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AN ANALYSIS OF THE OFFICE OF SURFACE MINING
ESTIMATES OF THE COST OF IMPLEMENTING THE
SURFACE MINING CONTROL AND RECLAMATION ACT

MASTER

December 1979

Work Performed Under Contract No. AC02-79EV10286

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SURFACE MINING CONTROL AND RECLAMATION ACT

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I. INTRODUCTION

Since the promulgation of the Surface Mining Control and Reclamation Act's (SMCRA) regulations, there has been some controversy concerning the costs of implementation of the standards. The Office of Surface Mining (OSM) conducted a Regulatory Analysis (RA) to determine the costs of the discretionary regulations. This study estimated a relatively small impact on the surface mining industry. During the public comment period, a substantial number of comments were received which estimated extremely high costs of complying with certain regulations.

In order to evaluate the cost estimates and the adequacy of OSM's methodology, DOE's Policy Analysis Division contracted Fred C. Hart Associates to assess the conclusions of the Regulatory Analysis.

This paper will review in Chapter II the final SMCRA regulations to determine whether the RA focused on the proper regulations in assessing the discretionary program costs. Unless the proper regulations are identified as discretionary, the cost figures developed from the list of regulations will not accurately reflect the costs of the discretionary regulations developed by OSM. The costs of other regulations which OSM was mandated to promulgate in the Public Law were not assessed in the RA.

Chapter III will examine the model mine data developed by D'Appolonia Consulting Engineers, Inc., for OSM. This model mine data was used to estimate the regional and national costs of the discretionary regulations. Any problems identified in the mine model will impact the costs associated with the regulations under consideration.

Chapter IV is a detailed analysis of the costs of those regulations identified by Hart Associates in the analysis described in Chapter II which are actually discretionary but were not analyzed in the RA.

The Appendix treats the analysis in Chapter II in greater detail, with a part-by-part review of the regulations which received extensive attention.

II. REVIEW OF FINAL SMCRA REGULATIONS

A. Introduction

In this chapter we will review the process by which we identified the regulations which OSM could have written after choosing among alternative regulatory strategies, i.e. discretionary regulations. In order to identify the discretionary regulations, we used a three step approach, comparing the regulations with the Act, State regulations, and standard engineering practices as noted in the preamble to the regulations. The methodology is illustrated in Figure 1. A more detailed discussion of the methodology may be found in the Appendix.

B. Analysis of SMCRA Regulations

Hart Associates reviewed the Act and OSM's regulations to independently identify which regulations were discretionary. That is, for which regulations did OSM have discretion in setting standards, limits, or strategies to meet the mandate of the relevant section of the Act?

Each part of the regulations was compared to the corresponding section of the Public Law to determine whether each regulation or subpart was specifically detailed in the law, thereby removing any discretion on the part of OSM in drafting the regulations. We conducted this analysis without regard to the Regulatory Analysis so that our results would not be biased by OSM's findings.

The first step in our analysis focused on those regulations that were clearly discretionary, for those which either the regulation was clearly an interpretation or enhancement of a performance standard or the regulation mandated one of several ways to reach a numerical standard cited in the Act. Eighty-nine regulations were identified as discretionary using this definition. It became apparent, however, that this definition was too narrow to identify all of the discretionary regulations.

Further inspection showed that OSM regulations which repeat the wording of the Act may indeed be discretionary if OSM could have chosen some other regulatory strategy. This led to the inclusion of four additional regulations to a preliminary list of discretionary regulations.

FIGURE 1

STEP BY STEP ANALYSIS OF SMCRA REGULATIONS

C. Review of State Regulations

The discretionary regulations were then compared in the second step of our analysis with the State surface mining regulations in the six largest coal-producing States to determine whether the Federal regulations duplicate State regulations, thereby removing them from the discretionary category. The State regulations reviewed were: Illinois, Kentucky, Pennsylvania, Ohio, West Virginia and Wyoming. Resources did not permit a review of the regulatory programs of all the coal producing States. The reasoning in this step of the analysis is that if the States have regulations which are essentially the same as the Federal regulations, the specific actions would have been required even without Federal legislation. Those regulations are, therefore, not considered to be discretionary.

Certain State regulations were duplicative of SMCRA. We determined, however, that the duplication is not uniform over any region. It was therefore necessary to check OSM's methodology for treating the State regulations. This was done through a meeting with OSM personnel where the methodology was described. Actual documentation was unavailable to us.

D. Review of Regulatory Analysis

Having isolated those regulations which were discretionary in light of the Act and of the State regulations, the third step of our analysis was a comparison of those regulations with the Regulatory Analysis (RA). For the most part, our assessment of the regulations which were discretionary matched that of OSM. There were, however, ten regulations or subparts which the Regulatory Analysis deemed non-discretionary that seemed to be, in fact, discretionary.

We then scheduled meetings with OSM officials to fully explore the reasoning for the RA's having left out any discussion of those few regulations which we identified as discretionary. Although there appeared to be few such regulations, all must be considered in order to accurately estimate cost levels of the regulatory program. Personnel from the RA project team at OSM were helpful in clarifying the approach taken when the RA was prepared. Given the time constraints of the analysis, the RA focused on those issues which the surface mining industry had identified as costly and burdensome regulations. Although every regulation of significant concern was included in the RA, OSM acknowledged that a few issues may have been overlooked in the analysis.

More importantly, however, some issues which might appear to have been missed might not have been included in the RA because they were shown in the preamble to the permanent regulations to have been required specifically by the legislative intent of the Act and the legislative history.

We, therefore, undertook an analysis of the preamble relating to the regulations still under consideration to determine whether the discrepancies could be explained by the preamble. The referenced technical material did, in fact, explain why certain of the regulations were considered non-discretionary. The specific parts are examined in the Appendix.

After having performed the various analyses outlined above, there remained three regulations which we identified as discretionary which were not discussed in the RA. These were:

- . Surface Water Information (Part 779.16)
- . Topsoil Removal (Part 816.22)
- . Water Quality Standards and Effluent Limitations (Part 816.42).

The implementation of these regulations would increase the cost of the discretionary program. The costs are estimated in Chapter IV.

III. REVIEW OSM'S MODEL MINE DATA

A. Introduction

The next part of our analysis consisted of a review of the model mine data base developed for the Office of Surface Mining by D'Appolonia Consulting Engineers, Inc. Specifically, Fred C. Hart Associates was to examine the adequacy of mine model criteria such as mine size and life, seam thickness, overburden ration, topography and mining methods. As will be seen in the following discussion, the calculated coal cost and production impacts caused by the discretionary SMCRA regulations are sensitive to these parameters, and a sound model mine data base is an important part of the OSM impact methodology.

B. Mine Model Background

The individual coal mine was chosen by OSM as the basic analytic unit for the Regulatory Analysis in the effort to assess the impacts of discretionary SMCRA rules and regulations on coal costs and production. In order to produce results statistically representative of regional production, and to avoid obvious data collection and proprietary information problems (which would be evidenced if actual mine data were to be used), representative-mine models are used as analytic tools to reflect typical mining operations in the various coal mining regions. The models are design to characterize the typical mining method, production level, overburden ratio, seam thickness, acreage disturbed, years of mine life, operations and equipment required for a mine in each producing region. It is important to emphasize here that these mine models provide only generalized examples of typical mining operations, and that the impacts of the discretionary SMCRA regulations will not be the same for all mines. Mine operation-controlled parameters (such as mine design and management), physical characteristics and on-site conditions (such as geology, hydrology, topography, climate and ecological parameters), and regional socio-economic and political factors, all of which vary on a mine-by-mine basis, will play substantial roles in determining mining costs and production levels incurred by each specific mining operation in each specific coal-producing region.

Twelve representative mine models were developed for use in the RA. Seven models reflected costs resulting from typical settings and mining techniques in six U.S. surface mining regions, while five models described the typical surface effects of underground mining in four underground-mining regions (see Tables 1 and 2). A computer mine simulation macromodel was then used to determine baseline initial investment and

Table 1.—Characteristics of regional surface-coal-mining simulation models

Region	Surface mining method	Annual production (tons/yr)	Seam thickness (inches)	Overburden ratio	Annual mined area (acres)	Mine life (years)	Coal heat value (Btu/lb)
Central and Southern Appalachia.	Contour with truck shovel-----	73,000	40	17:1	16	5	13,000
	Mountaintop removal with truck shovel.	300,000	40	17:1	65	5	13,000
Northern Appalachia----	Area stripping with dragline---	160,000	45	15:1	30	10	13,000
Midwest-----	Area stripping with dragline---	1,400,000	45	19:1	270	20	12,400
South-Central-----	Area stripping with dragline---	2,300,000	56	15:1	335	20	11,400
North Rocky Mountain---	Area stripping with truck shovel.	5,000,000	554	3:1	70	20	9,000
West-----	Area stripping with dragline---	2,800,000	119	6:1	145	20	11,500

Source: U.S. Department of the Interior, OSM (1979), Regulatory Analysis, Table 4.

Table 2 - Characteristics of model underground mines.

Models	Central and Southern Appalachia	Northern Appalachia	Midwest/ South-Central	West/North Rocky Mountain	
Mine Parameters:					
Type of mining-----	¹ R&P	² Longwall	¹ R&P	¹ R&P	¹ R&P
Seam thickness-----ft--	4.0	4.75	4.1	6.0	8.3
Depth of cover-----ft--	500	780	1,000	500	1,200
Type of access-----	Drift	Shaft and slope	Shaft	Shaft and slope	Drift
Extraction-----percent--	57	70	57	57	57
Clean coal production-----10 ⁶ tons/yr--	0.50	1.50	1.40	1.50	0.50
Clean coal recovery-----percent--	80	90	80	78	95
Tons per machine shift-----	290	1,100	320	450	340
Permit area-----acres--	2,825	5,120	7,860	6,070	1,540
Time to full production-----yr--	1.0	2.5	2.0	2.0	1.0
Investments (in 10 ⁶ dollars): ³					
20-yr depreciable items-----	1.16	1.57	1.64	1.64	1.12
Shafts and slopes-----	0	5.10	3.14	2.69	0
10-yr depreciable items-----	10.39	30.10	22.54	15.54	8.15
5-yr depreciable items-----	0.16	0.37	0.41	0.42	0.14
Engineering, fees, contingency, etc.-----	0.49	0.99	1.03	0.79	0.39
Land acquisition ⁴ -----	8.47	15.28	23.58	18.21	4.62
Total capital investment-----	⁵ 20.68	53.41	52.34	39.29	14.43
Interim capital-----	0.12	0.20	0.22	0.22	0.12
Working capital-----	2.02	4.68	5.21	5.33	1.77
Depreciation-----	1.33	3.79	2.94	2.22	1.09
Annual Costs:					
Labor (includes overhead & benefits)\$10 ⁶ --	4.00	11.03	10.97	10.13	3.74
Operating supplies-----\$10 ⁶ --	1.36	2.59	4.73	3.97	1.28
Power-----\$10 ⁶ --	0.38	0.45	0.85	0.70	0.30
Indirect costs-----\$10 ⁶ --	0.80	1.77	2.04	1.83	0.65
Fixed costs-----\$10 ⁶ --	0.83	2.14	2.09	1.57	0.58
Total annual amount-----\$10 ⁶ --	7.37	17.98	20.68	18.20	6.55
Operating cost-----\$/ton--	14.73	11.98	14.77	12.14	13.10
Preparation cost-----\$/ton--	3.50	3.50	3.50	3.50	0
Total operating/preparation costs--\$/ton--	18.23	15.48	18.27	15.64	13.10

¹Room and pillar.

²Longwall production accounts for approximately 4% of the total underground production in the United States.

³Debt-to-equity ratio was assumed to be 2:1, interest rate to be 10 percent, and inflation rate to be 7 percent.

⁴Assumes \$3,000 per acre.

⁵Rounding error.

annual operating costs for each of the seven surface-mine models. The capital and operating costs for the five underground-mine models are based on the relationships defined by a regression analysis used to modify equipment and manpower requirements of mine designs developed by Katell (1974) for the U.S. Bureau of Mines. The parameters which define the mine models directly determine mine capital and operating costs (see Tables 2 and 3) which are the key determinants of coal production costs.

C. Use of the Mine Model Data Base in the National Coal Model

The representative-mine model data base was used to determine the cost of production attributable to the major discretionary alternatives chosen by OSM in developing the permanent SMCRA regulations and the shifts in the supply curves for coal. These determinations were made through the use of the U.S. Department of Energy National Coal Model (NCM), which was designed to project future levels of U.S. coal production, consumption and prices, and to permit the analysis of the impact of coal-related public policy issues on such factors. As with all econometric models, the results obtained by using the NCM are dependent upon the relationships among variables expressed in the model, the assumptions made in formulating the model and the values of exogenous variables (values determined outside of the model used as "givens" for input into the model). Exogenous variables in the NCM include parameters such as coal quality and quantity by region, mining costs (both of which are direct inputs obtained from the mine model data base), and data on other determinants of coal costs and production (such as preparation, transportation, alternative fuels and growth in demand). In order to obtain realistic cost and production figures generated within the NCM, realistic inputs from the mine model data base are necessary. The relationships among variables, assumptions of the model, and values of other exogenous variables also play key roles in cost and production determination. However, their analysis is beyond the scope of this report.

Two computer runs of the NCM were carried out for purposes of determining costs and production impacts in the OSM RA. A base case represented the coal market without the discretionary regulations. An implementation case represented the situation with the discretionary regulations. The baseline case included existing State or Federal regulations other than SMCRA which have as their objective the same types of environmental protection required by SMCRA, and non-discretionary requirements of SMCRA. For discretionary regulations requiring additional procedural or regulatory steps beyond the baseline case, costs were determined from judgment and experience with similar situations. For discretionary regulations requiring the construction of physical structures or modifications to mining processes, additional costs were calculated from construction and operating cost estimating procedures according to standard engineering practices. All incremental costs resulting

TABLE 3

—Cost requirements of model surface mines
(Values are in thousands of 1975 dollars)

ITEM	REGION AND MINING METHOD													
	CENTRAL & SOUTHERN APPALACHIA CONTOURING		CENTRAL & SOUTHERN APPALACHIA MINTOP REMOVAL		NORTHERN APPALACHIA AREA STRIPPING		MIDWEST AREA STRIPPING		SOUTH-CENTRAL AREA STRIPPING		NORTH ROCKY MOUNTAIN AREA STRIPPING		WEST AREA STRIPPING	
	INITIAL INVESTMENT	ANNUAL OPERATING	INITIAL INVESTMENT	ANNUAL OPERATING	INITIAL INVESTMENT	ANNUAL OPERATING	INITIAL INVESTMENT	ANNUAL OPERATING	INITIAL INVESTMENT	ANNUAL OPERATING	INITIAL INVESTMENT	ANNUAL OPERATING	INITIAL INVESTMENT	ANNUAL OPERATING
Overburden Drilling Rigs	83	125	580	500	100	270	1,089	1,907	1,090	2,527	1,276	1,495	649	1,333
Overburden Draglines	-	-	-	-	2,729	970	16,058	3,164	22,656	4,111	-	-	10,689	2,393
Overburden Loaders and Trucks	327	415	-	-	-	-	-	-	-	-	-	-	-	-
Overburden Shovels and Trucks	-	-	3,470	3,050	-	-	-	-	-	-	10,359	9,928	-	-
Coal Drilling Rigs	25	20	25	15	25	24	37	99	37	144	71	283	37	169
Coal Loaders and Trucks	224	230	-	-	-	-	-	-	-	-	-	-	-	-
Coal Shovels and Trucks	-	-	500	234	350	250	3,377	1,367	4,975	2,073	4,010	1,951	4,176	1,720
Dozers and Scrapers	190	50	391	135	190	70	2,589	922	2,982	1,077	793	266	1,784	634
General and Administration	300	200	800	651	460	420	10,170	3,666	12,756	5,866	17,830	7,928	8,477	6,469
TOTALS	1,149	1,040	5,766	4,585	3,854	2,004	33,320	11,125	44,496	15,798	34,339	21,851	25,812	12,718

Source: U.S. Department of the Interior, OSM (1979), Regulatory Analysis, Table 6.

from the discretionary regulations were then added to baseline capital and operating costs for input into the implementation case NCM run. The difference between the baseline and implementation cases indicates the cost and production impacts of the OSM discretionary SMCRA rules and regulations.

D. Methodology of Analysis

The model mine data base to be reviewed by Fred C. Hart Associates was included in the RA. Additional background information was obtained from the OSM Administrative Record. All data obtained were analyzed through comparisons with existing literature and through the application of mineral economics and mining engineering knowledge.

E. Results of Analysis

In examining the representative-mine model data base developed by D'Appolonia Consulting Engineers for use in the Office of Surface Mining Regulatory Analysis, no major methodological or cost estimation errors were found. Generally, each mine model's characteristics and costs appear to be realistic under current circumstances for a "typical" mine within each specified coal-producing region. A "typical" mine here means a mine reflecting the most commonly occurring mine conditions and characteristics. This is in contrast to the use of arithmetic mean data, which would not necessarily reflect actual mining operations in existence today or in the near future. The use of data for an arithmetic mean mine would distort the applicability of these mine models for use as the basic analytical unit in the RA. This is due to the fact that in certain regions the largest mines account for a disproportionate amount of production. In Central and Southern Appalachia, for example, twelve percent of the mines account for over half the production tonnage.

As pointed out several times in the Final RA, site-specific differences (physical setting, mining methods and management procedures, and socio-economic factors) will prohibit actual mining characteristics and costs from being equal to those mining characteristics and costs used in the mine model in most cases. In actuality, a wide range of mine conditions and characteristics exists in each region. However, these representative-mine models, reflecting "typical" characteristics and conditions within each region, do provide valid examples of mining operations within the various regions. Specific comments on various aspects of the models follow.

Surface Mining Models

- The choice of coal-producing regions is standard and is adequate for this analysis.
- Mining types specified within each region (used as the basis for development of the mine models) are the most commonly used methods within each region and are adequate for this type of analysis. (Skelly and Loy -- The Skelly and Loy study is widely recognized within the coal mining industry as detailing environmentally sound surface mining methods throughout the U.S.).
- Median production levels for each mine model are, indeed, more appropriate in this analysis than mean production levels because they are better indicators of "typical" conditions.
- Chosen seam thickness and overburden ratio characteristics, calculated on a weighted average basis, are realistic and reflect "typical" mining conditions. These chosen characteristics also compare favorably to, although they are not exactly the same as, data obtained in a Hittman Associates (1974) study. This study was an important input for Energy Alternatives: A Comparative Analysis, the source document done several years ago for ERDA, CEQ, EPA, et alia. It is a widely recognized source.
- The chosen values for annual mined areas within each region are realistic, but more information could be supplied concerning additional acreage requirements for necessary infrastructure (beyond the actual acreage disturbed by mining).
- Determinations of mine lives, although only shown in a table in the RA, are realistic and exhibit the important relative differences among regions.
- Coal heat values chosen as characteristic of each region are adequate representations of "typical" mines.
- Equipment requirement determinations for each mine model only appear in tabular form in the RA and are a bit simplistic because many combinations of equipment will ultimately be used, depending upon site-specific conditions. Equipment selection does not reflect the recent trend of using front-end loaders as coal loaders, but this is not significant for purposes of this analysis. (Capital cost estimates would be similar using either alternative.) Additionally, an overburden dragline, as described in Katell (1976a), may be as appropriate as the shovel and truck alternative chosen for the North Rocky Mountain region. Apparently OSM chose a worst case, higher cost alternative. Capital cost estimates for 1 dragline would be \$2-4 million less than the truck-shovel combination.

- The mine characteristics and equipment requirements data base used as inputs to the mine simulation model are basically sound. The resulting cost estimates should therefore be sound if the mine simulation macromodel used to determine baseline investment and operating costs is methodologically correct. A quick comparison with the Katell (1976a) study (not directly comparable because of Katell's much higher production levels) shows no obvious major errors in the RA cost assumptions.
- Resultant production costs per ton by region are reasonable.

Underground Mining Models

- Mining regions are again standard and are adequate for this analysis.
- Mining methods within each region, used as the basis for mine models, are proper and represent the most prevalent mining types by region.
- Other mine parameters chosen for each region generally are appropriate and portray "typical" mines. Again, it is important to note that the proper methodological techniques of calculating median and weighted average figures rather than simple arithmetic mean have been used, giving a more realistic portrayal of mining characteristics and conditions.
- Perhaps the most difficult parameter to determine for use in the underground mine models is that of productivity because of the extreme variations of this parameter within regions. There is a lack of significant data in this determination; however, D'Appolonia's experience in mining should result in reasonable figures for this parameter.
- The fact that the mine models were developed from the Katell (1974) study is good. This study is looked upon as being an accurate representation of real mining conditions.
- No gross or obvious errors in capital and operating costs appear when the OSM data is compared to a Katell (1976b) study.
- Resultant production costs appear reasonable. The fact that the surface production cost per ton is greater than the underground production cost per ton in the Central and Southern Appalachian region is correctly explained in the RA as resulting from extremely different production levels and mine lives.

F. Summary of the Model Analysis

It is clear the D'Appolonia data base is one of the keys to a correct determination of discretionary costs of the OSM permanent regulatory program. Overall, this data base is sound. Therefore, any ultimate problems in assessing discretionary costs appear to lie in the determination of which regulations are, in fact, discretionary; in the estimation of the costs of implementation of these discretionary regulations; and in the use of econometric models (with their inherent limitations) to estimate mining costs and impacts of the discretionary SMCRA regulations on coal costs and production.

IV. COSTS OF IMPLEMENTING DISCRETIONARY REGULATIONS

A. Introduction

Chapter II of this report concluded that the Regulatory Analysis did not identify every discretionary cost of the SMCRA regulations. In order to assess the impact of these additional discretionary regulations, Hart Associates has evaluated the costs of those regulations which have quantifiable costs.

Regulations considered discretionary by Fred C. Hart Associates, which are in addition to those described in the OSM Regulatory Analysis (RA), "Permanent Regulatory Program of Surface Mining Control and Reclamation Act of 1977," are Parts 779.16, 816.22, and 816.42. These deal with the areas of surface water information, topsoil removal, and water quality standards and effluent limitations. An evaluation of the cost of these regulations must utilize the typical mining situations to which the costs of complying with the regulation can be added. All costs are in 1979 dollars.

B. Part 779.16 Surface Water Information

This regulation requires a detailed analysis of quantity and quality of the surface waters within the permit area and all receiving waters. Information required to analyze the costs of this regulation includes:

1. What level of effort is required to define the following surface water characteristics:
 - a. number and location of surface water bodies;
 - b. flow rates, including seasonal variations; and
 - c. water quality?
2. What are labor costs?
3. How many samples need to be taken?
4. What is the cost of analyzing water samples?

The cost of conducting a detailed analysis of the surface water characteristics could be approximately \$5,000.

The cost per ton of coal produced is shown below.

<u>Area</u>	<u>\$ Per Ton of Coal</u>
Central and Southern Appalachia	0.07
Northern Appalachia - Area strip mining	0.02
- Mountain top removal	0.03
Midwest	0.01
South-Central	0.01
Northern Rocky Mountain	0.01
West	0.01

To fully evaluate the total cost of this additional discretionary regulation, we multiplied the per ton cost in each region by the estimated 1985 production levels. These levels reflect the reductions brought about by the discretionary regulations analyzed in the Regulatory Analysis. The total cost of Part 779.16 is approximately \$15.69 million per year.

C. Part 816.22 Topsoil Removal

This regulation requires that topsoil be removed prior to mining and after vegetation has been removed. Information required to analyze the costs of this regulation includes:

1. What is the average soil thickness in the region?
2. What is the average haul distance to remove the soil?

To facilitate an analysis, several assumptions had to be made. These are listed below:

1. Only scrapers would be used to remove the surface material.
2. If the additional surface material was not required to be removed by the scrapers, it would have been removed by the primary stripping equipment at a certain cost. This cost was determined to be negligible and was not deducted from the incremental cost determined in this analysis.
3. Mining operations are based on the background data provided in the OSM Regulatory Analysis.
4. Thin topsoil areas cover the mine area in the same percentage as they occur in the region. Although this assumption is severe, this methodology will yield average results for the region in the aggregate.

<u>Region</u>	<u>\$ per Ton of Coal Mined</u>
Central and Southern Appalachia	<.01
Northern Appalachia	<.01
Midwest	<.01
South-Central	<.01
Northern Rocky Mountain	<.01
West	<.01

The total cost of complying with this regulation is negligible.

D. Part 816.42 Water Quality Standards and Effluent Limitations

This regulation requires that water from the mine and reclaimed area meet certain standards for Fe, Mn, TSS, and pH. The incremental cost associated with Part 816.42 is the additional cost to treat mine water to comply with the OSM effluent limitations above the cost to treat mine water to comply with the EPA regulations. OSM was required by the Surface Mining Control and Reclamation Act to comply with EPA regulations at a minimum. As noted in the Memorandum of Understanding between EPA and OSM proposed in the September 25, 1979, Federal Register, a surface mine in compliance with EPA's NPDES permit regulations will also be in compliance with this SMCRA regulation.

OSM had the discretionary option to make the effluent limitations stricter than EPA's. However, because this option was not exercised, the incremental costs to comply with the OSM regulation are zero.

E. Total Costs

The cost of implementing these additional regulations is not of such magnitude to significantly alter the overall costs estimated in the RA. The cost of implementing Part 779.16 is approximately \$15.69 million per year. The cost of implementing Parts 816.22 and 816.42 of the regulations was found to be negligible for topsoil removal and zero to meet effluent standards. This increases OSM's total discretionary cost level to \$505.68 or \$.51 billion per year, a three percent increase from the \$489.99 million estimate in the RA.

The analysis for removing the topsoil was based upon the discretionary value of 6" that was determined by OSM as the minimum amount of unconsolidated surface material that the mine operator is required to remove. If the total available material is less than 6", all of the material must be removed. If the operator was only required to remove topsoil, as stated in the Surface Mining Control and Reclamation Act, and the topsoil was less than 6", he would have less material to remove. The cost to remove the additional material to comply with the 6" minimum requirement is the incremental cost. Because of the operational characteristics of a scraper, the minimum amount of material a scraper can remove is 3." As a result, the maximum incremental amount of material an operator would be required to remove to meet the 6" minimum depth of material would be 3". The area of the additional material to be removed within the mining operation would be the percentage of the area within the Region with less than 6" of topsoil, times the area of the mine as defined in the RA. The percentage of the areas covered by less than 6" of topsoil for each region are listed below.

<u>Region</u>	<u>% of Area with Less than 6" of Topsoil</u>
Central & Southern Appalachia	25%
Northern Appalachia	25%
Midwest	5%
South-Central	10%
Northern Rocky Mountain	10%
West	30%

These areas are estimates only, based upon discussions with Soil Conservation personnel throughout the United States. Average data on topsoil thicknesses across the broad regions defined in the RA are not available. Several areas within the regions have never been studied by the Soil Conservation Service. The estimates are based upon information from areas that have been mapped and the experience of the Soil Conservation people within different States.

The cost per ton of coal produced is shown below. Again, all costs are in 1979 dollars.

V. SUMMARY

This report has focused on the adequacy of OSM's cost estimates for implementation of SMCRA's discretionary regulations. In considering whether the Regulatory Analysis included the proper regulations and subparts we determined that only three discretionary regulations were not assessed in the RA.

Our analysis of the model mine data base concluded that D'Appolonia Consulting Engineers used sound bases for their cost estimates. There were no apparent methodological errors.

In estimating the costs of those additional discretionary regulations which should have been included in the Regulatory Analysis, only one such regulation was found to have a significant or measureable implementation cost. While this cost should have been included in OSM's cost estimate, it amounts to an increase of only three percent in the estimated cost of complying with the discretionary regulations.

The Regulatory Analysis should be viewed in its proper light. It is an attempt to estimate the cost of complying with SMCRA's discretionary regulations. It is not an attempt to measure the total cost of implementing SMCRA. It has been shown to be, generally, an accurate analysis.

APPENDIX

A. Introduction

Chapter I of this report described the methodology used in our efforts to differentiate between discretionary and non-discretionary regulations. This is an essential issue in assessing the adequacy of any study estimating the implementation costs of the discretionary regulations. We have included the following details of our analysis of the different types of regulations which were or were not included in the RA and the reasoning in each specific example.

B. Analysis of SMCRA Regulations

Our comparison of the Act and OSM's regulations was designed to independently identify which regulations were discretionary. That is, for which regulations did OSM have discretion in setting standards, limits, or strategies to meet the mandate of the relevant section of the Act? The first step in our analysis focused on those regulations that were clearly discretionary: those for which either the regulation was clearly an interpretation or enhancement of a performance standard or the regulation mandated one of several ways to reach a numerical standard cited in the Act.

A question surfaced as to whether regulations which followed the Public Law word-for-word could be considered discretionary. Under further consideration, it seemed more appropriate that the sufficient condition for classifying a regulation as discretionary was if the regulatory authority could have treated the issue in a number of ways. In choosing to go no further than the law had directed, OSM had exercised its discretion in choosing that alternative. Other alternatives could have been adopted for the regulations, but they were not. It is important to remember, then, that if OSM had any discretion in drafting the regulations on a specific point, the regulation is considered discretionary. In Part 701.5, for example, the definition of "arid and semiarid areas" followed the Public Law's wording exactly yet the regulation is discretionary because OSM had other alternatives to choose, as shown in the RA.

There were four regulations which followed the Act's wording but were actually discretionary. (see Table 4). Part 771.25, regarding permit fees, states that "such fee may be less than, but shall not exceed, the actual or anticipated cost of reviewing, administering and enforcing the permit." The very same wording is used in the Public Law in Section 510(a). Since the regulatory authority could have set permit fees less than the actual cost of administering the permit this part is discretionary.

TABLE 4

DISCRETIONARY REGULATIONS
WHICH FOLLOW THE ACT'S WORDING PRECISELY

<u>PART</u>	<u>ISSUE</u>
771.25	Permit Fees
805.11, 805.12	Performance Bond Amounts
805.13	Period of Performance Bond Liability

Parts 805.11 and 805.12 relate to determination of bond amounts, which are set according to "...the estimated cost to the regulatory authority if it had to perform the reclamation, restoration and abatement work required of a person who conducts surface coal mining and reclamation operations under the act." The Act mandates this in Section 509(a). Since the regulatory authority could have extended the Act's mandate to cover potential subsidence and drainage costs in the long run, this regulation is discretionary.

Part 805.13 deals with period of performance bond liability which "shall continue in areas of more than 26.0 inches average precipitation, for not less than five years or in areas of 26.0 inches or less average annual precipitation, for not less than ten years." That requirement can be found in Section 515(b) 20 as cited in Section 509(b). The regulatory authority could have made the liability greater but chose not to do so. This regulation is, therefore, discretionary.

C. Review of State Regulations

In the second step of our analysis, we reviewed State surface mining regulations to determine if any discretionary regulations were required at the State level. The SMCRA regulation which concerns drift sizes for valley, head-of-hollow, and durable rock fills, Part 816.72, for example, is treated in essentially the same fashion in Kentucky (405 Kentucky Administrative Register 1:140 Section 2(7)), West Virginia (Article 6, Chapter 20, Code of West Virginia, Section 9E.06), and Ohio (Administrative Code 13-5-10(B)(7)). Since these States are large producers, it is essential that the cost of this regulation for production in those States not be attributed to SMCRA. In discussions with the Office of Surface Mining, it was determined that OSM's analysis corrected for State regulations in the cost analysis by assigning costs of OSM regulations based on the production levels in the States which do not have corresponding regulations in effect.

D. Review of Regulatory Analysis

In the third step of our analysis, we determined that a number of regulations which would be termed discretionary were, indeed, nondiscretionary in light of the referenced technical material contained in the preamble (see Table 5).

TABLE 5

NON-DISCRETIONARY REGULATIONS
DUE TO EXISTENCE OF STANDARD ENGINEERING PRACTICES

<u>PART</u>	<u>ISSUE</u>
816.49	Temporary or Permanent Impoundments
816.57	Stream Buffer Zones
816.85	Design Standards For Coal Processing Waste Banks
816.92	Design Standards For Waste Dams and Embankments
816.93	Design Standards For Processing Wastes Dams and Embankments
816.104	Thin Overburden Contour Requirements
816.117	Revegetation of Forest and Use Land

Part 816.49 which sets a specific grade requirement for perimeter slopes of water impoundments goes beyond the Act's wording. However, technical publications cited in the preamble treat such a slope requirement as standard engineering practice to ensure the safety of such an impoundment. Since the safety level is mandated by the Act, the regulation is nondiscretionary.

In Part 816.57, which is related to stream buffer zones, the 100 foot bound seems discretionary, given the language of the Act. The preamble, however, indicates that the "...limit is based on typical distances that should be maintained to protect stream channels from sedimentation..." and is "a simple rule for enforcement purposes," which presumably satisfied the requirements for technical interpretation rather than discretion.

Parts 816.85, 816.92, and 816.93 relate to design standards for coal processing waste banks, waste dams and embankments, and processing waste dams and embankments, respectively. The preamble treats them all in the same way in that citations to technical literature are used to substantiate these standards as being standard engineering practices in some instances sanctioned by Federal guidelines in other Agencies (Mine Safety and Health Administration, Soil Conservation Service, et alia).

Part 816.104 sets thin overburden contour requirements. The preamble states that "the legislative history and the Office's interpretation" and "years of experience by the U.S. Conservation Service" remove the requirements from the discretionary category to standard engineering practices.

Part 816.117 relates to revegetation of forest use land. Although the specific requirements again are referenced as standard practices, the preamble says the standards "...were adopted to recognize variances in proven reforestation practices and they provide an acceptable minimum standard..." which seems to indicate some balance of standard practice and regulatory discretion.

While some issues were settled by referring to the preamble, others were clearly not (see Table 6). Part 779.16 of the regulations, for example, relates to surface water data required in the permit application. While the Act in Section 507(b)10 requires "...sufficient data for the mine site and surrounding areas so an assessment can be made by the regulatory authority of the probable cumulative impacts of all anticipated mining in the area upon the hydrology of the area and particularly upon water availability..." this regulation goes further in detailing the specific information required. The preamble discusses the reasoning for requiring the specifics called for in the regulation but does not indicate that the regulatory authority did not use discretion in determining the specific hydrologic data called for.

TABLE 6

DISCRETIONARY REGULATIONS
NOT INCLUDED IN THE REGULATORY ANALYSIS

<u>PART</u>	<u>ISSUE</u>
779.16	Permit Application Surface Water Information
816.22	Thin Topsoil Removal
816.42	Effluent Limitations

Part 816.22 of the regulations outlines procedures for topsoil removal and segregation, such as removing a six inch layer of soil that includes the "A" horizon and unconsolidated materials immediately below the "A" horizon." While Section 515(b)5 mandates removal of topsoil "...in a separate layer..." and segregating it "...in a separate pile from other soil," the regulation under consideration appears to elaborate on the Act's requirements at its own discretion. The preamble indicates that technical sources were consulted, but there is no indication that the regulatory authority did not choose the specifics at their discretion. This example is quite different from design standards for such things as impoundments or embankments which depend on standard engineering practices to remove the discretion of the regulatory authority.

Part 816.42 of the regulations sets specific effluent limitations to protect the hydrologic balance. The preamble states, however, that "...the Office's (effluent) limitations are based on the authority of the Surface Mining Control and Reclamation Act and have been modified from USEPA regulations to fully implement the provisions of the Act." It was clearly at the discretion of the regulatory authority that the standards were established at the given levels. It may very well be that the Office of Surface Mining considered this particular regulation an insignificant and low-cost (therefore, low priority) item, but it is clearly a discretionary regulation.

We could find no information in the preamble, administrative record or RA which precluded OSM from choosing among alternative regulatory strategies for these last three regulations. They are, therefore, discretionary regulations and were subjected to analysis of their implementation costs.

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