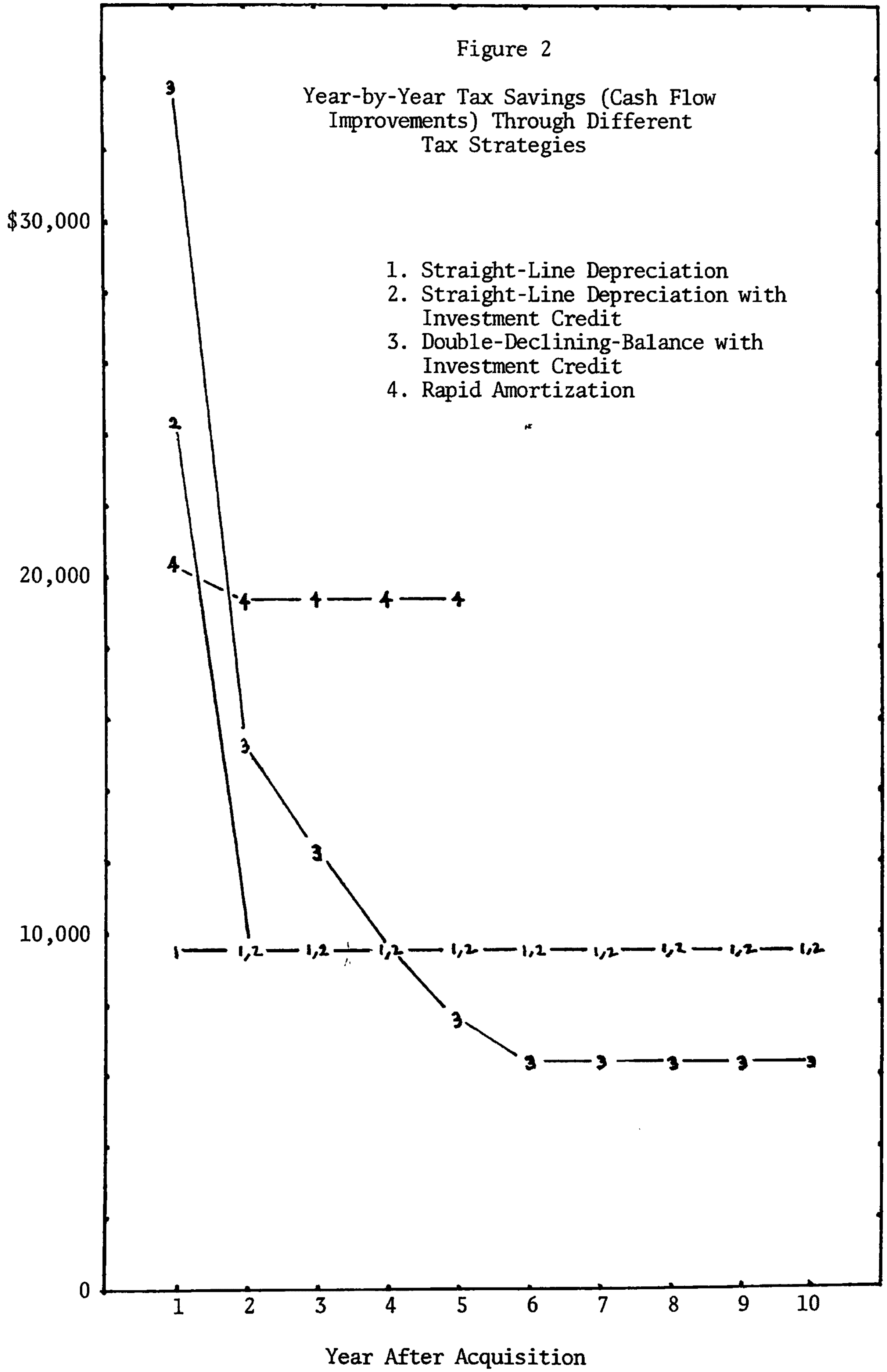


Figure 2
Year-by-Year Tax Savings (Cash Flow Improvements) Through Different Tax Strategies
1. Straight-Line Depreciation
2. Straight-Line Depreciation with Investment Credit
3. Double-Declining-Balance with Investment Credit
4. Rapid Amortization
$30,000
20,000
10,000
0
1
2
3
4
5
6
7
8
9
10
Year After Acquisition

level because of the installation of the equipment at the beginning of the fiscal year. The slight hump in the beginning results from the additional first year's depreciation. 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 hump in the first year also with a level amount over the next five years at a very slighty lower level.

The large hump in the first year of the double-declining balance method shown by #3's, results from taking the investment tax credit and the additional first year's depreciation.

Ability to Use Investment Tax Credit

A company must have a sufficient level of pre-tax earnings to be able to fully utilize the investment tax credit. An investment tax credit greater than the amount of corporate income taxes payable would defeat some of the advantage of taking the investment tax credit. In our example, and using a 48 percent tax rate, a company has to earn a minimum of approximately $28,000 before taxes to use the $14,000 available investment tax credit.

It is true that unused investment tax credits can be carried over into future, under certain conditions (Sec. 46b, IRC). However, the net present value of an investment tax credit carryover reduces, and its calculation here would present an unnecessarily complex situation.

This chapter demonstrated the large magnitude of differences in NPV's 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 method with investment tax credit over all other methods including rapid amortization. The life of the equipment has to be very long (over 30 years) before another depreciation method becomes superior in this illustration.

Next we will look at the effect of the special incentives for financing pollution control equipment. The determination of the differences in values for these financing methods coupled with the analysis just performed will carry us into Chapter III where the tax and financing strategies are combined.

CHAPTER II

FINANCING STRATEGIES FOR POLLUTION CONTROL INVESTMENTS

Prior to any special pollution control legislation, a plant manager would make the decision about a piece of equipment and then, if money was to be borrowed to pay for the equipment, get in touch with his normal financing source and request arrangements. With the advent of special pollution control incentives, there are, in general, not only new sources of funds available, but lower rates than normal for most sources of financing. This situation requires another whole set of analyses before a commitment is made with the optimal source.

Generally, two aspects of the financing strategy are covered in this chapter. The first aspect is the quantitative analysis using NPV as a tool for valuing each financial source and rate. The second aspect describes each financial source and based on rate and terms, calculates and compares the NPV of each. As in Chapter I, the example is based on a $200,000 extended aeration system.

Methods Used in Analyzing Financing Costs

In order to determine the cost to the company of the various available methods of raising funds, it is necessary to analyze the effect of such a venture on the company's operating financial position: its net profits after taxes. The methodology used in the subsequent comparisons is described below.

A comparison of the after-tax profits with and without the financing for pollution control equipment makes it possible to quantify and analyze such an effect: net annual profit after taxes, P, and the tax liability, L, can be related to other operating parameters by the equation:

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

where, p = annual taxable income

and, T = the tax rate, expressed as a fraction.

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

$$p = Q \quad I$$

where, Q = the operating income

and, I = the interest expense

combining the above two equations,

$$P = (Q \quad I)\ (1 \quad T) \qquad\qquad L = (Q \quad I)\ T$$

$$= Q\ (1 \quad T) \quad I\ (1 \quad T) \qquad\qquad = QT \quad IT$$

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

$$P = Q\ (1 \quad T) \qquad\qquad L = Q\ T$$

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 I T.

If C is the amount of principal that is paid back during a year, and I 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 (or tax savings):

$$NCF = (C + I) \quad (I \ T)$$

$$= C + I \ (1 \quad T)$$

The above equation represents the net effect of the loan 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. The effect of initial investments in pollution control on the company's fiscal position is analyzed here.)

Present Value Analysis

The payment of interest and principal payback extends through the term of the loan, which is defined as more than one year for a long term loan. The net cash outflow, NCF_i during year i is given by:

$$NCF_i = C_i + I_i \ (1 \quad T) \qquad i = 1, 2, --, n$$

where, C_i = principal payback during year i

I_i = interest expense during year i

n = term of the loan, years.

The total effect of the loan on the company's cash flow is determined by using the present value approach which utilizes the concept of time-value of money, described in Chapter I.

Thus, the discounted cash flow during year i,

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

The sum total of all such discounted cash flows over the terms of the loan is the net present value, NPV, of the loan:

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

Since NPV is the sum of discounted outflows, the lower the NPV, the more attractive the loan. The annual discount rate, r, as in Chapter I, is the after-tax cost of capital for the poultry processor, = 3.5 percent. For domestic corporations, the federal tax rate amounts to 48% on taxable income, if the taxable income is more than $25,000 annually. A tax rate of,

$$T = 48 \text{ percent}$$

is assumed throughout this analysis.

Bank Financing

Some commercial banks across the country have announced preferential rates and terms for certified pollution control facilities. Since these bank programs are quite random, the basis of analysis used here for financing pollution control equipment will be the type of normal equipment borrowing and not a special bank control loan.

The terms and rate suggested here as normal for this type of financing, are five years and 6 percent annually, with the effective rate of interest being 11.08 annually. The Net Present Value (NPV) analysis for financing the $200,000 extended aeration system through a bank is $208,078. The cash flows for this financing alternative are unique because of the bank repayments system. Although the repayment amounts are the same, the proportion of interest in those repayments is higher in the beginning. This interest is tax deductible, therefore, the net cash outflow is approximately halved. Since the repayments are equal and the proportions of the earlier payments have more tax-deductible interest expense and lower principal repayments, the net cash outflow is lower in the beginning.

Small Business Administration Water Pollution Control Loans

Since it could occur that some poultry processors might have access to the funds legislated under the Federal Water Pollution Control Act, the cost of such an alternative will be analyzed. Since this fund was just recently legislated and is as yet unappropriated, there are many program details yet to be developed. The fund however will be administered through the SBA and will most likely bear a rate equal to the weighted average of all federal government borrowings. Presently, that rate is 5-3/8 percent, and with general interest increasing we have used 5.5 percent in our calculations.

Those who qualify for the SBA loans are "any small business concern in affecting additions to or alterations in the equipment, facilities (including the construction of pre-treatment 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."

Obviously premature is any attempt at determining how many companies in the poultry processing industry will sustain substantial economic injury without assistance. However, by choosing a company with $4 million in sales and a sales-to-asset ratio of 3 to 1, we can demonstrate that a $200,000 capital expense consumes a significant portion of a company's capital program. If a complete asset turnover is accomplished every 10 years and the assets of a $4 million sales company are $1.3 million, then the yearly average capital investment would be approximately $130,000. At a 2 to 1 sales-to-assets ratio, the yearly capital expenditures would average $200,000. The substantiality of the cost for an extended aeration system as compared to normal capital expenditures becomes very evident if this example is representative. It cannot be construed that this exercise demonstrates substantial economic injury, but it does illustrate the need for rates such as those for a special SBA loan.

SBA loans are permissible to 30 years, however, we have chosen a ten year loan term to recognize rapidly changing technology and the normal Asset Depreciation Range into which a poultry processor belongs. Using the 5.5 percent rate and the 10 year repayment schedule, the NPV calculates to $194,171.

Government Aid to Financing (Tax-Free)

As a result of the effort to encourage industrial development in general, and in some cases to encourage industry to install control equipment on sources of pollution, governmental aid is available in the following areas:

(a) Aids to individual borrowers for low-cost capital, and

(b) tax aids to industry through special regulations and procedures.

The consequences of the latter will not be described at length, as their impact is not large and varies from state to state. They include sales, use and property tax exemptions.

Many states now have financing programs for the purchase and installation of pollution control facilities. These states, via governmental and/or quasi-governmental agencies, assist in floating attractive low-interest bond issues and in raising the required funds through industrial mortgages. Such bonds bear a lower interest rate than any of the aforementioned methods, since the interest payments are presently free of federal and state income taxes.

The terms in our example include a 5 percent interest rate with an initial underwriting cost of 5 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.

A word of caution about tax-free status concerns the advice of counsel needed. A whole set of provisions exists on the nature of the facilities qualifying and certified as eligible for tax-exempt financing.

The NPV of cash outflows for the tax-free financing method for the terms described above, and in our $200,000 example, is $184,529.

Comparison of Financing Methods

Figure 3 is a bar graph of the net present values of the negative cash outflows in financing the $200,000 cost by the three alternatives. This set of alternatives actually represents a range of maximum and minimum financial costs into which fall all methods of financing. In other

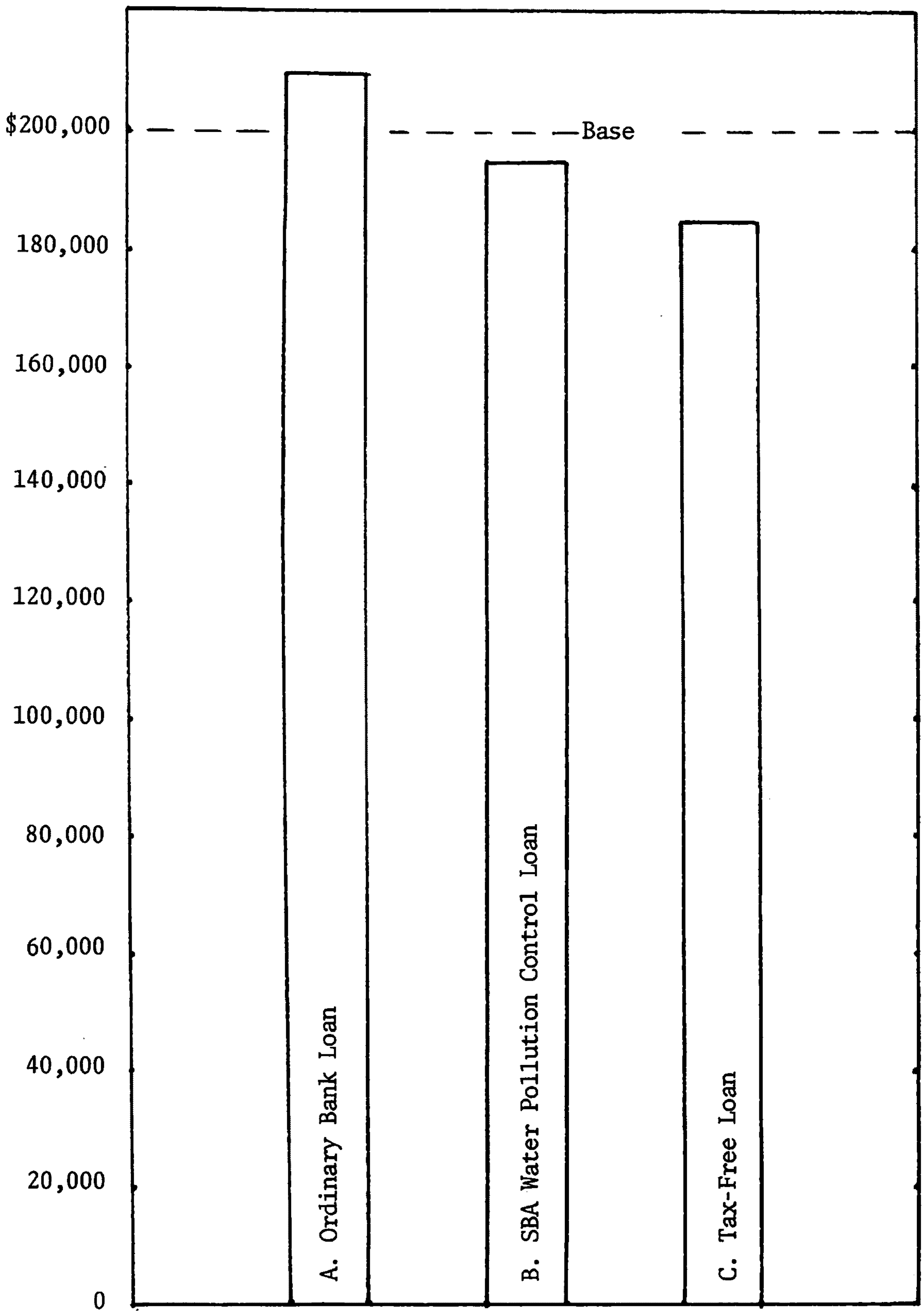


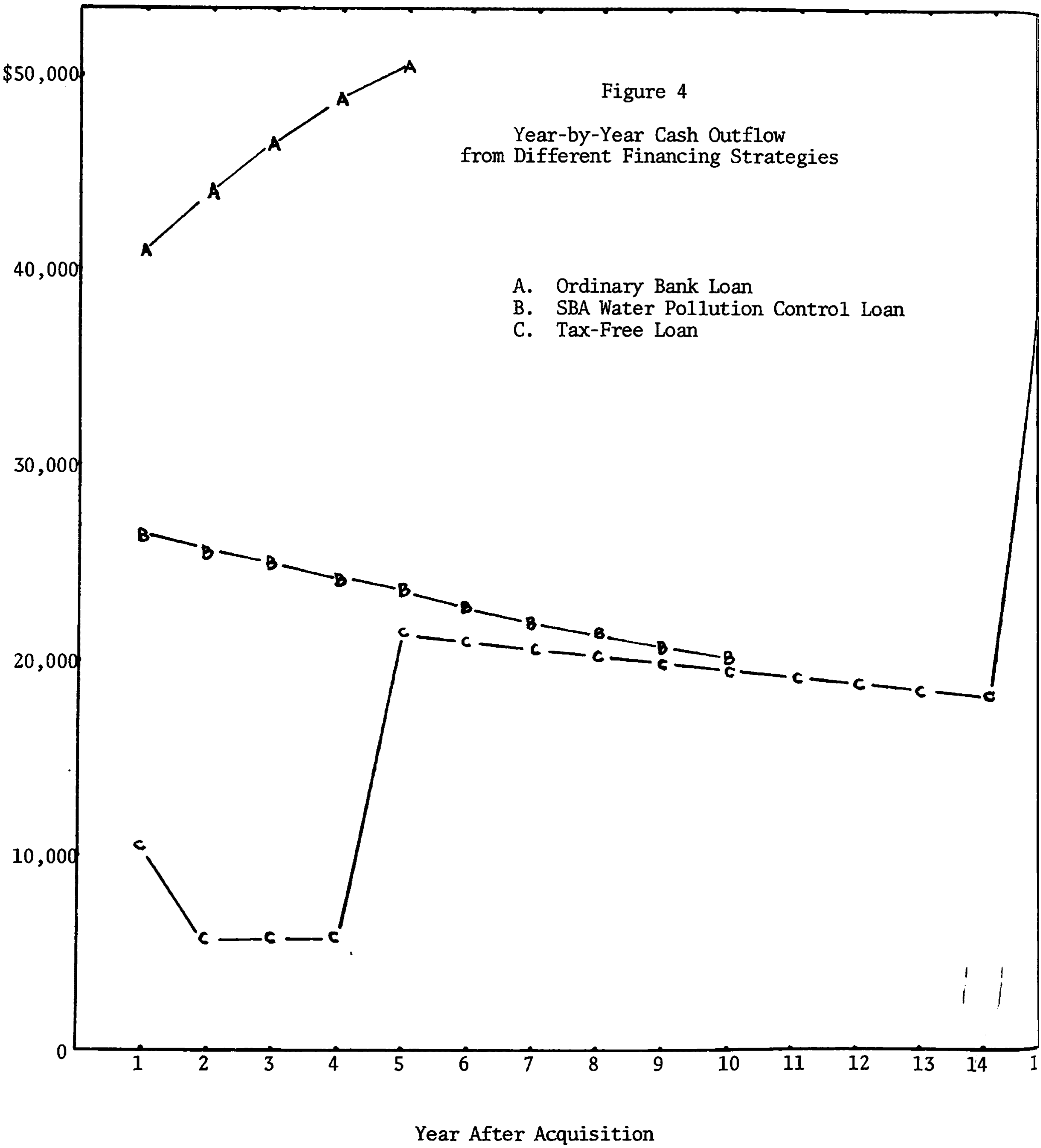
Figure 3
Net Present Values of Cash Outflows from Financing

words, more alternatives exist, however, the results would fall between the highest and the lowest bar.

The figure clearly shows the superiority of the tax-free method of financing pollution control equipment under net present value considerations. As equally important in emphasis, is the magnitude of the range of values. Just on a $200,000 piece of equipment, the range is approximately $23,000; a substantial cost if all the financing possibilities had not been fully considered.

Figure 4 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 five years, than either of the other strategies. On the other hand, a bond issue has the lowest cash outflow for an extended period. Depending on the payoff method chosen, however, full repayment of principal at the end or a sinking fund will be required. In the first instance (illustrated), high cash outflow is generated due to the ballooning effect in the final year.

Now that the ranges of financing and tax strategies have been fully described and analyzed, we are prepared to relate the choices for selection purposes. In order to perform selection, the objectives by which companies are managed will be explained in the next chapter as they impact possible combinations of the tax and financing alternatives.



$50,000
40,000
30,000
20,000
10,000
0
Figure 4
Year-by-Year Cash Outflow
from Different Financing Strategies
A. Ordinary Bank Loan
B. SBA Water Pollution Control Loan
C. Tax-Free Loan
1
2
3
4
5
6
7
8
9
10
11
12
13
14
Year After Acquisition

CHAPTER III

OPTIMUM FINANCIAL STRATEGY FOR POLLUTION CONTROL

With the data now available from the calculations discussed in Chapters I and II, it is now possible to develop the appropriate management approach to financing and tax strategies. The idea is to select the right combination of strategies to meet the management objectives of the company. To illustrate the pronounced effects involved, we will use a hypothetical plant procurement.

Figure 5 contains the key characteristics of three financing strategies, as well as fiscal characteristics of the hypothetical pollution control equipment needed. This will be used as the common base in developing the three illustrative examples that follow.

No two poultry processors face the same financial problems. And no two share exactly the same management objectives. To demonstrate the cumulative effects of the various tax and financing strategies covered so far, we have selected three typical business situations involving different management objectives that might exist in a poultry processing operation. We will show how different strategy combinations affect each situation.

First, let us look at a processor with a weak working capital. He needs pollution control equipment, but cannot "afford" it, 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.

Figure 5

ILLUSTRATIVE FINANCIAL CHARACTERISTICS OF POLLUTION CONTROL EQUIPMENT FOR THE POULTRY PROCESSING INDUSTRY

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 subject to a certain maximum
Additional First Year's Depreciation	$2000
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	11.08 percent annually
Repayment Period	5 years
(b) SBA Water Pollution Control Loan	
Interest Rate	Weighted average treasury rate
Present Treasury Rate	5-3/8% ~ 5.5 percent
Payment Period	As long as 30 years, not more than life of equipment, 10 years
(c) Tax-Free Loan	
Interest Rate	5 percent
Initial Cost of Obtaining Loan	5 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)

The lowest cash outflow, and the strategy combinations that permit it, are shown in Figure 6. This value, shown boxed, is $6,500--the result of following a combination of Tax Strategy 4 and Financing Strategy B. It is the best choice for a processor with weak working capital acquiring pollution control equipment.

If we use a three-year period as the near term, Figure 7 shows the cumulative profit impacts of the different strategies in their various possible combinations, resulting in the best near-term profit. The boxed value, $43,800, represents the lowest possible cash outflow under the circumstances. It is derived from a combination of Strategies 1 and B.

Finally, there's the processor with enough resources and stability to concentrate on maximizing its long-term profit. Figure 8 shows that the strategies producing the lowest long-term profit impairment ($77,800) are double-declining-balance depreciation with investment credit combined with a tax-free loan (Strategies 3 and C).

The hypothetical examples of Figures 6, 7 and 8 do not represent straightforward totals of year-by-year values, but rather the totals of present values, attributable at the start of the period to the future events portrayed in the examples. This replacement is necessary because a meaningful comparison between financial effects occurring at varying times in the future can be obtained only by relating them all to a common point in time, such as the present.

Having chosen a combination of tax and financing strategies based on analyses such as those presented in Figures 6, 7 and 8, it is

Figure 6

COMPARISONS OF PEAK ANNUAL CASH DRAIN
FROM
DIFFERENT TAX AND FINANCING STRATEGIES

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

TAX STRATEGY	FINANCING STRATEGY		
	A. Conventional Bank Loan	B. SBA Water Pollution Control Loan	C. Tax-Free Loan
1. Straight Line Depreciation	$41,000 (5)*	$16,100 (1)	$41,000(15)
2. Straight Line Depreciation with Investment Credit+	41,100(5)	15,600(2)	41,000(15)
3. Double Declining Balance Depreciation with Investment Credit+	42,800(5)	16,600(6)	41,000(15)
4. Special Amortization for Pollution Control Equipment+	31,400 (5)	6,500 (1)	41,000(15)

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

Figure 7

COMPARISONS OF SHORT-TERM PROFIT IMPAIRMENT FROM DIFFERENT TAX AND FINANCING STRATEGIES

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

TAX STRATEGY	FINANCING STRATEGY		
	A. Conventional Bank Loan	B. SBA Water Pollution Control Loan	C. Tax-Free Loan
1. Straight Line Depreciation	$53,400	$43,800	$48,700
2. Straight Line Depreciation with Investment Credit*	68,800	59,300	64,100
3. Double Declining Balance Depreciation with Investment Credit*	97,900	88,400	93,200
4. Special Amortization for Pollution Control Equipment*	82,600	73,000	77,900

*Also includes effect of additional first year depreciation, Section 179, Internal Revenue Code.

Figure 8

COMPARISON OF LONG-TERM PROFIT IMPAIRMENT FROM DIFFERENT TAX AND FINANCING STRATEGIES

Useful life 10 years
Investment Cost: $200,000

TAX STRATEGY	FINANCING STRATEGY		
	A. Conventional Bank Loan	B. SBA Water Pollution Control Loan	C. Tax-Free Loan
1. Straight Line Depreciation	$128,200	$114,300	$104,700
2. Straight Line Depreciation with Investment Credit*	114,600	100,700	91,000
3. Double Declining Balance Depreciation with Investment Credit*	101,400	87,500	77,800
4. Special Amortization for Pollution Control Equipment*	121,400	107,500	97,800

*Also includes effect of additional first year depreciation, Section 179, Internal Revenue Code.

good practice to refer to separate year-by-year projections like those in Figures 2 and 4. Doing so determines year-by-year effects and makes them fall within acceptable limits.

In two of the three cases above the rapid amortization plan for pollution control equipment was not the optimal choice. By the very fact that tax incentive exists it is logical to be drawn to its use. However, as demonstrated, the management objective carries the deciding weight in determining whether or not rapid amortization is the optimal choice.

Figure 9 clearly demonstrates why all this analysis is so important. From the consideration of long-term profit impairment, the magnitude of the difference in costs to a company is the height of the difference in the maximum and minimum costs. If a pollution control facility in our example was financed by an ordinary bank loan and rapid amortization was taken (a fairly traditional choice), the effective cost would have been $121,400. A tax-free loan and investment tax credit with double declining balance depreciation resulted in an effective cost of $77,800, a savings over the former plan of $33,600. It is well worth devoting whatever cost is necessary to explore the various alternatives available to arrive at the optimal choice.

To determine how optimal the choice can be for an equipment investment, we will further explore in the next chapter just how available are all of these alternatives. Limitations in the availability may possibly reduce the optimum savings, however, the savings will still be substantial.

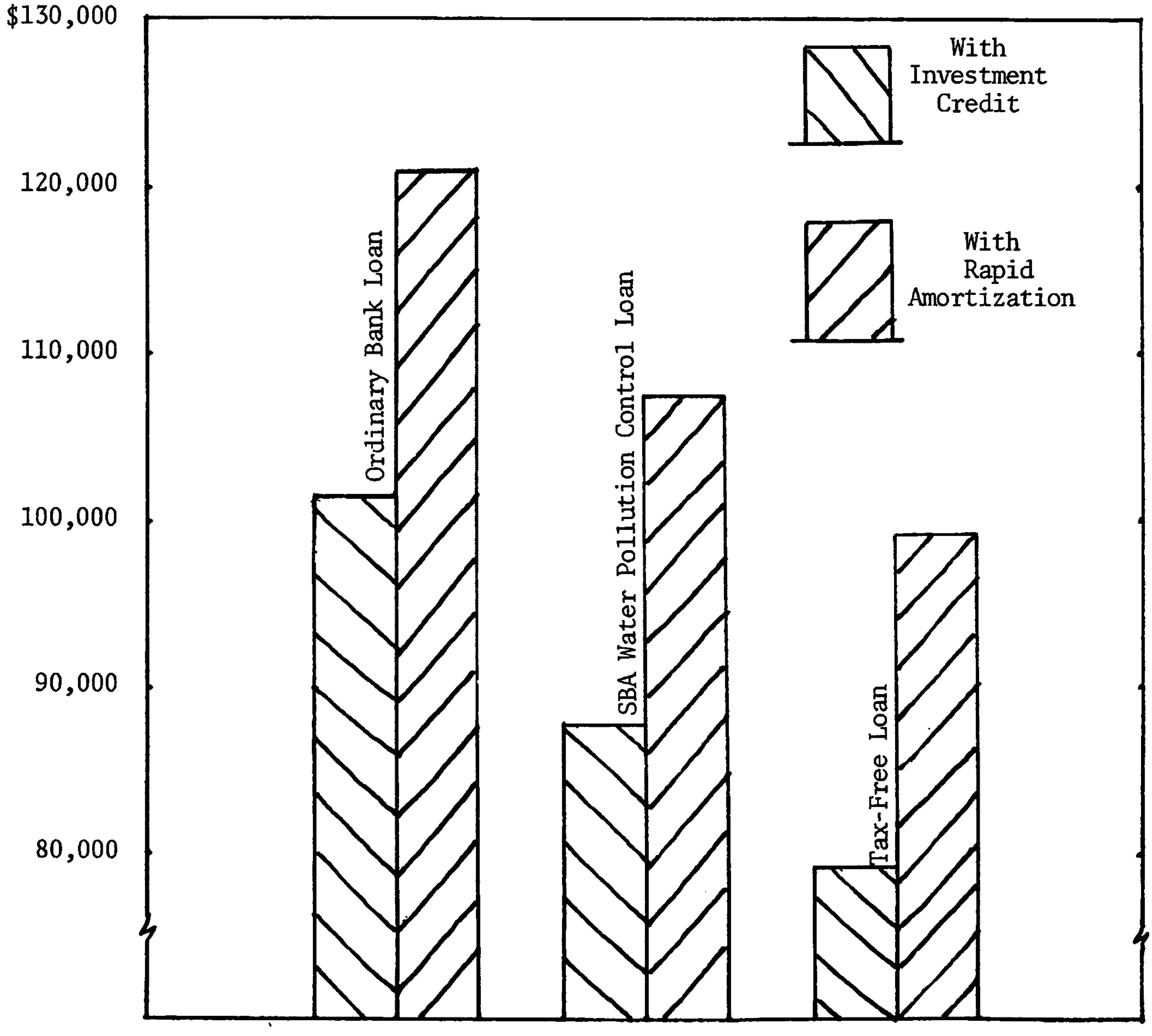


Figure 9

Long-Term Profit Impairment
From Various Financing and Tax Alternatives

CHAPTER IV

STATE FINANCING & TAX INCENTIVES

The tax and financing strategies discussed in Chapters I and II and the simplified examples of how they relate to management objectives (Chapter III) were based on an assumption that all companies would have access to each alternative. Whether or not this is true for a company depends considerably on size and location. The depreciation methods for tax strategies are available for any size company in any location.

Financial strategy availability is a much more complex matter requiring expert legal and tax advice. For example, although the tax-exempt financing is generally more attractive than regular bank borrowing, smaller companies generally do not have access to this source throughout the United States, except for a very few states.

A general statement cannot be made concerning tax-free financing which conveys obvious advantages to the borrower because of the many variations from state to state, but generally the borrower must qualify for the credit from either the public or a private source of capital. Enabling legislation must have also been passed in the state that permits revenue bond/industrial development financing for pollution control facilities. The ultimate tax-free eligibility ruler is the IRS. Specific attention must therefore be paid to what each poultry processor's state has passed into law as to availability of anti-pollution revenue bonds.

Size also is an important factor since there is usually a fixed portion of any bond underwriting expense. This requires a bond issue to be large enough to make those initial fixed costs effectively minimal. This limitation cuts off many potential users, or requires that a state have a form of private placement system for loans of less than nominally a million dollars.

The possible financing via states varies widely as can be seen from Table I. The tax regulations are usually fairly lengthy, and considerably involved so that they generally defy any attempt to condense and simplify. They are also time-varying so that the reader is cautioned to obtain a current reading before selecting a course of action. Nevertheless, what follows is a very brief and simplified overview of several states which are expected to be of special interest to this audience.

According to statistics from the last Census of Manufactures (1967), the following states had the highest value of shipments in the poultry processing industry:

Georgia	$333.7 million
Arkansas	253.4 million
North Carolina	224.6 million
California	195.9 million
Alabama	192.1 million
Texas	150.0 million

These states by themselves accounted for 46 percent of the value of shipments of the entire United States. Therefore, the tax and other

TABLE 1

FINANCIAL ASSISTANCE AND TAX INCENTIVES FOR INDUSTRY

	State Sponsored Industrial Development Authority 1	Privately Sponsored Development Credit Corp. 2	State Authority or Agency Revenue Bond Financing 3	City and/or County Revenue Bond Financing 4	State Loans for Equipment, Machinery 5	Excise Tax Exemption 6	Tax Exemption or Moratorium On Land, Capital Improvements 7	Tax Exemption or Moratorium On Equipment, Machinery 8	Sales/Use Tax Exemption On New Equipment 9	Sales/Use Tax Exemption Applicable to Lease of Pollution Control Facilities 10
Alabama	X	X		X		X	X	X	X	
Alaska	X	X	X	X	X	X	X	X	X	
Arizona	X			X						
Arkansas	X	X		X					X	
California		X							X	
Colorado		X		X						
Connecticut	X	X			X				X	
Delaware	X		X					X	X	
Florida	X	X		X						
Georgia			X	X					X	X
Hawaii				X	X	X		X	X	X
Idaho									X	
Illinois		X		X						
Indiana	X			X				X	X	
Iowa		X	X	X						
Kansas		X		X			X	X		
Kentucky	X	X		X	X		X	X	X	
Louisiana	X			X	X		X	X		
Maine	X	X		X					X	
Maryland	X	X		X			X	X	X	
Massachusetts	X	X		X				X		
Michigan				X				X	X	X
Minnesota		X	X	X	X		X	X		
Mississippi	X	X		X			X	X		
Missouri	X	X	X	X			X	X	X	

TABLE I (cont'd)

	State Sponsored Industrial Development Authority 1	Privately Sponsored Development Credit Corp. 2	State Authority or Agency Revenue Bond Financing 3	City and/or County Revenue Bond Financing 4	State Loans For Equipment, Machinery 5	Excise Tax Exemption 6	Tax Exemption or Moratorium ON Land, Capital Improvements 7	Tax Exemption or Moratorium On Equipment, Machinery 8	Sales/Use Tax Exemption On New Equipment 9	Sales/Use Tax Exemption Applicable to Lease of Pollution Control Facilities 10
Montana		X		X			X	X		
Nebraska	X	X		X						
Nevada				X						
New Hampshire	X	X	X						X	
New Jersey	X	X								X
New Mexico				X		X				
New York	X	X	X	X	X		X	X	X	X
North Carolina		X							X	
North Dakota	X	X	X	X		X	X	X		
Ohio	X	X	X	X					X	X
Oklahoma	X		X	X	X				X	
Oregon		X	X				X			
Pennsylvania	X	X	X	X		X		X	X	X
Rhode Island	X	X	X	X			X	X		X
South Carolina	X	X		X			X	X	X	
South Dakota				X		X				
Tennessee		X		X			X	X	X	X
Texas	X			X			X			
Utah	X	X	X	X						
Vermont	X	X	X	X						X
Virginia	X	X		X					X	
Washington		X		X						
West Virginia	X	X		X	X	X			X	
Wisconsin				X					X	
Wyoming		X	X	X		X				

pollution control incentives available in these states have a very significant relationship to the pollution control efforts of the poultry processing industry. To keep the amount of detail to a reasonable level we will limit the overview to five poultry producing southern states.

There are two categories of state tax incentives as aforementioned; one being exemptions from certain state taxes whose consideration would not enter the calculations performed in previous chapters. Examples include franchise taxes, property taxes, use and sales taxes. The second category pertains to the cost of financing involving low cost pollution control loans.

Alabama

Alabama leads the rest of the states reviewed here in the number of their pollution control incentives.

State Corporate Income Tax Deductions: The State of Alabama allows as a deduction for purposes of computing state corporate income taxes "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 one year depreciation writeoff of pollution control facilities or the election of a customary depreciation method, for state tax purposes. (Amendment to Section 402 of Title 51 of the Code of Alabama, 1940.)

Ad Valorem Taxation Exemption: Section 2 of Title 51 of the Code of Alabama, 1940, was amended in 1969 by adding paragraph S. This amendment permits the same type of pollution control facilities as described above to be exempt from the ad valorem tax.

Sales Tax Exemption for Equipment and Materials: Section 33 of Act No. 100 (1959) was Amended in 1969 to exempt from sales tax all equipment and materials to be used in the control of air and water pollution.

Domestic Corporation Shares of Ad Valorem Tax Deduction for Pollution Control Devices: Every share of a corporation in Alabama is assessed at thirty percent of its value to the person in whose name the shares stand for the purposes of computing a taxation. The assessed value of pollution control equipment can be deducted from the assessed shares value. This deduction was permitted by an amendment to Section 25 of Title 51 of the Code of Alabama, 1940.

Use Tax Exemption (Amendment to Section 789 of Title 51: The storage, use or consumption of all equipment and materials for air and water pollution control purposes is exempt from the Alabama use tax.

Tax-Free Financing: Municipalities [Title 37, Section 511 (20) (32), Code of Alabama-1958] and local non-profit development corporations [Title 37, Sections 815-830 (1)] can issue tax-exempt industrial revenue bonds to finance pollution control acquisitions. The methods by which the program operates are similar to those already covered in Chapter II.

We note that Alabama is an example of the most progressive pollution control finance and tax incentives of the states described here and elsewhere in the country. One unique fact is that the exemptions provided for the sales and use taxes include material purchases for pollution control as well as the device per se. A second feature of Alabama's incentives is the provision of the industrial development tax-exempt financing for pollution control facilities.

As we illustrated in Chapter II and III, the tax-free method of financing yields the lowest net present value of negative cash flows. Therefore, a poultry processor in a state such as Alabama has the competitive advantage of financing his control facilities at a lower cost over a processor in a state where revenue bonds cannot be used for pollution control.

The ability to issue eligible tax-exempt revenue bonds depends on a company's ability to float bond issues. To find a tax-free bond economically attractive, the amount usually has to be quite large (as a minimum, one to two million dollars). Therefore, the tax-free route is not open to all, even if their credit rating is basically good to excellent. In some states other than those being described, the local development corporation could arrange for the small tax-exempt revenue "bonds" to be purchased by a single financial institution such as a bank. Each poultry processor should determine what is the practice of the local development corporation. In some instances around the country, it is likely that a number of smaller corporations could be grouped together for financing purposes to permit a bond issue large enough to be floated without excessive underwriting costs.

In place of listing the Codes and Titles of each of the four remaining states pollution control tax incentives, we will generally describe the incentive in relation to the scope of Alabama's.

Arkansas

Arkansas has a tax-exempt revenue bond provision for industrial development but not for pollution control facilities. For equipment purchases, the state allows an exemption from the personal property tax for seven years provided that all pollution control equipment is owned by the municipality or county in which it operates. Arkansas also has a compensated use tax exemption for pollution control equipment.

Georgia

Georgia also has a revenue bond program that is available for pollution control. Georgia has a sales tax exemption for both purchased and leased pollution control equipment.

North Carolina

North Carolina has a franchise tax on domestic and foreign corporations operating within the state. The tax is essentially computed on net worth after certain taxes, dividends and reserves for depreciation have been deducted. In this state, the entire cost of certified pollution control facilities can be deducted from the base on which the tax is calculated.

For state corporate income tax calculations, North Carolina permits an allowance for depreciation of the polution control equipment to be spread over a 60 month period. This resembles the rapid amortization plan for federal corporate taxes payable.

In North Carolina the assessment value of property should not be increased by pollution control facilities, and a property tax is not levied against the same equipment.

Texas

The State of Texas has not extended their tax-exempt industrial revenue bond for pollution control facilities in general. There are limited provisions for pollution control revenue bonds in the solid waste area. The only tax-exemption which Texas appears to have is a property tax exemption.

The above description of incentives in various states should strongly demonstrate two aspects:

1. It would be unusual to find the exact condition in two states, especially where the incentive legislation is time-varying.

2. It is worth the effort to study the tax and financing schemes available in the pertinent state.

Review

From the above explanation, it becomes clear that the ability to achieve an optimum financial strategy is highly dependent upon the size of the firm and its location. Parameters used in Chapters II and III in the optimal choice analysis may have to be altered to reflect a firm's real spectrum of choices. The stress in the analysis thus far has been a firm's capital costs. In the next and last chapter, the realm of user charges and their possible modifications in the future will be discussed. Complete optimization under long-range management objectives can then be made by weighing the ramifications of being a part of a municipal waste water treatment system vis-a-vis constructing private treatment facilities.

CHAPTER V

MUNICIPAL VERSUS PRIVATE FACILITIES

Assuming that each are available, many poultry processing plants have the ability to choose whether they should have private or municipal waste water treatment. The present mix of poultry processing plants as stated in the foreword to this report favors municipal tie-ins. Such a mix is not unexpected when considering the fact that user charges have generally not been assessed based on any cost accounting system for allocating the entire costs of operations and replacements. Likewise, many rural and developing areas over the years have been able to attract plant locations by purposely keeping user charges low.

This user charge system as we know it today, is headed for abrupt change due to the 1972 Federal Water Pollution Control Act (FWPCA) amendments. As generally known, all waste water control standards for private and waste water treatment will become highly stringent as a result of the aforementioned legislation. Unless private or public current plants happen to have advanced waste water treatment, all will be expected to make significant investments in the best practicable or best available technology.

It is fairly safe to say that a major decision-making process in water pollution control will take place in the United States due to the large number of companies expected to need change. A major part of the decision-making scope includes the financial implications of equipment buying versus yearly municipal waste treatment rates.

Under previous amendments to the FWPCA there has always been a grant system, although comparatively small, through which federal funds were apportioned to the states. The 1972 FWPCA amendments continue the grant concept but at a tremendously bolstered dollar level. The fraction of total municipal treatment construction costs that can be funded by the federal grants has also been increased: At least $21 billion in future and repayment construction grants will eventually be funneled to municipalities; provisions of the FWPCA will permit up to 75 percent of the construction costs to be derived from the federal grant.

It also appears that a significantly higher user charge rate structure is in the offing as the FWPCA requires the municipality to recover, through charges, the operational costs and replacement value attributable to the industrial proportion of the federal grant. In other words, a municipal plant devoting 60 percent of its capacity to the general population and 40 percent to industry, must recover at least 40 percent of the 75 percent federal portion if the maximum grant contribution was used. Never before has such a replacement value recovery system existed.

The remaining portions of this chapter will construct a type of analysis for use in making the "user charge versus private facility" decision. The FWPCA is recent and its effects on the rate structure are yet to unfold. It would therefore be premature to portray any cost estimates. One major reason why it is difficult at this stage to estimate user costs, is the lack of EPA or other guidelines as to the number of years over which the replacement value is to be recovered from industrial users of a municipal facility.

There are at least three major factors -- pre-treatment costs, by-product recovery value, and two sets of operating costs -- which must be separately calculated before the final decision phase is consummated.

Pre-Treatment Costs

The first factor is pre-treatment costs for the conditioning or pre-treating of a company's waste water by a company before the wastes reach the municipal system. The costs of pre-treatment depend on the nature and volume of the wastes and will vary widely from industry to industry. It is conceivable that very little in the way of expensive equipment may be needed for some industries, where pre-treatment costs would consist of chemicals and other consumable supplies. Certain other industries will require capital investments for pre-treatment but not nearly as large as would be needed for complete private treatment.

The net present value (NPV) method of analysis will again be used to calculate a cost for pre-treatment. The financial and tax strategy calculations for this equipment are the same as those used in Chapters I and II. Further analysis would have to take into account the expected difference in useful life of a pre-treatment facility from a municipality's.

By-Product Recovery Value

It is reasonable that pre-treatment will produce by-product recovery in a poultry processing plant, however, the relativity of the subject here is for its value in a complete private facility. For our purposes, we will describe the value of annual by-product recoveries as an offset to the equipment costs. Rather than offset the recovery values against annual operating costs, the reason for offsetting against capital costs involves the factor that by-product recovery could effectively have in the initial facility decision.

We purposely did not enter by-product considerations earlier in the equipment decision phase. Its description here takes note of the fact that before the 1972 FWPCA, by-product recovery of some degree did exist in the poultry processing industry. The emphasis on by-product recovery here is the very likely increase in extent as events proceed in the poultry processing industry.

Operating Cost Differentials

Intuitively, the operating costs for a pre-treatment and municipal use system will be less than the costs to operate a private facility. This yearly difference must be assigned a NPV to be added to the NPV of the private treatment facility. The analytical method is the same as that described in Chapter II for a negative cash flow.

Municipal Versus Private Waste Water Treatment

To complete the sequence necessary for constructing a municipal versus private treatment analysis the remaining step is the calculation of a NPV for user charges. Using the formula in Chapter II, the yearly cash flows for the longest predictable horizon of the user charge system should be valued at NPV (as that horizon lengthens, the NPV approaches the value that would have resulted if the present value of an annuity had been used where the payments are infinite in duration). The sets of costs that we now have to compare in the decision process, have been adjusted as follows:

	effective equipment cost
minus	NPV of by-product recovery
plus	NPV of greater operations cost
equals	<u>Adjusted Effective Equipment Cost for a Private Treatment Facility</u>

	effective use charge value
plus	NPV of pre-treatment costs
equals	<u>Adjusted Effective User Charge Value for Using a Municipal Facility</u>

The basis for a <u>financial</u> decision between the two alternatives is outlined above. The financial data can be added to the technical factors that enter into the final decision.

<u>Summary</u>

Figure 10 is a flow chart of the analytical guides suggested for choosing the optimum financial strategy for pollution control. The chart summarizes the entire flow of this Report. Under the previously defined pollution control laws we were able, as we did in Chapters I, II, and III, to use quantifiable examples to optimize tax and financial strategies for equipment decisions. This area of the chart is depicted to the left of the dashed line. Chapter IV, while not in the flow, showed how these alternatives may be limited due to specific state programs.

The tradeoffs and factors entering the municipal versus private treatment decision process are shown on the right of the dashed line. They are not quantifiable at this time, and are intended as a guideline at the time when these costs become firmly known.

Figure 10

Guide to Management For Choosing The Optimum Financial Strategy For Pollution Control