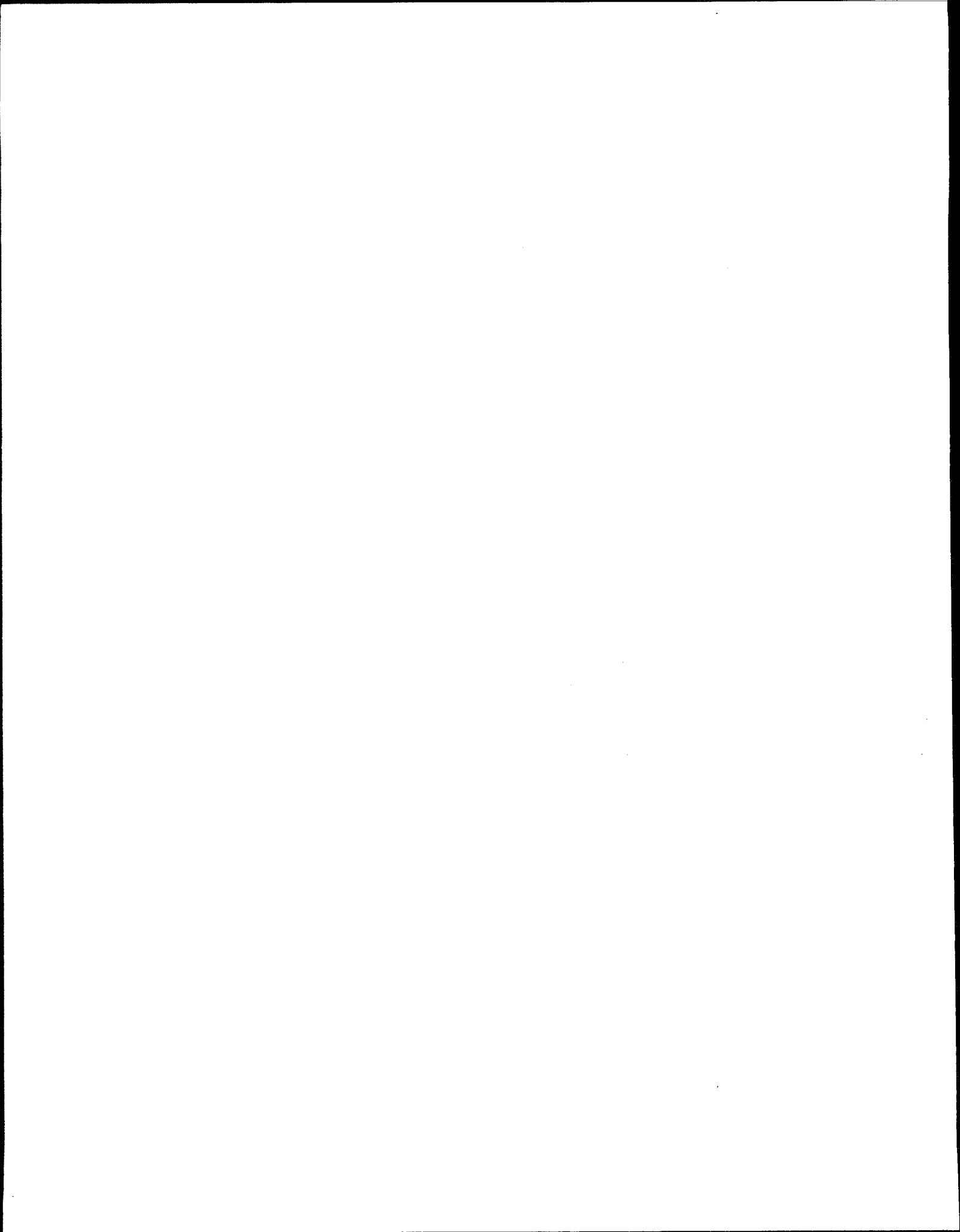


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**Re-evaluation of the Economic Impact Analysis of
Effluent Limitations Guidelines for
the Organic Chemicals, Plastics, and Synthetic Fibers Industry**

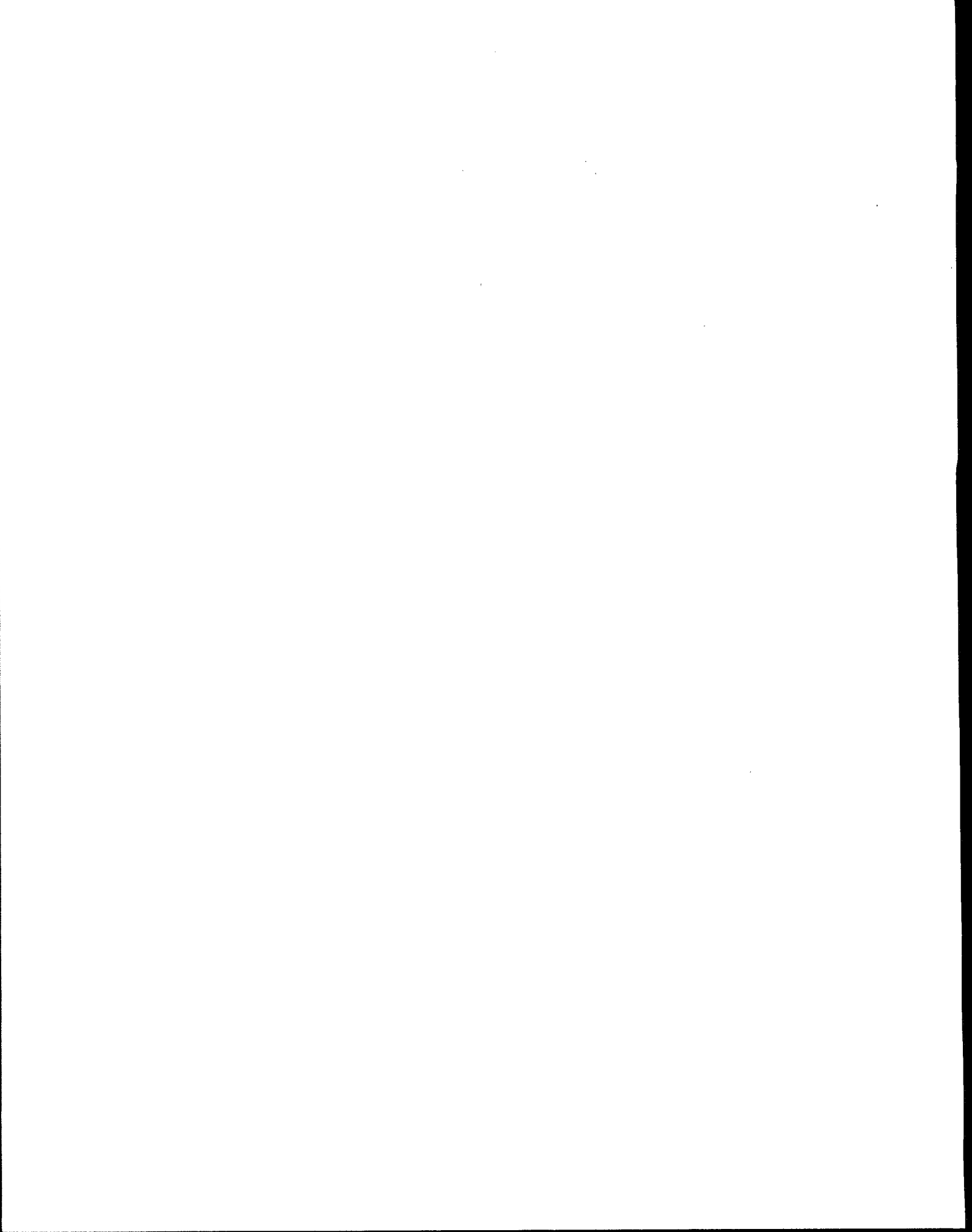
**Engineering and Analysis Division
Office of Science and Technology
Office of Water
U.S. Environmental Protection Agency
Washington, DC 20460**

May 1993



ACKNOWLEDGEMENTS

This report was prepared for the Economic and Statistical Analysis Branch of the Office of Water's Engineering and Analysis Division. Economic analysis support was provided by Abt Associates Inc., under EPA Contract Number 68-C0-0080.



PREFACE

This report summarizes the effects that revised compliance cost estimates have on the economic impact analysis (EIA) of effluent limitations guidelines for the Organic Chemicals, Plastics, and Synthetic Fibers (OCPSF) Industry. The original EIA was prepared for the OCPSF rule which was promulgated in November 1987. The primary purpose of revisiting the economic impact analysis is to determine if, in light of the compliance cost revisions, the OCPSF rule remains economically achievable. The analyses and results in this report cover:

- BAT and PSES rules as promulgated in 1987;
- Corrections to the cost estimates for particular plants ("the revised baseline");
- Revisions made in proposed amendments to the 1987 rule identified in a Federal Register notice on December 6, 1991 (56 FR 63897) and further explained in a notice on January 21, 1992 (57 FR 2238);
- Revisions identified in a Federal Register notice in December 1, 1992 (57 FR 56883).
- Revisions to reflect updated plant information obtained in EPA's April 1991 telephone survey of plants that, according to the OCPSF database, did not have end-of-pipe biological treatment.

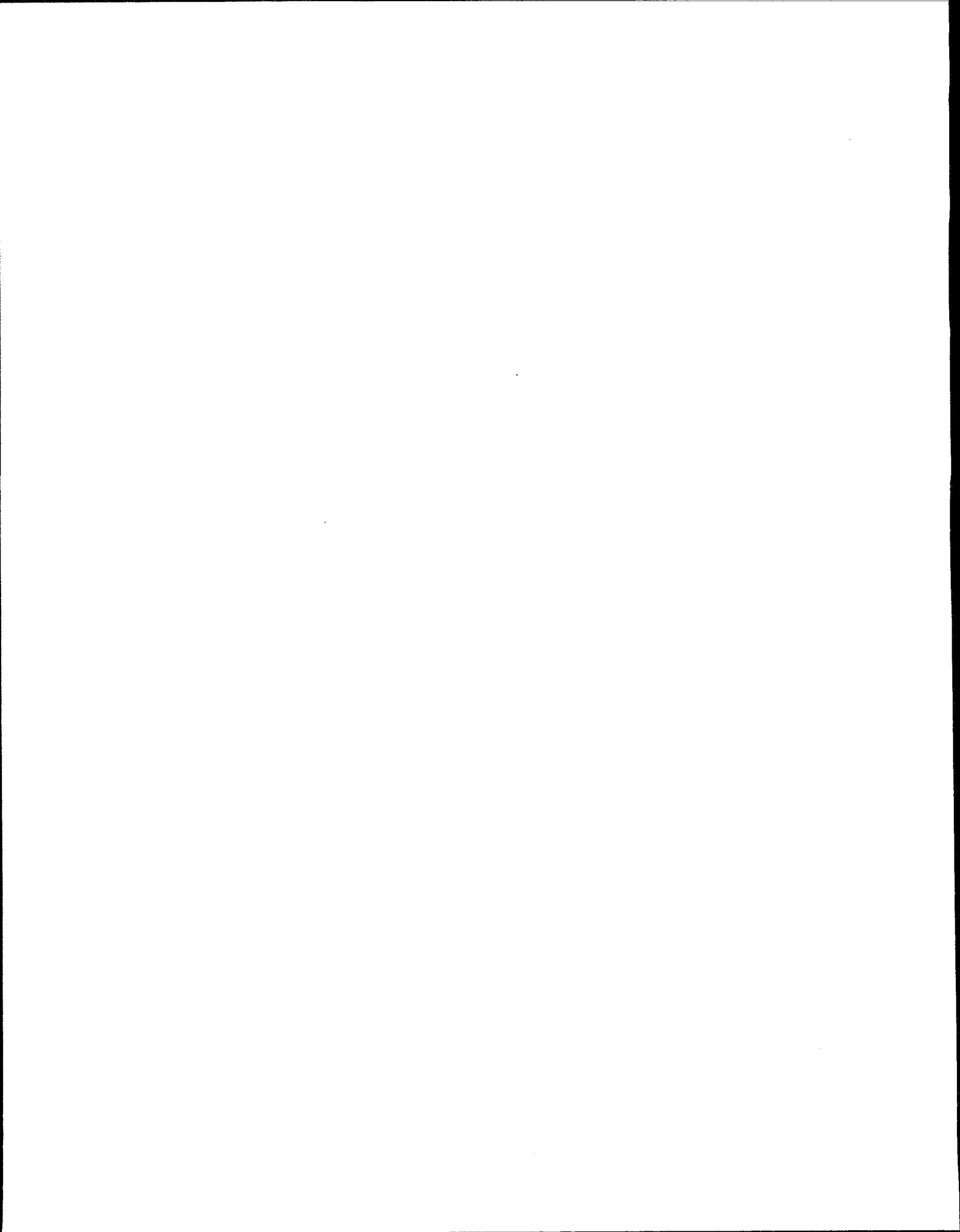
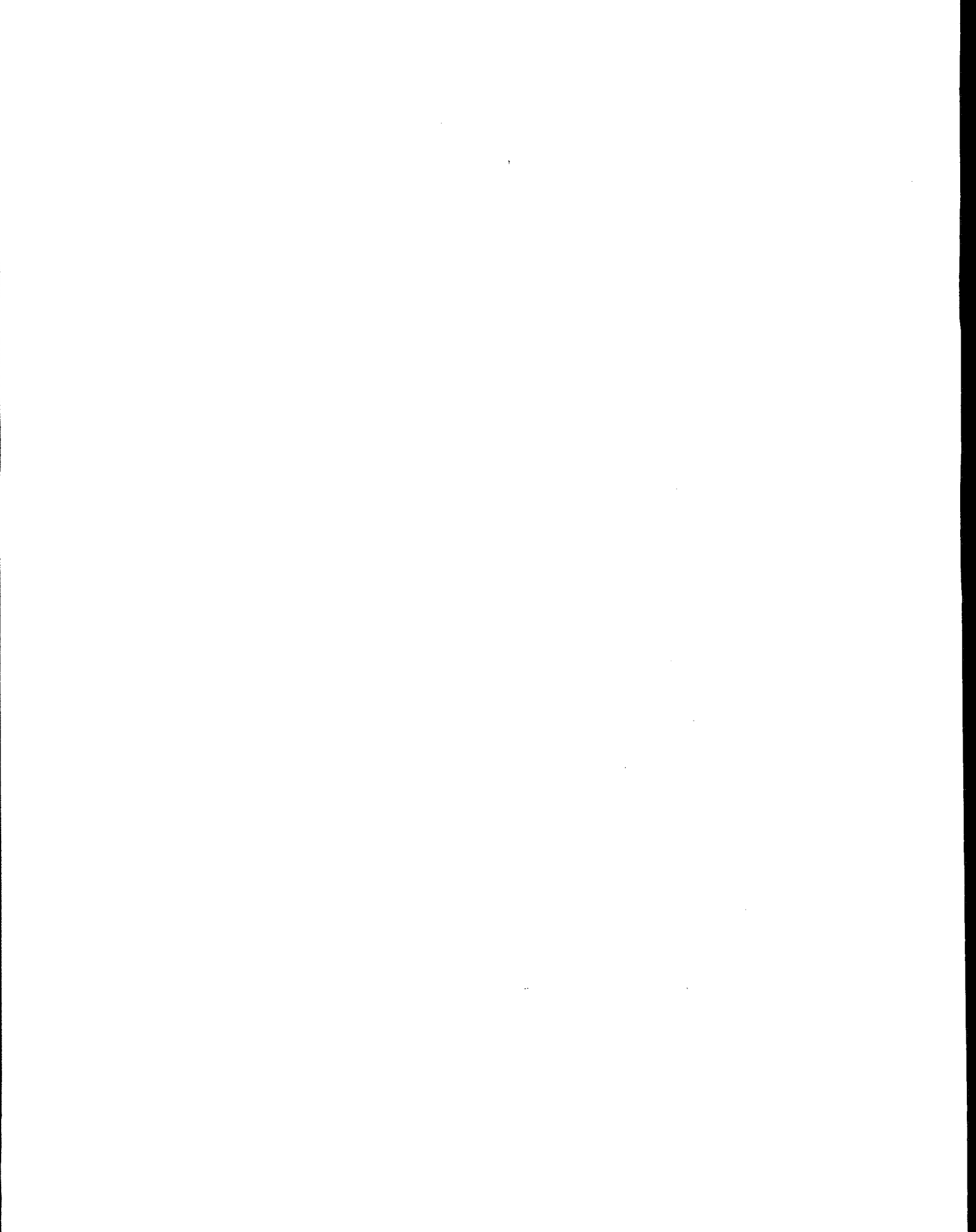


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A. Background

In November 1987, the U.S. Environmental Protection Agency (EPA) promulgated effluent limitations guidelines for the OCPSF manufacturing point source category. Certain portions of the OCPSF regulation were remanded to EPA for further rulemaking proceedings by the U.S. Court of Appeals for the Fifth Circuit. One consequence of these actions is that the costs for particular control technologies were revised. The Chemicals Branch of the Office of Water's Engineering and Analysis Division is responsible for developing revised compliance cost estimates. The Economic and Statistical Analysis Branch (ESAB) in the Engineering and Analysis Division is responsible for re-evaluating all elements of the EIA carried out in support of the 1987 OCPSF rulemaking to determine if the selected control options remain economically achievable given the compliance cost revisions. Abt Associates assisted ESAB in re-evaluating the economic impact analysis for the OCPSF effluent limitations guidelines.

ESAB considers a re-evaluation of the EIA to be important because revisions to the compliance cost estimates, if sufficiently different, could substantially alter the results of the economic impact analyses that were conducted as part of the promulgated effluent limitations guidelines for the OCPSF industry (EPA 440/2/87-007). Three types of analyses were undertaken as part of this project:

- a revised plant impact analysis;
- a revised regulatory flexibility analysis (RFA); and
- a revised cost-effectiveness (CE) analysis.

The plant impact analysis is used as the primary basis for evaluating economic achievability. The regulatory flexibility analysis provides information with which to determine if small plants are disproportionately affected by the revised cost estimates. The cost-effectiveness analysis provides information for (1) determining if the selected option remains the most cost-effective in reducing pollutant discharges; and (2) comparing the cost-effectiveness (\$/amount of pollutant removed) of the selected control option to other effluent limitations guidelines promulgated by the Agency.

B. Changes in Compliance Cost Estimates

Four types of compliance cost changes are included in this analysis. The first type of cost change covers revisions and corrections that were made after the 1987 rule was promulgated. These changes were not incorporated in the EIA conducted for the 1987 OCPSF rule, but are evaluated here as a Revised Baseline. The second change relates to the re-estimate of compliance costs for in-plant biological treatment as ordered by the federal court. Costs for three control options designed to meet the court-ordered remand (Options 1, 2 and 3) were evaluated in an economic impact analysis conducted in support of the December 1991 proposal (subsequently revised in January 1992). The economic impact analysis of these options was published in Re-evaluation of the Economic Impact Analysis of Effluent Limitations Guidelines for the Organic Chemicals, Plastics, and Synthetic Fibers Industry Using Revised Compliance Costs (EPA 440/1-91/009b). The selected BAT and PSES options from the December 1991 proposal are presented throughout this report for comparative purposes.¹ The third cost revision included in this analysis reflects the decision not to establish pretreatment standards for two pollutants (phenol and 2,4-dimethylphenol). The fourth change relates to a reallocation of plants among both subcategories and discharge status. As a result of a 1991 survey of OCPSF facilities that did not report biological treatment, the number of subcategory J plants increases from 23 (reported in the analysis of the 1987 Rule) to 47 plants for the Final Rule. In addition, fourteen plants previously identified as direct dischargers are now considered indirect dischargers in this analysis for the Final Rule.² The net result of these changes is referred to as the Final Rule.

The revised economic impact analysis reported below used the EIA of the 1987 OCPSF rule as a baseline. From that point, the impact analysis examines the effects of the cost revisions and corrections (Revised Baseline) in combination with two iterations of biological treatment cost re-estimates: 1) those associated with the December 1991 proposal and 2) those associated with the Final Rule. Such an analysis facilitates consistent comparisons of the impacts of the Final Rule to previously published analyses that accompanied the 1987 rule and the December 1991 proposal.

¹ The economic analysis for the December 1991 proposal was revised in January 1992. The results presented in this document reflect the January 1992 revisions, but are referred to as the results for the December 1991 proposal.

² Of the 14 plants altering discharge status as a result of the 1991 survey, one plant is a zero discharger of toxics and is projected to incur no costs and is therefore not retained in the economic impact analysis. Consequently, the analyses of the Final Rule reflect a reduction (from the rule as promulgated in 1987) in the number of direct dischargers of 14 and an increase in the number of indirect dischargers of 13 plants.

B.1 Revised Baseline

The Engineering and Analysis Division revised and corrected compliance cost estimates for particular plants. These cost revisions reflect the addition of steam stripping and chemical precipitation upgrades as well as correction of some errors (such as inaccurate wastewater flow and treatment technologies). The revised BAT Option II-B included changes for 23 out of 289 direct dischargers. The revised PSES Option IV-B included changes for 51 out of 365 indirect dischargers.

B.2 December 1991 Proposal for Remanded Portions of the 1987 OCPSF Rule

The Agency recosted in-plant biological treatment to account for greater residence times (approximately 3 to 17 days depending upon plant-specific parameters). Increasing the residence time of the biological treatment system also expands the land requirements. The costs reported for the December 1991 proposal are cumulative; they include the cost revisions attributed to the Revised Baseline. A total of 45 direct dischargers and 250 indirect dischargers incur cost changes under the December 1991 proposal. The results contained in this report reflect minor revisions made in January 1992 following the December 1991 Federal Register Notice.

B.3 Final Rule

The economic analysis of effluent limitations guidelines for the Final Rule took into consideration three incremental changes from the Revised Baseline: the remanded portions of the 1987 rule (addressed by the December 1991 proposal), the decision not to regulate phenol and 2,4-dimethylphenol in the final PSES, and the updated subcategory and discharge status information. Indirect dischargers with no regulated organic pollutants amenable to in-plant biological treatment other than phenol and 2,4-dimethylphenol are no longer assumed to install in-plant biological treatment. For such plants, the associated treatment costs and the removal of nonregulated organics (amenable to in-plant biological treatment) are now zero. For facilities with other regulated organics removed by in-plant biological treatment, however, the cost of in-plant biological treatment is reduced to reflect the shorter detention time needed for treatment of the remaining regulated organic pollutants. In such cases where detention time is shortened, the removal of phenol and 2,4-dimethylphenol is assumed to be zero.

As mentioned above, certain plants are reallocated among subcategories and discharge status as a result of a 1991 survey of OCPSF facilities that did not report biological treatment. The number of subcategory J plants increases from 23 (reported in the analysis of the 1987 Rule) to 47 plants for the Final Rule. In addition, 13 of 14 plants previously identified as direct dischargers are now considered indirect dischargers in this analysis for the Final Rule. The remaining one plant incurs no PSES costs and is thus not included in this analysis for the Final Rule.

C. Plant Impact Analysis

The plant impact analysis is conducted separately for direct and indirect dischargers.³ Several measures are used to summarize the impact of the regulations on OCPSF plants. They include: total annualized cost of the selected option, number of plants expected to close, number of product lines expected to close, number of plants with significant sales or profit impacts, and expected job losses (associated with closures). Additional information regarding the calculation of impact measures, and their significance can be found in the EIA prepared for the 1987 OCPSF rule (EPA 440/2/87-007).

Total Incremental Annualized Costs

The costs subject to revision in this analysis are the costs of controlling priority pollutants. These costs are incremental to the cost of removing conventional pollutants, such as biological oxygen demand (BOD) and total suspended solids (TSS), from the wastestream. Tables 1 and 2 present costs for direct and joint dischargers. (Throughout this report, the costs (and impacts) for joint dischargers are reported along with direct dischargers.) Tables 3 and 4 present costs for indirect dischargers. All cost estimates in the body of this report are presented in 1982 dollars, which minimizes possible bias (of updating costs to the current year) during comparisons with financial plant-level information collected at that time. Slightly fewer plants than the number with compliance cost estimates are analyzed for impact measures because some plants did not provide sufficient financial information with which to calculate impacts.

³ Compliance costs for joint dischargers include the costs to control both their direct and indirect wastewater discharges under the selected control options (BAT II-B for direct discharges and PSES IV-B for indirect discharges). In this analysis, the results for joint dischargers are reported with the results for direct dischargers.

Plant and Product Line Closures

A closure is expected where the liquidation value of the plant exceeds the present value of cash flow minus annualized compliance costs. The entire plant is expected to close if the OCPSF employment is 80 percent or more of total plant employment. Otherwise the plant is expected to remain open but the OCPSF product line is projected to close.

Profit or Sales Impacts

Even if a plant is not expected to incur a plant or product line closure, it may still incur a significant adverse impact due to compliance costs. Adverse impacts on both profit and sales measures are included in the economic impact model. If post-compliance plant profitability falls below the lowest decile of the industry segment or compliance costs exceed 5 percent of sales, then the impact is considered significant.

Employment Reduction

Employment losses are expected at plants where the cost of compliance results in a plant or product line closure. In plants where less than 80 percent of the employees work on OCPSF product lines, a closure is assumed to affect only the OCPSF product lines. The employment reduction of a product line closure is, therefore, equal to the plant's OCPSF employment. However, in plants where 80 percent or more of the employees work on OCPSF product lines, a closure is assumed to affect the entire facility and the employment reduction is equal to total plant employment.

The percentage reduction in employment is calculated using the total OCPSF employment for all plants considered in the plant level economic impact analysis. Total OCPSF employment does not include plant workers who work on non-OCPSF product lines. Employment reductions associated with controls for both direct and indirect dischargers are compared to total OCPSF employment of 180,739.

C.1 Plant Impact Analysis Results

Two types of comparisons are made between the impacts of the OCPSF rule as promulgated and the impacts of the rule including the cost revisions:

- the absolute change in the impact measure (e.g., the number of direct discharging plants expected to close rises from *a* to *b*); and
- the change in the percentage of the industry subject to a specific impact (e.g., the percentage of all direct dischargers that are expected to close rises from *x* to *y* percent).

Both types of measures are considered when comparing the impacts of the revisions to the impacts of the OCPSF rule as promulgated. The results are summarized in Tables 1 and 2 for direct dischargers and in Tables 3 and 4 for indirect dischargers.

C.2 Revised Baseline: Revisions and Corrections: Direct and Joint Dischargers

As explained in Section B.1, compliance costs for 23 of the 289 direct dischargers were revised between the 1987 OCPSF promulgation and the December 1991 proposal. The total annualized cost of the revised BAT option increased by \$2.0 million (less than 1 percent) to \$208.0 million. There are no incremental impacts associated with these cost changes. Consequently, the change in compliance costs would not alter the findings of the EIA of the rule as promulgated.

C.3 December 1991 Proposal for Remanded Portions of the 1987 OCPSF Rule: Direct and Joint Dischargers

For the 288 direct and joint dischargers with cost information, the compliance costs associated with the December 1991 proposal total \$215.8 million. This is a \$9.8 million (5 percent) increase over the cost of the rule as promulgated in 1987. The cost of the December 1991 proposal is significantly less than that of other control options evaluated but not selected for the 1987 promulgated rule.

There is one incremental product line closure associated with this cost increase. Under the December 1991 proposal, costs increased for specific plants but did not trigger their impact measures' thresholds (37 cases) or the costs increased for plants that were previously projected to incur an economic impact (8 cases). One plant changed from a profit/sales impact to a

product line closure and another product line closure was removed from the analysis. The total number of closures, therefore, does not change.

C.4 Final Rule:

Direct and Joint Dischargers

As mentioned above, the incremental change made for the Final Rule involved revisions to cost estimates of in-plant biological treatment. In addition, as a result of a 1991 survey of direct dischargers without biological treatment, 24 plants switched from subcategory I to subcategory J status, and 14 plants previously considered direct dischargers have been changed to indirect discharger status. For the Final Rule, these plants are presented in the analysis of indirect dischargers. The annualized compliance costs of the Final Rule are \$210.5 million, a \$4.5 million increase over the cost of the rule as promulgated in 1987 and a \$5.3 million reduction from the December 1991 proposal. While the total annualized costs increased by 2 percent over the 1987 promulgated rule, there are five fewer plant and product line closures and 154 fewer jobs lost.

Table 1
Summary of Economic Impact Analyses
Direct and Joint Dischargers

Impact Measure	Promulgated BAT Option	Revised Baseline	December 1991 Proposal	Final Rule*
Plants Analyzed/Plants Costed	283/289	283/289	282/288	269/275
Total Annualized Cost (1982 \$, millions)	\$206.0	\$208.0	\$215.8	\$210.5
Plant Closures (% of direct discharging plants)	11 (3.8%)	11 (3.8%)	11 (3.8%)	8 (2.9%)
Product Line Closures (% of direct discharging plants)	9 (3.1%)	9 (3.1%)	9 (3.1%)	6 (2.2%)
Profit or Sales Impacts (% of direct discharging plants)	17 (5.9%)	17 (5.9%)	16 (5.6)	16 (5.8%)
Employment Reduction (% of total OCPSF employment)	1,359 (0.8%)	1,359 (0.8%)	1,735 (1.0%)	1,194 (0.7%)

* The discharge status for 14 plants has been changed from direct to indirect for the final rule following a 1991 survey of direct dischargers without biological treatment; one of the 14 incurs no PSES costs and is not included in the analysis of indirect dischargers.

Table 2
Incremental Changes of Final Rule
Direct and Joint Dischargers

Impact Measure	Promulgated BAT Option	Final Rule	Incremental Change
Plants Analyzed/Plants Costed	283/289	269/275	-14/-14
Total Annualized Cost (1982 \$, millions)	\$206.0	\$210.5	\$4.5
Plant Closures (% of direct discharging plants)	11 (3.8%)	8 (2.9%)	-3 (-1.0%)
Product Line Closures (% of direct discharging plants)	9 (3.1%)	6 (2.2%)	-3 (-1.0%)
Profit or Sales Impacts (% of direct discharging plants)	17 (5.9%)	16 (5.8%)	-1 (-0.4%)
Employment Reduction (% of Total OCPSF employment)	1,359 (0.8%)	1,194 (0.7%)	-165 (> -0.1%)

**C.5 Revised Baseline: Revisions and Corrections:
Indirect Dischargers**

Compliance costs for 51 of the 365 indirect dischargers were revised between the 1987 OCPSF promulgation and the December 1991 proposal. The total annualized cost increased by \$7.9 million (4 percent), from \$182.7 million to \$190.6 million. The cost revisions result in one additional product line closure, 3 additional sales/profit impacts, and an additional employment reduction of 19 workers. Across the base of 365 plants, such changes do not change the findings of the economic impact analysis of the rule as promulgated.

**C.6 December 1991 Proposal for Remanded Portions of the 1987 OCPSF Rule:
Indirect Dischargers**

For the 365 indirect dischargers with cost information, compliance costs increased from \$182.7 (as promulgated in 1987) to \$233.0 million under the December 1991 proposal -- an increase of \$50.3 million (28 percent). Unlike the cost revisions for direct dischargers, plant impacts increase under the December 1991 proposal. The number of plant and product line closures rises from 52 for the rule as promulgated to 56, an increase of 2 plants and 2 product lines. The number of profit/sales impacts also increases, from 63 to 66. The employment reduction associated with these closures increases from 2,190 (1.2 percent of total OCPSF employment) to 3,396 (1.9 percent of total OCPSF employment) under the December 1991 proposal.

**C.7 Final Rule:
Indirect Dischargers**

PSES compliance costs increased from \$182.7 (as promulgated) to \$226.5 million under the Final Rule. This is a \$43.8 million (24 percent) increase in compliance costs compared to the 1987 Rule and a reduction of \$6.5 million from the December 1991 proposal. Cost estimates for in-plant biological treatment changed for 204 indirect dischargers (including 14 plants changing discharge status). The revised cost of controls for indirect dischargers remains less than any other control option evaluated in the EIA for the 1987 promulgated rule.

All three types of plant-level impacts (plant closures, product line closures, and profit/sales impacts) increase from the levels estimated for the 1987 OCPSF rule, due in part

to the additional 14 plants now considered indirect dischargers. The number of plant and product line closures rises from 52 for the rule as promulgated to 60 (from 14 percent of the indirect dischargers analyzed to 16 percent). Two of these additional closures result from the shift of two projected closures from direct to indirect status, and thus are not attributable to the cost increase of the Final Rule. The number of profit/sales impacts also increases, from 63 (17 percent) to 66 (18 percent). For the rule as promulgated, 32 percent of the indirect dischargers were expected to incur some type of significant impact. For the Final Rule, this measure rises slightly to 33 percent. The OCPSF employment reduction associated with the Final Rule is 0.4 percent greater than the 1987 rule, rising from 2,190 for the 1987 rule to 2,946 (1.6 percent of total OCPSF employment) for the Final Rule.

Table 3
Summary of Economic Impact Analyses
Indirect Dischargers

Impact Measure	Promulgated PSES Option	Revised Baseline	December 1991 Proposal	Final Rule
Plants Analyzed/Plants Costed	362/365	362/365	362/365	375/378
Total Annualized Cost (1982 \$, millions)	\$182.7	\$190.6	\$233.0	\$226.5
Plant Closures (% of direct discharging plants)	25 (6.8%)	25 (6.8%)	27 (7.4%)	30 (7.9%)
Product Line Closures (% of direct discharging plants)	27 (7.4%)	28 (7.7%)	29 (7.9%)	30 (7.9%)
Profit or Sales Impacts (% of direct discharging plants)	63 (17.3%)	66 (18.1%)	66 (18.1%)	66 (17.5%)
Employment Reduction (% of total OCPSF employment)	2,190 (1.2%)	2,209 (1.2%)	3,396 (1.9%)	2,946 (1.6%)

Table 4
Incremental Changes of Final Rule
Indirect Dischargers

Impact Measure	Promulgated PSES Option	Final Rule	Incremental Change
Plants Analyzed/Plants Costed	362/365	375/378	+13/+13
Total Annualized Cost (1982 \$, millions)	\$182.7	\$226.5	\$43.8
Plant Closures (% of indirect discharging plants)	25 (6.8%)	30 (7.9%)	5 (1.3%)
Product Line Closures (% of indirect discharging plants)	27 (7.4%)	30 (7.9%)	3 (0.8%)
Profit or Sales Impacts (% of indirect discharging plants)	63 (17.3%)	66 (17.9%)	3 (0.8%)
Employment Reduction (% of Total OCPSF employment)	2,190 (1.2%)	2,946 (1.6%)	756 (0.4%)

D. Cost-Effectiveness Analysis

The revised cost-effectiveness (CE) analysis can be used to determine:

- if the selected option remains the most cost-effective manner by which to achieve the reduction in pollutant discharges; and
- the relative cost-effectiveness (\$/amount of pollutant removed) of the selected control option, compared to other effluent limitations guidelines promulgated by the Agency.

Typically, a cost-effectiveness value, expressed as the cost of treatment (in 1981 dollars) per pound-equivalent of pollutant removed, is calculated separately for BAT and PSES controls. The revised CE analysis follows the same methodology to calculate CE values for each control option evaluated. The CE analysis includes only plants with both cost information and pollutant removal information. Pollutant removals are aggregated using toxic weighting factors developed by the Standards and Applied Science Division (formerly the Assessment and Watershed Protection Division). Compliance costs are converted to 1981 dollars using the Engineering News Record's Construction Cost Index for 1981 and 1982.⁴

This analysis includes both revised compliance costs and revised pollutant removals of the BAT and PSES control options being evaluated. The cost revisions are explained in Section B of this report. The pollutant removals reflect the decision not to establish pretreatment standards for phenol and 2,4-dimethylphenol which affects certain indirect dischargers and one joint discharger. For the cost-effectiveness analysis of PSES, removals of phenol and 2,4-dimethylphenol are assumed to be zero, even if in-plant biological treatment is assumed to be installed for removal of other PSES regulated pollutants. The incidental removal of other organic compounds (for which PSES standards are not proposed) by in-plant biological treatment is either:

- eliminated (where phenol or 2,4-dimethylphenol were previously the only PSES regulated pollutants for which in-plant biological treatment was needed) or
- reduced (where the wastestream contains other pollutants regulated under PSES for which in-plant biological treatment is assumed).

⁴ ENR's CCI 1981/ENR's CCI 1982 = 3535/3825 = 0.924.

D.1 Cost-Effectiveness Analysis Results

Direct Dischargers:

The CE value for the selected BAT option for the 1987 OCPSF rule was \$4.23/lb-eq. removed (\$ 1981).⁵ This is calculated as the cost of BAT controls for all plants with pollutant removal information (\$203.9 million x .924) divided by the total pollutant removals (44,489,543 lb-eq.) for those plants. Table 5 presents the CE values for the re-evaluation of BAT options. The CE value for the Revised Baseline increases by less than 1 percent from the value for the selected BAT option as promulgated to \$4.27/lb-eq. removed. The CE value for the Final Rule is \$3.98/lb-eq. removed, an 8 percent decrease from the selected BAT option. Because other BAT options evaluated for the 1987 OCPSF rule were costlier (BAT II-A and BAT V) or removed less pollutant loading from OCPSF wastestreams, the Final Rule remains a cost-effective BAT control. BAT controls are also relatively cost-effective when compared to the CE values for other effluent limitations guidelines (Table 6).

Table 5
Cost-Effectiveness Values for BAT Options

	Annualized Cost for Plants <u>with</u> <u>Removals</u> (1982 \$MM/year)	Annualized Cost for Plants <u>with</u> <u>Removals</u> (1981 \$MM/year)	Pollutant Removals (lb-eq.)	Cost- Effectiveness Value (\$/lb-eq. removed)
Promulgated BAT Option	203.9	188.4	44,489,543	4.23
Revised Baseline	205.8	190.2	44,489,543	4.27
December 1991 Proposal	213.6	197.4	44,489,543	4.44
Final Rule	208.3	192.5	48,376,293	3.98

⁵ The CE value for the selected BAT option was reported in the Cost-Effectiveness Analysis that supported the 1987 OCPSF Rule as \$4.58/lb-equivalent removed. The difference is attributable to the adjustment of control costs to 1981 dollars. The actual value, calculated as $\$203.9 \text{ million} \times .924 / 44,489,543 \text{ lb eq. removed} = \$4.23/\text{lb-eq. removed}$, is used in this analysis to compare CE values of revised BAT options to the CE value of the selected option of the rule as promulgated.

Table 6
Industry Comparison of Cost Effectiveness for
Direct Dischargers
(Toxic and Nonconventional Pollutants Only)
Copper Based Weights
(1981 Dollars)

<u>Industry</u>	<u>Pounds Equivalent Currently Discharged (000's)</u>	<u>Pounds Equivalent Remaining at Selected Option (000's)</u>	<u>Cost Effectiveness Selected Option(s) (\$/lb-eq. removed)</u>
Aluminum Forming	1,340	90	121
Battery Manufacturing	4,126	5	2
Canmaking	12	0.2	10
Coal Mining	BAT=BPT	BAT=BPT	BAT=BPT
Coil Coating	2,289	9	49
Copper Forming	70	8	27
Electronics I	9	3	404
Electronics II	NA	NA	NA
Foundries	2,308	39	84
Inorganic Chemicals I	32,503	1,290	< 1
Inorganic Chemicals II	605	27	6
Iron & Steel	40,746	1,040	2
Leather Tanning	259	112	BAT=BPT
Metal Finishing	3,305	3,268	12
Nonferrous Metals Forming	34	2	69
Nonferrous Metals Mfg I	6,653	313	4
Nonferrous Metals Mfg II	1,004	12	6
OCPSF*	54,225	9,735	5
Pesticides	2,461	371	15
Pharmaceuticals	208	4	1
Plastics Molding & Forming	44	41	BAT=BPT
Porcelain Enameling	1,086	63	6
Petroleum Refining	BAT=BPT	BAT=BPT	BAT=BPT
Pulp & Paper**	1,330	748	18
Textile Mills	BAT=BPT	BAT=BPT	BAT=BPT

* Reflects costs and removals for water pollutants and some air pollutants.

** PCB control for Deink subcategory only.

Indirect Dischargers:

The CE value for the selected PSES option for the 1987 OCPSF rule was \$31.13/lb-eq. removed (1981 dollars).⁶ This is calculated as the cost of PSES controls for all plants with pollutant removal information (\$173.1 million x .924) divided by the total pollutant removals (5,138,182 lb-eq.) for those plants. Table 7 presents the CE values for the re-evaluation of PSES at several stages in the rulemaking. Including the additional plants that switched to indirect discharge status, the annual cost used to calculate the CE value for the Final Rule is \$5.6 million lower than that of the December 1991 proposal due, in part, to the decision not to establish PSES standards for phenol and 2,4-dimethylphenol (which results in a change in the assumed treatment technology for certain plants -- in-plant biological treatment may be either unnecessary or the detention time may be reduced). Pollutant removals, however, decrease only slightly; the decrease in removals attributable to the removal of two pollutants from the list of regulated pollutants under PSES is offset by the additional removals of the plants that switched discharge status.

Under the Final Rule, the CE value increases to \$39.05/lb-eq. removed, a 25 percent increase above the CE value for the 1987 PSES option. Because other PSES options evaluated for the 1987 OCPSF rule were more costly (PSES IV-A and PSES VII) or removed less pollutant loading from OCPSF wastestreams, the Final Rule remains the most cost-effective PSES control. PSES controls are also relatively cost-effective when compared to the CE values for other effluent limitations guidelines (Table 8).

Table 7
Cost-Effectiveness Values for PSES Options

	Annualized Cost for Plants with Removals (1982 \$ MM/year)	Annualized Cost for Plants with Removals (1981 \$ MM/year)	Pollutant Removals (lb-eq.)	Cost- Effectiveness Value (\$/lb-eq. removed)
Promulgated PSES Option	173.1	159.9	5,138,182	31.13
Revised Baseline	181.0	167.2	5,138,182	32.55
December 1991 Proposal	223.2	206.2	5,138,182	40.14
Final Rule	217.1	200.6	5,136,762	39.05

⁶ The CE value for the selected PSES option was reported as \$33.69/lb-eq. removed. The difference is attributable to the adjustment of control costs to 1981 dollars. The actual value, calculated as \$173.1 million * .924 / 5,138,182 lb eq. removed = \$31.13/lb-eq. removed, is used in this analysis to compare CE values of revised options to the CE value of the selected PSES option of the rule as promulgated.

Table 8
Industry Comparison of Cost Effectiveness for
Indirect Dischargers
(Toxic and Nonconventional Pollutants Only)
Copper Based Weights
(1981 Dollars)

<u>Industry</u>	<u>Pounds Equivalent Currently Discharged (To Surface Waters) (000's)</u>	<u>Pounds Equivalent Remaining at Selected Option (To Surface Waters) (000's)</u>	<u>Cost Effectiveness Selected Option(s) Beyond BPT* (\$/lb-eq. removed)</u>
Aluminum Forming	1,602	18	155
Battery Manufacturing	1,152	5	15
Can Making	252	5	38
Coal Mining**	N/A	N/A	N/A*
Coil Coating	2,503	10	10
Copper Forming	34	4	10
Electronics I	75	35	14
Electronics II	260	24	14
Foundries	2,136	18	116
Inorganic Chemicals I	3,971	3,004	9
Inorganic Chemicals II	4,760	6	<1
Iron & Steel	5,599	1,404	6
Leather Tanning	16,830	1,899	111
Metal Finishing	11,680	755	10
Nonferrous Mtls Forming	189	5	90
Nonferrous Metals Mfg I	3,187	19	15
Nonferrous Metals Mfg II	38	0.41	12
OCPSF***	5,210	72	34
Pesticides	9,522	162	3
Pharmaceuticals	340	63	1
Plast. Molding&Forming	N/A	N/A	N/A
Porcelain Enameling	1,565	96	14
Pulp & Paper	N/A	N/A	N/A

* N/A: Pretreatment Standards not promulgated, or no incremental costs will be incurred.

** Industry has no known or expected indirect dischargers.

*** Reflects costs and removals for water pollutants and some air pollutants.

E. Regulatory Flexibility Analysis

A Regulatory Flexibility Analysis (RFA) allows the Agency and other reviewers to specifically address the burden of regulatory actions on small business entities. In the case of the effluent limitations guidelines for the OCPSF industry, the RFA examined whether small plants (as defined by annual organic chemical production thresholds of 5, 10, and 15 million pounds) were disproportionately affected by the regulations. Regulatory relief for small entities must also be balanced against greater pollutant discharges that would result from relaxed or no controls. The RFA is conducted separately for direct and indirect dischargers.

As a result of the original RFA, BAT controls more stringent than BPT were not required for small (5 million pounds or less of annual production) direct dischargers. Small indirect dischargers were required to comply with PSES controls to remove priority pollutants.

E.1 Regulatory Flexibility Analysis Results

The RFA for this re-evaluation is limited to evaluating the effects of cost changes on small indirect dischargers since the impacts on small direct dischargers do not increase. Table 9 summarizes the impacts on small indirect dischargers for the OCPSF rule as promulgated in 1987 and the Final Rule. For the selected option under the OCPSF rule as promulgated in 1987, 65 of the 106 small indirect dischargers (61 percent) sustained significant impacts, which include closures and sales or profit impacts. Under the Final Rule, 5 additional small plants are significantly affected primarily because 1) 4 small plants (among the fourteen plants that switch discharge status) are anticipated to be adversely affected (those are not actual additional impacts, but simply reflect plants already projected to be adversely affected as direct dischargers which have now switched to indirect discharge status) and 2) the cost estimate increase of biological treatment results in one additional impact among smaller indirect dischargers. However, most of the \$43.8 million cost increase associated with the Final PSES Rule is incurred by larger facilities (those with greater than 5 million pounds of production).

When compared to the impacts on small direct dischargers (for whom less stringent regulatory requirements were promulgated), a number of other differences are evident. Most significant is that while the percentage of small indirect discharging plants adversely affected rises slightly from 61 to 63 percent due to the revisions in the Final Rule, that result is well below the 77 percent of small direct discharging plants adversely affected. In addition,

controls for small indirect dischargers remove a far greater amount of pollutants (618,927 lb-eq.) than do controls for small (exempted) direct dischargers (71,274 lb-eq.). Expanding the exemption from small direct dischargers to include small indirect dischargers would increase the amount of pollutant discharges exempted by almost tenfold.

In summary, plant impacts on small indirect dischargers under the Final Rule are not significantly different than the impacts evaluated for the selected PSES option in the original RFA. Under the Final Rule, the impacts remain less severe for small indirect dischargers than for the small directs and the amount of pollutant removals possible for small indirect dischargers is far greater than for small directs. An exemption would permit a large amount of potential removals to be discharged untreated. The results of the revised RFA do not indicate that a change in the RFA findings is warranted.

Table 9
Comparison of Impacts for Small Indirect Dischargers and
Direct Dischargers Exempted from BAT Controls

Impact Measure	Indirect Dischargers ≤ 5 MM lbs Production		Direct Dischargers ≤ 5 MM lbs Production <u>Given Relief</u> from BAT Controls	
	Impacts of 1987 Rule	Impacts of Final Rule	Impacts of 1987 Rule	Impacts of Final Rule
Total Plants Under Threshold	106	112	19	13
Closures	27	31	9	5
Sales/Profit Impacts	38	39	6	5
Small Plants Affected (as % of Small Plants)	65 (61%)	70 (63%)	15 (79%)	10 (77%)
% of Production Under Threshold	0.3%	0.3%	0.02%	0.01%
% of Pollutant Removals Excluded from Controls	12%	12%	0.1%	0.1%

F. Overall Summary and Conclusions

After extensive review and comparison of the economic impact analyses, the Agency has concluded that the cost revisions incorporated into the analyses reported above do not significantly alter the findings of economic achievability for the OCPSF effluent limitations guidelines. Cost revisions did not change the conclusions of the economic impact analysis for direct or indirect dischargers.

In addition, controls for both direct and indirect dischargers remain among the most cost-effective rules when compared to other effluent limitations guidelines promulgated by the Agency. Finally, the revised regulatory flexibility analysis revealed no change for direct dischargers and only a small increase in the percentage of small indirect dischargers that were substantially affected.

While BAT compliance costs increased by 2 percent (for 275 plants compared with 289 in the analysis of the 1987 Rule), there are 3 fewer plant closures, 3 fewer product line closures and 165 fewer jobs lost (due primarily to the change in discharge status of 14 plants). The cost-effectiveness value for BAT options decreases by 6 percent but does not affect the relative cost-effectiveness of the BAT option when compared to other effluent limitations guidelines. Controls for direct discharging OCPSF plants rank in the lowest third of CE values (Table 6).

PSES compliance costs increased annualized costs by 24 percent. As a result of the change in costs and the revised discharge status of several plants, an additional 11 plants sustained significant adverse impacts (i.e., closures or profit/sales impacts) under the Final Rule. Plant closures increased from 25 to 30. Product line closures rose from 27 to 30. Profit or sales impacts increased from 63 to 66. In total, the percentage of indirect dischargers adversely affected rises from 32 percent to 33 percent. The expected employment reduction from closures increased from 2,190 to 2,946 workers. Such changes do not alter the original finding that PSES controls are economically achievable.

Because of the reallocation of 14 plants in the analysis from direct discharge status to indirect discharge status, it is also useful to examine the costs and impacts of BAT and PSES combined. This presents a more accurate overall depiction of the effects of the Final Rule compared to the rule as promulgated in 1987 since some of the changes in results for BAT and PSES, viewed separately, result from the change in discharge status for 14 plants, rather than actual changes in plant level impacts. Under such an analysis, the total costs of the Final Rule are 12 percent higher than at promulgation in 1987. The number of plants affected by closure, product line closure or profit/sales impact under both BAT and PSES is

virtually unchanged, increasing slightly from 152 plants (23.2 percent) to 156 plants (23.9 percent). Due to closures, 591 more job losses are anticipated under the Final Rule which is equivalent to 0.3 percent of industry employment. Accounting for the shift in discharge status, the plant-level economic impact results remain relatively unchanged from the rule at promulgation and the finding of economic achievability for PSES and BAT are unchanged.

The cost-effectiveness result for PSES controls (\$39.05/lb-eq. removed, 1981 \$) remains well within the range of other promulgated rules (Table 8). Furthermore, no other PSES control option evaluated for the 1987 OCPSF rule would have removed as much or more pollutants at the same or lower cost. Consequently, the changes in compliance costs for indirect discharging plants do not affect the findings of the original CE analysis.

The regulatory flexibility analysis found that the revisions did not disproportionately affect small (5 million pounds or less of annual production) indirect dischargers. While the percentage of small indirect dischargers affected increased from 61 to 63 percent as a result of the cost revisions under PSES, this does not approach the percentage of small direct dischargers projected to be adversely affected by the Final Rule (77 percent) and which were granted an exemption from BAT controls. Another consideration in the RFA is that an exemption from PSES controls for small plants would result in considerable uncontrolled discharge of pollutants. The possible pollutant removals of small direct dischargers exempted account for 0.1 percent of all direct discharges, whereas the possible pollutant removals of small indirect dischargers account for approximately 12 percent of all indirect discharges (even considering the fact that two pollutants are no longer regulated). The change in compliance costs for PSES plants do not alter the original findings that alternative regulatory controls are warranted for small direct dischargers but not for small indirect dischargers.

Appendix A

Calculation of Costs and Impacts Used in the Preamble

The costs reported in the preamble to the Final Rule differ in two respects from the compliance costs reported in the body of this report.⁷ First, the preamble costs are reported in 1986 dollars, whereas costs in this report are reported in 1982 dollars. The preamble costs were escalated to 1986 dollars to facilitate comparison with the 1987 OCPSF preamble, which also escalated the 1982 dollars used to perform the impact analyses to 1986 dollars for preamble presentation. Second, the preamble reports impact measures for BAT options after removing costs and impacts associated with small direct dischargers (those with less than 5 million pounds annual organic chemical production) as a result of the original regulatory flexibility analysis. This appendix facilitates the comparison of impact measures reported in the preamble of the OCPSF rule as promulgated.

In Tables A-1 and A-2, compliance costs used in this EIA (1982 dollars) are indexed to 1986 dollars using Engineering News Record's Construction Cost Index (CCI) for the relevant years. The inflation factor for 1986 is calculated as follows:

$$1986 \text{ CCI} / 1982 \text{ CCI} = 4295 / 3825 = 1.123$$

The compliance costs associated with small direct dischargers were removed prior to indexing the compliance costs for BAT options presented in Table A-1. The other impact measures in Table A-1 (e.g., closures and employment losses) were also adjusted to remove the impacts associated with the incremental cost of BAT for small directs. Indexed costs for PSES options are presented in Table A-2; all other impact measures are identical to those summarized in the body of this report.

⁷ While the final OCPSF rule has not been published as of the date of this report, the reference here is to the preamble to that final rule, based on EPA's draft of the Federal Register notice.

Table A-1
Costs and Impacts Used in the Preamble
Direct Dischargers
(Excluding Costs and Impacts Associated with 19 Small Plants)
1986 Dollars

Impact Measure	Promulgated BAT Option	Revised Baseline	December 1991 Proposal	Final Rule
Plants Costed	270	270	270	262
Total Annualized Cost (1986 \$, millions)	\$224.2	\$226.9	\$235.8	\$231.1
Plant Closures (% of direct discharging plants)	5 (1.7%)	5 (1.7%)	5 (1.7%)	4 (1.5%)
Product Line Closures (% of direct discharging plants)	6 (2.1%)	6 (2.1%)	7 (2.6%)	5 (1.8%)
Profit or Sales Impacts (% of direct discharging plants)	11 (3.8%)	11 (3.8%)	10 (3.7%)	11 (4.0%)
Employment Reduction (% of Total OCPSF employment)	1,197 (0.7%)	1,197 (0.7%)	1,585 (0.9%)	1,060 (0.6%)

Table A-2
Costs and Impacts Used in the Preamble
Indirect Dischargers
1986 Dollars

Impact Measure	Promulgated PSES Option	Revised Baseline	December 1991 Proposal	Final Rule
Plants Costed	365	365	365	378
Total Annualized Cost (1986 \$, millions)	\$204.3	\$214.0	\$261.7	\$254.4
Plant Closures (% of indirect discharging plants)	25 (6.8%)	25 (6.8%)	27 (7.4%)	30 (7.9%)
Product Line Closures (% of indirect discharging plants)	27 (7.4%)	28 (7.7%)	29 (7.9%)	30 (7.9%)
Profit or Sales Impacts (% of indirect discharging plants)	63 (17.3%)	66 (18.1%)	66 (18.4%)	66 (17.5%)
Employment Reduction (% of Total OCPSF employment)	2,190 (1.2%)	2,209 (1.2%)	3,396 (1.9%)	2,946 (1.6%)

