INITIAL ANALYSES OF THE ECONOMIC IMPACT

OF

ANTICIPATED WATER POLLUTION CONTROL COSTS

UPON SELECTED INDUSTRIES

A Summary of Recent Studies

Prepared by

The Economic Analysis Division

Environmental Protection Agency

The Economic Analysis Division of the Environmental Protection Agency has recently completed a series of studies designed to provide an initial analysis of the economic impact of anticipated water pollution control costs upon selected industries. The industry studies completed to date include: Beet Sugar, Beverages, Cane Sugar, Coal Mining, Dairies, Fertilizers, Fiberglass, Inorganic Chemicals, Meat Products, Motor Vehicles, Plastics, and Textiles.

This paper summarizes the findings of those studies. Individual summaries of the industry studies are attached. A tabular summary of key economic impact figures is presented in Exhibit I.

This series of economic impact studies was initiated in the summer of 1972 to provide an initial economic impact analysis of the industrial effluent limitation guidance being prepared at that time by the EPA Office of Permit Programs.

Since that time, the Water Pollution Control Act Amendments of 1972 have become law. These direct EPA to establish effluent limitation guidelines for each industry requiring "best practicable control technology" by 1977, and "best available control technology" by 1983. Although the effluent limitation guidance prepared in 1972 was designed to anticipate "best practicable control technology" as much as possible, these studies do not provide a complete analysis of the economic impact of the new legislation.

They should be regarded instead as preliminary analyses of the effluent guidance developed for the Refuse Act Permit Program, guidance which is likely to approximate, in most cases, but not be identical to the effluent guidelines required by the new water bill to be proposed in the fall of 1973.

Methodology

Analyzing the economic impacts of pollution controls upon specific industry segments involves first an estimation of the costs that are likely to be incurred by industry; and then an analysis of how these costs would affect prices, profits, production, employment and the other economic variables that are critical to an industry.

Costs for these studies were developed by the EPA Economic Analysis Division on the basis of treatment technologies assumed necessary to meet the EPA Office of Permit Programs' effluent limitation guidance. A summary of these assumed technologies and costs is presented in Exhibit II. Costs are related to the reduction in biochemical oxygen demand for those industries in which this is a significant pollutant.

The analyses of the impact of these costs upon each industry were performed on contract by consulting firms with recognized industrial expertise. A list of these contractors is provided in Exhibit III. Because of the limitations of time (approximately two months) and information available, neither phase (i.e., cost estimates or economic impact analysis) of these studies was able to be performed with complete accuracy and rigor. Sufficient resources were available, however, to provide a good indication of the kinds of impacts to be expected, and to highlight possible problem areas.

Summary of Findings

These studies, like the previous inter-Agency economic impact studies* found that no industry studied would be seriously threatened by the requirements of pollution control. Price increases could be expected in most industries, but these would generally be in the order of ½% per year for five years. Some plant closings could be expected in those industries characterized by the existence of small, marginal plants competing against much larger, and much more efficient plants. In no industry, however, were these closings expected to have a significant impact upon productive capacity. Similarly, the direct unemployment resulting from these plant closings could be expected to present economic difficulties for some localities, but was not judged to be a significant part of total industry employment. In no instance were the increased costs associated with water pollution control requirements found to have any significant impact upon international trade.

* See The Economic Impact of Pollution Control, Government Printing Office, Washington, D.C., 1972

Prices

Price increases associated with the costs of water pollution control were anticipated to be in the order of 1%-3% for most industries. Over the five year period, this would average out to approximately ¼%-½% per year.

For some industries, and especially for some products, the anticipated price increases were much higher. Some table wines, for example, were anticipated to undergo a price increase of as much as 22% or about 4% per year for five years at the retail level. Relatively high price increases were also anticipated in the food processing industries for cane sugar and cottage cheese. The only other price increases approaching 10% were anticipated for certain products in the inorganic chemicals industry, most notably chlor-alkali.

For two industries, beet sugar and wool fiberglass, no price increases are anticipated, because major portions of these industries have already installed the necessary pollution control equipment. In both cases, this involves 100% recycling of process waters.

Plant Closings

In reviewing the findings of the recent studies on plant closings and unemployment, it is important to keep in mind that these economic impacts are based on the effluent guidance developed for the Refuse Act Permit Program. Since this effluent guidance was developed to apply primarily to major dischargers, it may not represent "best practicable control technology" for certain segments of the industries studied. In developing the effluent guidelines required by the new water bill, industries will be segmented on the basis of such factors as age, size, and technology; and separate effluent guidelines developed for each segment. Hence, it is possible that the economic impact of the new water bill effluent guidelines will be even less severe than that of Refuse Act Permit Program guidance.

Plant closings are expected in 8 of the 12 industries studied, with a possibility of one plant closing in a ninth industry. For these industries, the closing of a maximum of approximately 1,100 processing plants and 3,000 small coal

mines were judged to be possible as a result of water pollution control requirements. This compares to an estimated total of 25,100 plants and 5,600 coal mines currently existing in the industries studied.

The figure of 3,000 coal mines represents the total of those small, 3-4 employee, mines estimated to be located in particularly difficult pollution control areas. These mines are so small that it is difficult to estimate how they will actually be affected by pollution control regulations. Because their capital investment is minimal and their financial position is probably marginal, however, it was judged that these mines would be forced to close if any significant investment in pollution control equipment were required.

The other two industries in which more than 100 plant closings were judged to be possible were Dairies and Meat Products. Both of these industries are characterized by the existence of a number of small, marginal operations which must compete with much larger, more efficient plants. Because the profits of the small producers were estimated to be low, it was anticipated that many would not be able to make the required pollution control expenditures.

Plant closings were anticipated also in the cane sugar industry. The small, older plants in this industry were found to be in a situation similar to those in the other food processing industries discussed above. Another dimension was added in this case, however, for some mills were found to be so situated - on the edge of a cliff, for example - that pollution control was judged to be inordinately expensive.

Few problems were indicated for most producers in the Fertilizer, Inorganic Chemicals, Plastics and Textiles Industries. However, it was anticipated that some producers of products which present special pollution control problems would be forced to close. Generally, the products involved were also those for which the market prospects are poor.

In four industries - Beet Sugar, Beverages, Fiberglass and Motor Vehicles - no plant closings were anticipated. This was due to a variety of factors. In the case of Beet Sugar and Fiberglass, most plants in the industry have already installed

complete recycling systems for their process waters. Only one plant in the Beet Sugar industry was judged to require additional expenditures sufficient to list this plant as a possible closure.

The Beverage industry presents a special case in that for the two products studied, wine and distilled spirits, no plant closings were anticipated even though the anticipated costs were very large in some cases, and the industry contains a number of small, old plants. This was because the market for the products was judged to be so strong currently that all plants could remain profitable even in the face of these difficulties.

The direct costs of water pollution control in the Motor Vehicle industry were estimated to be so low ($10-$13 per vehicle) that they were judged to be insignificant.

Unemployment and Community Impacts

As a result of these plant closings a maximum possible direct unemployment of approximately 100,000 was anticipated. This compares with an estimated total employment in the industries studied of 2,400,000. Almost all of the direct unemployment was anticipated to occur in four industries - Cane Sugar, Coal Mining, Dairies, and Meat Products.

Half of the total possible unemployment accounted for by the Cane Sugar industry. In this industry, plant closings were expected to have an impact not only upon the plant employees, but also upon all of the farm workers involved in producing the raw sugar cane. These workers comprise almost all of the industry. Three states - Hawaii, Louisiana, and principally Puerto Rico - contain almost all of the plants which might be forced to close.

Community impacts were also judged to be possible in the two other food processing activities in which plant closings were anticipated, Dairies and Meat Products. However, in neither of these cases was the secondary unemployment of farm workers expected to result. The regions that might be affected by this unemployment were identified as the Great Lakes in the case of dairies; and the Midwest, California, Pennsylvania, and New York in the case of Meat Products.

Because of the possible closing of small coal mines, a maximum unemployment of 11,000 was estimated, principally in the states of Kentucky, Pennsylvania, Virginia, and West Virginia.

Community impacts were judged to be possible only in one other industry, textiles. The state principally affected would be North Carolina.

International Trade Impact

In none of the industries studied was it anticipated that the costs of pollution control requirements would have any significant adverse impact upon the balance of international trade. In general, this was because the price increases resulting from pollution control activities would be inconsequential, and/or that the amount of international trade in those industries is itself insignificant.

In two industries where high pollution control costs might be expected to result in increased imports, beverages (wines) and cane sugar, other circumstances mitigated against such increases. Although the price of some wines is expected to rise significantly, the demand for this product was judged to be growing so rapidly that the consumption of neither domestic nor imported wines would be significantly affected. In the case of cane sugar prices and imports are controlled by Congress in such a way that no significant increase in imports was judged likely.

For one industry, Coal Mining, it was proposed that price increases might actually have a positive effect upon the balance of trade. This was because the demand for U.S. export coal is such that the volume of exports was not expected to decrease even though prices would rise. The total dollar volume of exports, therefore, would be expected to increase.

EXHIBIT I

INITIAL ANALYSES OF THE ECONOMIC IMPACT OF WATER POLLUTION CONTROL COSTS ON SELECTED INDUSTRIES SUMMARY

Industry	Possible Price Increases	Maximum Plant Closings	Estimated Total Number of Plants [1]	Maximum Unemployment	Approximate Total Employment [1]	Possible Community Impacts
Beet Sugar	-	1	53	45	13,250	-
Beverages	1% - 22%	-	509	-	26,000	-
Cane Sugar	10% - 18%	55	123	50,000	160,000	La., Hawaii, Puerto Rico
Coal Mining	1% - 3%	3,000	5,600	11,000	140,000	Ky., Pa., Va. W.Va.
Dairies	2% - 10%	420	5,000	15,000	200,000	Great Lakes
Fertilizers	3% - 6%	40	315	770	22,000	-
Fiberglass	-	-	34	-	17,500	-
Inorganic Chemicals	3% - 9%	47	720	5,000	115,000 [2]	-
Meat Products	1% - 2%	440	10,700	18,000	225,000	Midwest, Cal Pa., N.Y.
Motor Vehicles	0.3%	-	180 [3]	-	320,000 [3]	-
Plastics	1%	40	400	400	90,000 [4]	-
Textiles	1%	70	7,100	700	1,050,000	North Carolina
TOTAL - All Industries Studies	-	4,100	31,000	100,000	2,400,000	-

[1] Unless otherwise noted estimates are taken from the studies themselves, and include only those industry segments covered in the studies.

[2] Derived from 1967 census of manufacturers. Equivalent to 37% of total industry employment in SIC 281, Industrial Chemicals, where 37% is equal to the portion of total value added accounted for by the ten chemicals studied.

[3] Taken from 1967 census of manufacturers - includes all plants and employees for SIC 371, Motor Vehicles.

[4] Derived from 1967 census of manufacturers, equivalent to 400/771 of total employment in SIC 282, Plastics and Synthetics, where 771 equals the total number of plants in that industry, and 400 equals the estimated number of plants in the industry segment studied.

EXHIBIT II

COST/EFFICIENCY ESTIMATES
INDUSTRIAL WATER POLLUTION CONTROL

IDUSTRY	Assumed Treatment Process	BOD CONCENTRATION Influent (mg/l)	BOD CONCENTRATION Effluent (mg/l)	Assumed Percent Removal	UNIT TREATMENT COSTS Capital ($/lb BOD/day)	UNIT TREATMENT COSTS Annual ($/lb BOD/day)	Projected Price Increase
Sugar	Lagoon & Recycle	400-500	0	100%	$500-$1,050	$3-$10	-
cages	Activated Sludge	1000-1300	30	97%-98%	$195-$445	$45-160	1%-22%
Sugar	Lagoons or Activated Sludge	600-700	20-30	95%-97%	$12-$80	$5-$32	10%-15%
Mining	Lagoons & Neutralization	N/A	N/A	N/A	N/A	N/A	1%-3%
ies	Activated Sludge	1200-10,000	30	97%-99%	$585-$2,335	$160-$685	2%-10%
ilizers	Neutralization, Act. Sludge, Filtr., Amm. Stripping	N/A	N/A	N/A	N/A	N/A	3%-7%
rglass	Filtration Flocculation Recycle	N/A	N/A	N/A	N/A	N/A	-
ganic micals	Neutralization, Lagoons Chemical Precip.	N/A	N/A	N/A	N/A	N/A	3%-9%
lucts	Activated Sludge	2000-3000	30	98%-99%	$30-$700	$7-$92	1%-2%
icles	Neutralization, Lagoons, Chemical Precip.	N/A	N/A	N/A	N/A	N/A	0.3%
ics	Oil Separation, Neutralization & Activated Sludge	0-4100	20-30	90%-99%	$30-$10,000	$12-$775	1%
ies	Act Sludge & Chemical Precip.	350-550	28-44	87%-94%	$150-$375	$50-$115	1%

EXHIBIT III

LIST OF CONTRACTORS

Industry Studied	Contractor
Beet Sugar	Development Planning and Research Associates Manhattan, Kansas
Beverages	Booz-Allen Public Administration Services, Inc. Washington, D.C.
Cane Sugar	Economic Research Service U.S. Department of Agriculture Washington, D.C.
Coal Mining	Arthur D. Little, Inc. Cambridge, Massachusetts
Dairies	Economic Research Service U.S. Department of Agriculture Washington, D.C.
Fertilizers	Development Planning and Research Associates Manhattan, Kansas
Fiberglass	Arthur D. Little, Inc. Cambridge, Massachusetts
Inorganic Chemicals	Booz-Allen Public Administration Services, Inc. Washington, D.C.
Meat Products	Development Planning and Research Associates Manhattan, Kansas
Motor Vehicles	Booz-Allen Public Administration Services, Inc. Washington, D.C.

Industry Studied	Contractor
Plastics	Arthur D. Little, Inc. Cambridge, Massachusetts
Textiles	Booz-Allen Public Administration Services, Inc. Washington, D.C.

BEET SUGAR

The majority of the beet sugar industry seems to be in compliance with proposed water pollution guidance. The cost of that compliance has affected the profitability of the industry and indications are that the added cost of possible future requirements could place additional pressure on the industry, resulting in significant restructuring of ownership, but only one possible plant closing.

Estimates of past expenditures for compliance with water pollution guidelines are in the range of $18 to $20 million. An estimated additional $3.0 million investment is needed by the industry is to be in total compliance with the proposed guidance. The cost for total industry compliance with possible future requirements (zero discharge and control of air and solid waste) have been estimated as high as $44 million for investment, with a $6.5 million increase in annual cost.

No immediate price changes are expected as a result of water pollution controls. The prices for sugar produced from sugar beets are in effect regulated by the U.S. Department of Agriculture. Any price increases that occur as a result of past or future pollution control cost will take place only as the result of policy decisions by the Secretary of Agriculture. The price increase that would be needed to affect the cost of possible future pollution requirements (water, air and solid waste) has been estimated at about 3%.

Five plant closings have occurred in the last four years but it is felt in each case that pollution control requirements were not the major considerations in the shut down decision. There is only one existing plant that might close due to proposed water pollution regulations.

The generally low profitability of the beet sugar industry combined with recent expenditures for water pollution control has led several large companies (representing about 15 plants out of a total of 53 for the industry) to seriously consider selling out to producer on grocer co-ops. The intent of the co-ops has been to buy the plants, at highly discounted values, in order to maintain a market outlet for their crops. The cost of future pollution control requirements could be expected to accelerate this restructuring of ownership so that subsequent impacts of control cost would fall more directly on the growers.

Total production in the beet sugar industry has been stable over the last few years in spite of five plant closings. Any future closings would probably not affect total production since sugar demand is relatively stable and production levels are ultimately controlled by the Secretary of Agriculture. Employment effects due to pollution control requirements are not expected to be significant. Only one potential plant closing has been postulated. The employment in this plant averages about 45 permanent and up to 200 seasonal.

Since import quotas are controlled, the ratio of imported to domestic sugar is expected to remain unchanged. Thus, there would be no appreciable balance of trade effects from pollution control requirements in this industry.

BEVERAGES

Two segments of the beverage industry were analyzed: wines and distilled spirits.

WINES

The cost of water pollution control in the wine industry is expected to result in noticable price increases; however, no significant effects are expected insofar as total consumption, plant closings or balance of trade are concerned.

Total annual cost increase for the wine industry for water pollution control have been estimated at $1.20 to $1.95 per gallon, or approximately $90 million in total for the nation. There is a great deal of uncertainty in this estimate due to lack of accurate data on water usage and due to incomplete data on existing pollution control practices.

The cost of control in this industry are expected to result in price increases to the consumer ranging from 3.3% to 22% on table wines, 1.3% to 5.3% on brandies and 4.8% to 20% on distilled wines. The wide range of estimated price increases is due to the differences in winery sizes and in treatment alternatives available.

No plant closings are expected as a result of pollution control costs. It is expected that a high degree of price inelasticity will allow full recovery of cost through price increases. Traditionally high profit margins would allow most facilities to continue operations even if full cost recovery did not occur. Some small wineries may have difficulty in raising needed capital. This would make them vulnverable to acquisition by larger firms, but shut downs would be unlikely.

Pollution control cost are not expected to affect the balance of trade in the wine industry. The California market is well protected from European imports by transportation cost. The New York market affords some protection on this basis. The role of imports is expected to increase, especially on the east cost, but for reasons other than pollution control, e.g., limited U.S. capacity and rapidly growing demand.

Thermal pollution and odor were not addressed under this study. They could result in additional cost under future regulations. Rising land cost in certain parts of California are also placing pressure on some wineries to relocate.

DISTILLED SPIRITS

The cost of water pollution control are expected to have no noticable impacts on the distilled spirits industry insofar as price increases, plant closings, or balance of trade are concerned.

Total annual cost increases for the industry have been estimated at $0.06 to $0.39 per proof gallon, or approximately $3 to $12 million nationally. The uncertainty in the estimates is due mainly to lack of accurate data on existing waste treatment facilities.

A maximum retail price increase of 1% has been estimated. This represents full recovery of cost. Due to high profit margins and stiff foreign competition in certain product lines these cost in some cases may instead be absorbed rather than recovered.

No plant closings are expected as a result of pollution control requirements. Over the last few years the industry trend has been toward elimination of small facilities. This consolidation has been mostly for reasons of marketing, production efficiencies, and excess capacity rather than high pollution control cost.

The cost of water pollution control are not expected to affect the balance of trade for distilled spirits. The maximum expected price increase is less than 1.0%. Only in the case of bourbon is foreign competition considered serious and in that case pollution control cost could be absorbed internally if necessary to prevent losses to imports.

The impact of pollution control cost on rum manufacturing has not been addressed in this study. It is felt that the waste treatment problems for rum (concentrated mostly in Puerto Rico) are significantly different than for the rest of the distilled spirits industry, and that the impact of control costs could be quite different.

CANE SUGAR

While the impact of water pollution control cost on the total cane sugar industry capacity and balance of trade is not expected to be severe, there are certain segments which may have difficulty dealing with those costs.

Total industry cost increases on an annual basis have been estimated between $2.0 and $8.9 million for refineries and $11.7 and $14.8 million for mills. These costs average approximately 3¢ for refineries, and 25¢ for mills per hundred pounds of product. The uncertainty in these estimates stems mainly from lack of accurate data on existing controls and uncertainty about the required technology for refineries.

Assuming total recovery of pollution control costs, price increases must be expected as high as 18% of the wholesale level. However, it is not expected that full cost recovery would occur. Ultimately, control of price increases of the wholesale level on raw material cost lies with Congress and the Department of Agriculture.

Approximately 30 small mills and refineries in the mainland U.S. have been identified as potential closings due to pollution control cost. In addition, approximately 5 small mills in Hawaii, and all 20 of the mills and refineries in Puerto Rico are expected to have difficulties.

The maximum industry capacity expected to have serious trouble meeting pollution control requirements has been estimated at 25%. Even at this level, however, it is not expected that any long term shortages would occur. The maximum employment impact has been estimated at 1200 for refinery workers, 6000 for mill workers and 44000 for farm workers.

The regions most likely to experience plant closings and employment impacts are Louisiana, Hawaii and Puerto Rico. The bulk of the potential unemployment impact derives from the Puerto Rican sector where approximately 2800 mill and refinery workers and 32000 farm workers are employed.

Imports of sugar are tightly controlled by the Congress through the Department of Agriculture. Any potential balance of trade impact resulting from production losses in the mainland or in Puerto Rico and Hawaii could be compensated for by policies on quotas and acreage allotments. Thus, no balance of trade impact are expected as a result of pollution control costs.

COAL MINING

The cost of water pollution control in the coal mining industry are not expected to seriously affect the medium to large operations. However, it is anticipated that for a large number of small operations (less than 50,000 tons/yr) the cost could prove to be prohibitive to continued operations.

While accurate cost information has been difficult to generate because of inadequate flow information, estimates of total industry cost for water pollution control range from $16 to $78 million per year. Based on 1970 production levels, this amounts to about $0.03 - $0.13 per ton of coal. The cost are expected to vary considerably within all size groups due to variability in volume and ph of water flows.

The cost estimates given above represent an increase in total production cost of 0.5%-2.6%. It is felt that these cost will be passed on to the consumer with the large producers setting the lead on actual price increases.

There are an estimated 3,000 small mines (less than 50,000 tone/yr) located in areas that are considered subject to problems of acid mine drainage. Not all of these mines are expected to incur significant control cost since in some cases the volume of discharge might be quite low. However, it is felt that most of them would incur some cost and that they would have difficulty in abosorbing these costs or in passing them on to consumers.

The total production represented by these small mines is not significant in terms of the total production capacity of the industry. The employment represented by small mines is more significant, however, especially in certain counties. Total employment in small mines that are considered subject to high control cost is estimated at 11,000.

It is felt that the Appalachia and Central regions will be most affected by the closing of small mines. In the states of Kentucky, Pennsylvania, Virginia and West Virginia, eleven counties have been identified where the cost of control are expected to be significant and where a high percentage of the population (1.0%-3.5%) is employed in small mines. Seven other

counties have been identified where the number of small mines is significant but where the percent of the population employed in small mines is less than 1.0%.

No significant impact on the balance of trade is anticipated as a result of pollution control cost in the coal mining industry. The major product in the case of trade is metallurgical coal which is higher priced than normal coal and in which the U.S. is already in a strong competitive position.

Several other regulations may add to the cost of coal production. These include regulations on air pollution, strip-mining and health and safety. The cost on health and safety regulations alone have been estimated from $1.91 to $2.15 per ton. These additional costs were not considered in this study.

DAIRIES

While the impact of pollution control costs on this industry is not expected to be significant in terms of prices, balance of trade, and total industry capacity; it is expected that in some product groups the cost of controls will tend to accelerate the existing trends of consolidation and specialization.

Increases in total annual costs for the total industry to meet the proposed water effluent guidance by 1977 have been estimated at 0.1¢ per gallon of fluid milk, 0.15¢ to 2.0¢ per pound of butter, 0.1¢ to 1.0¢ per pound of cheese, and from 1.0¢ to 10.0¢ per pound of cottage cheese. The total annual cost of producing dairy products for the nation is expected to rise approximately $110 million.

Price increases due to pollution control cost are expected in all product groups to be less than 2%, except for cottage cheese where increases could be as high as 10%. Prices for non-fat dry milk could decrease due to an increased supply resulting from efforts to recover the cost of treating whey.

Approximately 367 small (less than $250,000 assets) and 59 medium ($250,000 to $5,000,000 assets) plants in the butter, cheese, and condensed and evaporated product groups have been classified as vulnerable to closing because of water pollution control costs. These represent the maximum number of closings that could be expected. For these two product groupings the vulnerable plants represent about 14% and 6%, respectively, of total industry capacity.

A maximum potential unemployment resulting from pollution controls has been estimated at 15,000 for the dairy industry. These are from the processing sectors only. No milk suppliers are expected to be affected adversely.

These impacts (possible closings and unemployment) are expected to be scattered throughout the U.S. with the highest concentration in the Great Lakes region - especially in small rural communities.

No significant balance of trade effecgs are expected to result from pollution control costs in this industry.

.FERTILIZER INDUSTRY

The cost of water pollution control for the fertilizer industry is expected to be significant, due to a general lack of past abatement efforts. Although these costs may cause a number of plant closings within specific segments of the industry, the overall impact on the fertilizer industry in terms of production curtailment, regional and community effects, balance of trade, and employment will be minor.

Pollution control investment costs associated with the proposed EPA guidance ranges from $2 per annual ton capacity for a 1,000,000 TYP ammonia plant to $30 per annual ton capacity for a 50,000 TYP phosphoric acid plant. Comparative total capital investment figures for these plants range from $22 per ton for ammonia to $140 per ton for phosphoric acid.

Due to a relatively low price elasticity within the fertilizer industry, it is expected that the above costs will be passed on in the form of price increases. Assuming nitric, sulfuric, and phosphoric acid to be intermediate products, the following price increases are expected:

	% Increase	$/Ton
Ammonia	2.9	0.95
Ammonium Nitrate	5.0	2.05
Urea	4.4	2.50
Diammonium Phosphate	5.7	4.00

Ammonium sulfate is excluded. Because 30-40% of ammonium sulfate is produced at by-product, the increased costs of producing the primary product are not expected to be reflected in the price of ammonium sulfate. Due to the competitive nature of this segment, excepting unique local advantages, U.S. producers will probably absorb any cost increases.

It is estimated that, due to these increased costs, as many as 40 plants may be expected to close. For the most part, these closures represent the small, inefficient plants maintaining only a minor portion of the industry's productive capacity. These plant closings range from 2% of productive capacity and 3% of manpower for ammonium sulfate, to 15% of production and 29% of manpower for ammonium nitrate. Aggregate unemployment for these segments may total 770 workers representing 0.6% of all workers employed in these segments of the industry.

Dislocations caused by these closings are expected to be spread evenly over the seven fertilizer regions, with resulting minor impact. Texas will be the hardest hit with projected unemployed at 132; however, new plant construction is expected to negate any effect of plant closings in this area. With little concentration of expected plant closings, no severe community impacts are anticipated.

Although the U.S. is a major exporter of fertilizers, expected price increases and plant closings are not expected to affect the U.S. balance of trade. This is because the expected price increases (3%-5%) over a five year period are insignificant when compared with the normally wide variations experienced in foreign fertilizer prices from year to year.

This study did not undertake an analysis of the remaining major products, which include TSP, NSP mixed fertilizers and nitrogen solutions from ammonium nitrate and urea.

FIBERGLASS

The impact of the costs of water pollution abatement upon the fiberglass industry must be broken into two sub-categories: Wool Glass Fiber and Textile Fiberglass.

Wool Glass Fiber

The costs of water pollution abatement in a given wool fiberglass plant will vary from 0.2¢ to 1.2¢ per pound of glass wool produced. Incremental costs as a percentage of the selling price will average 0.65% to 3.8%. The capital investment related to water pollution abatement represents 1% to 3.8% of total plant investment. In all cases the impact of these costs is most severe on the smaller plants.

It is felt that these cost increases will not result in price increases, but will be absorbed by the producers. The effects on profitability of the industry will be minimal, both because of the low cost increases expected, and because of anticipated increases in operating efficiency.

Most plants currently maintain a 10% to 15% return on investment, which will not be effected by these cost. There are no plants currently operating which have been judged to be earning only a marginal return on investment of 5% or less. In addition, present demands are fully utilizing the capacity of the wool glass industry and future growth projections are optimistic. Thus, no plant closings or production curtailment are expected in this industry because of water pollution control costs.

Because no price increases are anticipated in this industry, water pollution control costs will have no effect upon the balance of international trade.

Textile Fiberglass

Water pollution control costs are expected to vary from 0.12¢ to 0.21¢ per pound of product for the largest plant and from 1.4¢ to 3.1¢ per pound for the smallest plant in this industry. Associated investment costs are expected to heavily impact plants with capacities of less than five million pounds per year, but will have little effect on the larger plants.

The average annual cost increase in pollution control for this industry is estimated to be 1.5% of selling price. This increase would probably not be passed on in the form of price increases by the larger firm. Hence, most smaller firms will probably have to absorb their much larger costs (3%-6%).

Only one plant of less than five million annual pounds capacity exists. It is felt that only this plant will be severely impacted by pollution abatement costs, precipitating a decision to close. If this one plant were to close, less than 25 employees would be effected in the New York metropolitan area. Thus, no community or egional impacts are expected to result from water pollution control costs in this industry.

Because no price increases are anticipated in this industry, there should be no impact upon the balance of international trade.

INORGANIC CHEMICALS

The study of pollution abatement costs in the inorganic chemical industry covered 10 major chemicals - aluminum chloride, aluminum sulfate, chlor-alkali, hydrochloric acid, hydrofluoric acid, hydrogen peroxide, lime, nitric acid, phosphorus, and sulfuric acid. These 10 chemicals represent approximately 50% of the total domestic production tonnage of all inorganic chemicals and 37% of the total annual value of production.

Although water pollution abatement costs for some of the producers of the ten chemicals studied are significant, few plants will be forced to close with little resulting impact on any of the industry segments. In all cases of plant closings over-capacity, declining markets, obsolescent technology, and air pollution control are major influences, with water pollution abatement only serving to add to an already unmanageable burden.

Total capital costs associated with water pollution abatement for the ten chemicals is estimated to be $150-$300 million, or 10 to 20 percent of this segment of the industrial chemical industry's income in 1971. Annual costs are small, less than 3% of sales, for many of the chemicals studied, but significant - 6% to 9% of sales - for aluminum sulfate, chlor-alkali, lime, and hydrochloric acid.

Generally, due to such factors as low capacity utilization and substitution of other products, it is unlikely that the above costs can be passed on entirely in the form of price increases. For those chemicals where the costs are significant the smaller plants which are in direct competition with large plants may be forced to close. At a maximum, it is estimated that 47 plants may be forced to close. In addition, plant closings may occur in those segments where water pollution abatement costs are not significant, due to the overall dynamics of the markets.

Assuming 100 employees per plant closing, a total unemployment of 4,700, representing 1.5% of total employment, may be effected. Since most of the plants are located throughout the United States, no community or regional impacts are expected as a result of anticipated plant closings.

Since production curtailment and price increases are expected to be minimal, no balance of trade problems should arise.

Although it has been determined that water pollution abatement will have little impact on the viability of the ten chemicals studied in this report, other factors, such as air pollution control, energy shortages and power costs may have significant impact. Further studies should attempt to quantify these effects.

MEAT PROCESSING

While the costs of water pollution control on the meat industry are not expected to result in significant price or balance of trade impacts, they may result in the closing of a significant number of small slaughter, processing and packing operations.

Total annual cost increases for the entire industry to meet water pollution control requirements have been estimated at $1.25 per thousand pounds of live weight killed, or approximately $135 million nationally. A significant factor in these costs is the charge for the use of municipal systems. It is believed that a significant number of meat packing operations use municipal sewers (approximately 70%). Pretreatment requirements and user charges will significantly affect the total industry cost for waste treatment.

Price increases resulting from pollution control requirements are expected to be less than one cent per pound retail on the average or approximately 1%-2%.

Given the available data on control cost and on the industry financial structure, it is felt that a number of small and medium size facilities could close as a result of pollution control requirements. Estimates of actual numbers range as high as 70 for process only operations, 250 for slaughter only and 120 for packing houses (slaughter and process). In most cases, these would be small size facilities; between 2.0 and 25.0 million live weight kill per year for slaughter only and packing houses and between 0.3 and 2.5 million pounds per year processed for process only operations. These closings would represent about 7% of total industry capacity. It is expected that this capacity loss could easily be made up by the remaining plants.

The unemployment resulting from these potential closings has been estimated at about 18,000 for the entire industry.

Many of the potential plant closings would be in small communities; i.e., less than 50,000 population in which cases the community impact would be significant. Data is not available to help in identifying specific communities; however, it is felt that the states of California, New York, Pennsylvania along with most of the mid-western states would have the highest concentration of closings.

It is not felt that any significant balance of trade impacts will result from pollution control cost and the associated price increases. This holds true even should the current suspension of the impact quota be extended. This is because most imported meat consists of boneless, frozen, lean beef which doesn't compete with the major segments of the market for meat in the U.S.

MOTOR VEHICLES

While the total cost of water pollution control for the major producers in the auto industry are expected to be substantial, it is also expected that these cost can be recovered with no significant impact on producers, plant operation, employment, communities or foreign trade.

The investment cost for water pollution control for the four major manufacturers in the auto industry has been estimated between $228 and $332 million. Total annual cost are expected to rise by $70 to $89 million. These cost cover only about 70% of the total water usage of the big four, but they also fail to give credit for control expenditures that have already been made by the industry.

It is expected that the full cost of water pollution control will be passed on to the consumer. Estimates of the resulting average price increase range from $10 to $12 per car. Actual increases will probably be less for low priced cars and higher for high priced cars. It is not anticipated that these increases (veen if they were twice the expected amount) would have any significant effect on domestic sales.

The cost of water pollution control for the four major manufacturers are not expected to result in any plant closings. Similarly, no effects on employment are expected.

No impact on the balance of trade is expected as a result of price increases for recovery of water pollution control cost. The projected price increases are not expected to be high enough to affect the consumers decision to purchase an import. Moreover, several factors other than price are felt to have an equal if not greater influence on the market penetration being achieved by imports.

The cost of air pollution control (both stationary and mobile) and the cost of health and safety requirements were not addressed in this study. It is recognized that those cost are expected to be significant and would completely overshadow the cost of water pollution control.

SYNTHETIC POLYMERS

Although some plant closings are expected to occur in the synthetic polymer industry, water pollution abatement costs will not be a major factor. Such variables as technological obsolescence, declining markets, economic plant size, and raw material costs will have a far greater effect on prices, profitability, and plant closings.

With the exception of polypropylene and polyacetal, water pollution abatement costs for this industry represent less than 0.2¢ per pound of product, or less than 1% of the selling price. These costs will vary within the industry according to a multitude of variables, but will be considerably greater for the smaller plants.

With few exceptions these costs will be passed in the form of price increases, but will be overshadowed by price changes due to traditional market variations and the increasing costs of raw materials.

Few plants are expected to close in the synthetic polymer industry as a result of pollution abatement expenditures. Since the cost estimates by EPA were based on no present waste treatment for the industry, the impact on those plants with waste treatment facilities is overstated. However, as a conservative estimate, not more than 5 major producers will close rather than invest in abatement facilities. Some small non-integrated producers will close, particularly small phenolic resin producers which are lacking technology and capital to install the necessary pollution abatement facilities. At a maximum, plant closings might number 30-40 plants in the entire synthetic polymer industry. These plants would represent less than 1% of the industry's productive capacity.

Since many of the small plants which may close employ less than 10 workers, employment effects will be negligible. However, skilled labor in this industry is not easily transferable to other industries, and some community effects could result from a plant closing in a small community. Synthetic polymer plants are located throughout the country. Thus, it is not anticipated that plant closings will have any regional impact.

Due to the negligible effect of pollution abatement on this industry in terms of prices and production, no significant effect is expected on the U.S. balance of trade.

This study did not include cellulosic production, which has been severely impacted by declining market demand. Pollution abatement costs may significantly hasten plant closings in this segment.

TEXTILES

Although some textile manufacturing facilities will close during the next few years, water pollution abatement costs will not be the major economic factor. Competition from imports and changing demand characteristics have placed the textile industry in an unstable economic position. Water pollution control costs will directly effect only the wet process mills, which represent less than 10% of the textile industry. Of these plants, approximately 90% will be able to defray much of the abatement costs through the use of existing municipal or private treatment facilities.

A conservative cost estimate for this industry, assuming no present abatement facilities places capital investment requirements control at $641-$1,015 million, with annual expenditures of $220-$350 million. Given that the relatively small proportion of the industry actually requires further investment, however, this estimate greatly overstates the actual expected cost to the industry.

The price increase necessary to pass on all costs of water pollution control, assuming no present control, would be 0.9% to 1.4%. It is estimated, however, that manufacturing costs will increase at a rate of 3% per annum over the next five years. In terms of cumulative cost pressure through 1977, pollution abatement costs are only a minor part of the total.

Although maintenance of current return-on-investment goals would probably require price increases for those investing in pollution abatement facilities, it is doubtful that the overall dynamics of the industry would permit such short-term increases. In the long-run, the increasing cost squeeze will probably dictate higher prices, but these will not be brought about by pollution control efforts.

Increased operating costs, coupled with extraordinary needs for investment capital may force some small, old mills to close. If we assume that all wet process mills which presently have no abatement facilities will close, approximately 70 mills would be affected. This represents a maximum figure. It does not take into account possible local market situations which will either lessen the costs or enable the mill to remain open in spite of increased costs.