ECONOMIC ANALYSIS OF THE REGULATORY DETERMINATION ON WASTES FROM COMBUSTION OF FOSSIL FUELS

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EXECUTIVE SUMMARY

A. OVERVIEW

< This paper responds to EPA's request for comment on the cost associated with regulating wastes from the combustion of fossil fuels as hazardous wastes under Subtitle C of the Resource Conservation and Recovery Act (RCRA). We provide an initial economic analysis of EPA's alternative approach (i.e., regulating of coal combustion wastes as hazardous waste under RCRA Subtitle C). While this methodology can also be used to estimate the cost of national management standards promulgated under Subtitle D, many specifics associated with such a standard remain undecided. Therefore, such an estimate would be premature.

< Cost estimates in this paper are based on EPA's March 1999 cost and economic analysis. However, that analysis provided no information on the baseline costs of management of these wastes by the utility industry. Therefore, we use the national average Subtitle C disposal costs used in EPA's Economic Background Document, Proposal by the U.S. EPA to List Wastewaters and Wastewater sludges from Chlorinated Aliphatic Chemical Manufacturing Plants, as RCRA Hazardous Wastecodes K173, K174, K175: Industry Profile and Estimation of Industry Regulatory Compliance Costs.

< If coal combustion waste were regulated under Subtitle C of RCRA, our conservative annual cost estimate is $13.8 billion.

< The increased cost to coal-based electric generation facilities is the equivalent of 26.2% of projected 2000 generating revenue. The percentage impact will be higher for smaller facilities.

< Additional waste management costs as a proportion of generating revenue will vary yearly and by region and are estimated to range from 8.1% to 27.6%.

< The incremental cost to coal-based generation would result in price increases to consumers or shut down of capacity or both. The magnitude of these impacts will vary by electricity market area, and were not evaluated in this analysis.

< The cost estimates in the analysis are conservative. They are based primarily upon EPA or DOE publicly available data. Where a range of estimates was available, the low end typically was used rather than the mid-point.

< A key issue affecting the potential range of cost estimates is the huge volume of coal combustion wastes. The Regulatory Determination encompasses over 88 million tons annually of coal combustion waste. This amount is over 30 times the amount of all hazardous waste annually disposed in Subtitle C facilities. It also is roughly twice the size of the total amount of all hazardous waste being remediated on the current Superfund NPL.

B. METHODOLOGY

< The starting point for this analysis was a review of the EPA cost and economic analysis contained in "Technical Background Document for the Report to Congress on Remaining Wastes From Fossil Fuel Combustion" (March 30, 1999).

< The 1999 EPA Report to Congress estimated annual incremental before-tax compliance costs for comanaged waste at $860 million per year, assuming that additional risk mitigation action would be necessary for 52.1 million tons annually of newly-generated comanaged coal

combustion wastes. The potential range of annual incremental compliance cost was estimated from $430 million to $1,330 million.

< Where necessary, additional information was drawn from other publicly available sources, including DOE data, information from the EPA Report to Congress on "Wastes from the Combustion of Coal by Electric Utility Power Plants" (February 1988) and published industry sources, including the Utility Solid Waste Act Group (USWAG).

< This study addresses the economic impacts of the Determination on utility coal-based power plants only. The Determination also applies to coal combustion wastes generated by non-utilities, coal combustion wastes at facilities with fluidized bed combustion technology, petroleum coke combustion wastes and wastes from the co-burning of coal and other fuels.

< The results of the analysis are presented as adjustments to the estimate contained in the EPA 1999 Study. This presentation is intended to provide complete transparency and consistency with the EPA estimates.

C. RELATIONSHIP OF COSTS AND ECONOMIC IMPACTS TO ELECTRICITY DEREGULATION AND MARKET COMPETITION

< The EPA analysis did not address the changes underway in the electricity industry resulting from deregulation and increased market competition. These trends have significant implications.

< The evolving competitive market for electricity will affect the incidence of the change in generation costs and, therefore, change the analytical baseline for evaluating economic impacts of the standards.

< For example, the economic impact of increased costs for coal combustion waste disposal needs to be assessed relative to the price and revenues of the electricity generation sector. Costs cannot be measured relative to the delivered prices and revenues from ultimate consumers. Utilities are either divesting portions of the vertically integrated industry structure (generation, transmission and distribution) or unbundling prices.

< In a competitive market, with prices set at the equilibrium between supply and demand, changes in generating costs will affect market prices and the supply of coal-based electricity. It is too simplistic to assume that increased costs can be 100% absorbed from profits within a specified range of return on investment.

< Finally, the cost estimates themselves need to be developed using a different methodology, particularly the assumption regarding recovery of the substantial new capital investment to close existing land disposal facilities and construct new facilities.

< In a competitive market environment, the capital costs of new land disposal investments cannot be amortized over 40 years. In a deregulated, competitive market, capital investments likely would need to be amortized within a 20-year period or less.

< Other EPA planned regulatory actions, such as New Source Review, also raise significant uncertainties regarding the lifetime of coal-fired generating facilities, further necessitating shorter capital recovery periods for new investments.

D. ISSUES REGARDING THE SCOPE OF REGULATORY IMPACTS

The 1999 EPA Cost and Economic Impact Study did not address several major effects (expressed or implied) of a decision to regulate coal combustion wastes as hazardous.

< The analysis did not address the cost of high volume coal combustion wastes (fly ash and bottom ash) that are not co-managed with low volume wastes such as boiler blow down or mill rejects.

< The analysis did not include information on the baseline costs of managing coal combustion wastes for the utility industry. It also did not include information on the projected total cost of management of these wastes under Subtitle C.

< The analysis did not address the cost of closure of existing operating facilities that would not be in compliance with the proposed new national management standards.

< The analysis did not address the increased costs (including lost revenues) as a result of the potential loss of beneficial reuse markets for coal combustion wastes.

< The analysis did not address cases where former land disposal facilities may be subject to remediation under either RCRA corrective action or Superfund as a result of a hazardous waste determination.

<

E. ISSUES REGARDING THE TECHNICAL COST ASSUMPTIONS IN THE EPA ANALYSIS

There are several significant instances where technical costing assumptions were set too low, resulting in an underestimate of costs. For example:

< The unit cost assumptions make no adjustment for potential cost increases due to the sudden massive increase in demand for suitable composite lined disposal capacity that will meet the proposed concept of national management standards.

< The EPA cost analysis assumes that about 15% of coal combustion wastes would incur no increase in compliance costs simply because they are currently disposed in lined facilities (landfills or impoundments) without any further analysis comparing the design and/or performance of these facilities with the possible national management standards.

< The EPA cost analysis makes no allowance for projected future growth in coal utilization and coal combustion waste generation, which could increase annual coal waste generation by over 40% by 2010.

< The EPA cost analysis did not account for significant cost elements of Subtitle C management such as permitting, stabilization, treatment of leachate, and treatment to meet LDR standards.

F. CONCLUSIONS AND RECOMMENDATIONS

< A decision to regulate coal combustion wastes as hazardous likely would have a significant economic impact on the coal-based segment of electricity generating industry.

< This analysis identifies a series of adjustments to the EPA 1999 estimate, resulting in a revised estimate of $13.8 billion annually.

< The increased annual cost is, on average, the equivalent of 26% of coal generating revenues. The percentage would be larger for small facilities.

< This level of impact would adversely affect the competitive position of coal-based electric generation, increasing prices or forcing the shut down of capacity. The magnitude of these effects would vary by electricity market area.

< The remainder of this paper is organized into five sections:

I. Summary and Review of EPA Information (Regulatory Determination and Cost and Economic Impact Study).

II. Description and Analysis of Adjustments, Based on the Alternative Approach of Regulating Coal Combustion Wastes as "Hazardous," to the EPA Cost and Economic Analysis

III. Relationship of Costs and Economic Impact to Electricity Deregulation and Market Competition.

IV. Comparison of Waste Volumes.

SUMMARY COST AND ECONOMIC IMPACT ANALYSIS

COST ANALYSIS (ANNUALIZED COSTS)		Million $
• EPA 1999 Estimate (prior to Adjustments)		$5731
• Inclusion of Separately Managed Wastes	$1562	
• Loss of Beneficial Reuse Application Markets		$1050
• Effect of Future Growth in Coal Consumption		$398
• Closure of Current Facilities in Noncompliance		$338
• Cost of unamortized investments in Facilities to be Closed		Not Estimated
• Cost for Remedial Action at 1% of Historical Sites		$4700
ADJUSTED TOTAL		**$13,750**

ECONOMIC AND MARKET IMPACTS

- National Average Impact on Coal-based Generation Revenue (Subtitle C) 26.2%
- Impact on market prices will vary by region.

II. SUMMARY AND REVIEW OF EPA INFORMATION

A. DESCRIPTION OF THE EPA MAY 2000 REGULATORY DETERMINATION

The EPA Regulatory Determination is complex, and open-ended. Technically the determination imposes no additional costs on the utility or any other industry. Until the Agency promulgates new national management standards for coal combustion waste under Subtitle D of RCRA, there is no mandatory change in current management practices. State Subtitle D regulation of these wastes still applies in the interim. However, the resulting economic costs could fall within a wide range, depending upon future actions by EPA, the States and citizen suits. In any case, the economic costs will be substantial.

1. National Management Standards

< EPA's Regulatory Determination is that regulation under Subtitle C of RCRA is not warranted for coal combustion wastes.

< However, the Regulatory Determination concluded that additional controls were necessary to protect human health and the environment from potential risks from the disposal of coal

combustion wastes. The Agency concluded that national management standards promulgated under the authority of Subtitle D were warranted to address this potential risk.

< The agency indicates that it intends to develop regulations establishing national management standards. No information was provided on what such standards may include.

2. Types of Wastes Subject to the Regulatory Determination

The Regulatory Determination applies to:

High volume coal combustion wastes from electric generating facilities that are co-managed together with certain other low volume coal combustion wastes.
Coal combustion wastes generated by non-utilities.
Coal combustion wastes generated at facilities with fluidized bed combustion technology
Petroleum coke combustion wastes.
Wastes from the combustion of mixtures of coal and other fuels.

< In addition, the Regulatory Determination (and subsequent national standards) would be made applicable to high volume coal combustion wastes (e.g., bottom ash and fly ash) from electric generating facilities that are managed separately from other fossil fuel combustion wastes. These wastes are typically disposed in facilities known as monofills. A 1993 Regulatory Determination concluded that such wastes (referred to as Part 1 wastes) did not warrant regulation as hazardous waste under RCRA Subtitle C.

B. EPA 1999 COST AND ECONOMIC ANALYSIS

As part of a 1999 Report to Congress on remaining wastes from fossil fuel combustion, EPA prepared a cost and economic impact analysis associated with alternative disposal and management practices for fossil fuel combustion wastes. The analysis included:

< Comanaged wastes at coal-fired utilities (comanaged wastes are large-volume wastes such as fly ash and/or flue gas desulfurization wastes that are mixed with other low-volume wastes, such as boiler blow down, cleaning wastes and coal pile runoff).

< Non-utility coal combustion wastes.

< Fluidized-bed combustion wastes.

< Oil combustion wastes.

The following summary discussion focuses largely on fossil fuel combustion wastes at coal-fired utilities, which accounts for the vast majority of the costs. This information was used as the starting point for estimating the economic costs of the Regulatory Determination.

1. Disposal Quantities

EPA estimated that, based on 1993 information, utility plants annually produce 69.32 million tons of ash, 18.69 million tons of flue gas desulfurization waste, and 440,000 tons of mill rejects from coal preparation. Their estimates of the 1993 disposition of these wastes are:

Disposition	Comanaged waste (Millions Tons)	Total waste (Millions Tons)
Landfills	24.01	34.30
Impoundments	25.79	28.34
Stored on site	3.08	4.40
Paid for off-site disposal/use	7.64	10.92
Sold for beneficial reuse	--	10.08
TOTAL	60.50	88.04

The 1999 EPA cost and economic impact analysis analyzed the impact of regulating comanaged waste only. In all likelihood, a decision to impose hazardous waste regulations on coal combustion wastes would apply to all utility fossil fuel combustion waste, including fly ash, bottom ash and flue gas desulfurization wastes that are not comanaged.

For analytical purposes, EPA assumed that the stored on site and paid for off-site disposal/use categories will go to landfills eventually. Based upon survey data from EPRI on land disposal practices, EPA assumed that of the 60.52 million tons of comanaged wastes, 34.7 million tons are landfilled and 25.8 million tons are impounded.

The existing baseline land disposal practice for the 60.50 million tons of comanaged wastes were assumed to be as follows:

	Landfills		Impoundments	
	%	Million Tons	%	Million Tons
Unlined	51.1	17.7	73.2	18.9
Clay- lined	28.7	10.0	21.4	5.5
Single synthetic, composite, or double-synthetic lined	20.2	7.0	5.4	1.4
TOTAL	**100.0**	**34.7**	**100.0**	**25.8**

2. Costs for Compliance

The assumed risk-management alternative was the use of composite-lined landfills and impoundments, with ground water monitoring, leachate collection, and composite capping at closure.

The EPA analysis assumed that the quantities of ash currently disposed in unlined or clay-lined facilities would be upgraded, or a total of 52.1 million tons annually. The EPA analysis assumed that waste quantities currently disposed in synthetic or composite lined facilities would require no further action. This amount is estimated at 8.4 million tons, or 14% of all comanaged waste.

The incremental costs of the risk-management alternative was estimated at $ 430 to $ 1,330 million

annually, with a most likely value of $ 860 million at an average cost of $ 16.51 per ton for the 52.1million tons subject to additional risk management. The cost estimates reported in the EPA analysis were the incremental costs of upgrading unlined or clay-lined land disposal practices to composite-lined facilities. Conceptually, this approach would accurately portray the cost of a new requirement. However, the lack of information on baseline costs makes it very difficult to assess the reasonableness of the unit cost assumptions. In addition, all costs are reported as annualized costs. All capital costs were amortized at a 7% discount factor (based on OMB guidelines) over a 40-year period (the estimated useful life of the facilities). No breakdown of capital and operating costs was provided.

In addition to closure costs, currently operating waste facilities would incur costs due to the premature abandonment of the remaining unused capacity at existing facilities. In many cases, the initial capital costs have not been fully amortized. In economic terms, these costs could be viewed as sunk costs, but in financial terms, there would be a real impact either in higher electricity prices or reduced earnings. If EPA's assumption of a 40-year capital recovery period is valid, these costs could be significant. However, because of the lack of information, these costs have not been estimated in this analysis.

III. DESCRIPTION AND ANALYSIS OF ADJUSTMENTS TO THE EPA COST AND ECONOMIC ANALYSIS- Regulating Wastes as Hazardous under Subtitle C

The Regulatory Determination indicates that EPA may reconsider its decision not to regulate coal combustion wastes under Subtitle C of RCRA. This section estimates the potential costs associated with this alternative approach.

A. ADJUSTMENT TO REFLECT CONSISTENT ESTIMATES RCRA UNIT COST

EPA's 1999 cost and impact analysis does not include sufficient information to allow replication of the Agency's analysis for coal combustion wastes from electric utilities. However, there is no reason to believe that the utility industry is significantly more efficient at disposing of hazardous waste than the hazardous waste industry. As a result we use the national average Subtitle C disposal cost of $130 per ton[1] to estimate the cost of this rule to the utility industry.

EPA's 1999 Cost and Impact Analysis did not contain information on the baseline costs associated with current management of coal combustion wastes at electric utilities. It did, however, contain estimates of baseline cost for similar sources. These costs were in the range of 12 to 15 dollars per ton. To avoid overstating the potential cost of national standards, this analysis assumes a baseline cost of $20 per ton for coal combustion wastes managed at utility facilities.

Consistent with EPA's coal combustion waste analysis, we assume the synthetic or composite lined units will continue to operate under the new standards without incurring additional costs. This is likely to be a conservative assumption.

Approximately 52.1 million tons of waste would need to be managed under Subtitle C regulation at an incremental cost of $110 per ton. This results in an increase in cost of $57.3 billion.

[1] Chlorinated Aliphatic Chemical Manufacturing Plants, as RCRA Hazardous Wastecodes K173, K174, K175: Industry Profile and Estimation of Industry Regulatory Compliance Costs.

B. ADJUSTMENT TO REFLECT REGULATION OF ALL FOSSIL COMBUSTION WASTES, INCLUDING HIGH VOLUME, SEPARATELY MANAGED WASTES

Hazardous waste regulation of utility coal combustion wastes, likely would apply to all combustion wastes, whether comanaged or not. The EPA 1999 cost estimate needs to be expanded to reflect this larger volume. The difference is due to coal combustion wastes (fly ash and bottom ash) that are separately managed. An alternative Regulatory Determination would apply the Subtitle C requirements to these wastes as well. For purposes of this analysis, it is assumed that the separately managed wastes, totaling 17.4 million tons in 1993, are disposed in the same proportion as comanaged wastes. This results in the following distribution of disposal practice.

SEPARATELY MANAGED COAL COMBUSTION WASTE

(Millions of tons)

	Landfill		Impoundment	
	%	Amount	%	Amount
Unlined	51.1	7.6	73.2	1.8
Clay-Lined	28.7	4.3	21.4	0.5
Synthetic or Composite	20.2	3.0	5.4	0.1
TOTAL	100.0	14.9	100.0	2.5
Additional Mitigation Required		11.9		2.3

If we assume that synthetic and composite lined waste units would already comply with Subtitle C requirements, applying the same assumptions as used in the EPA analysis of comanaged waste, an additional 17.2 million ton/year of separately managed waste would need to be upgraded to disposal in composite lined land disposal facilities. (The remaining 3.1 million tons/year of separated managed waste are assumed to already meet the proposal national management standard). Applying the same unit cost factors to this waste results in an additional cost of $1.56 billion annually.

C. ADJUSTMENT FOR THE LIKELY LOSS OF BENEFICIAL REUSE APPLICATION MARKETS

The 1999 EPA cost and impact analysis assumed that the 10 million tons of 1993 waste that was estimated as sold for beneficial uses would continue to be sold and used. There was no analysis of the potential for increased costs if this market application was diminished as a result of hazardous waste regulation.

An earlier study by EPA (in 1988) noted the potential for the loss of markets for beneficial reuse applications that could result from hazardous waste regulation.

> "In the event that some or all of these wastes were declared hazardous, it is possible that the amount of by-product utilization of coal-fired utility wastes would decline as a result of increased costs for their use and the potential for outright prohibition of their use in some applications."[2]

[2] Environmental Protection Agency. Report to Congress: Wastes from the Combustion of Coal by Electric

An earlier analysis by USWAG, which was incorporated into the 1988 EPA study, estimated potential loss of markets at:

- 10% loss of market if coal combustion waste were subjected to hazardous waste transportation regulations under Subtitle C of RCRA.

- 75% loss of market if coal combustion waste were subjected to full Subtitle C regulations.

Using these factors, the regulation of coal combustion wastes as a hazardous waste under RCRA Subtitle C, could result in the loss of markets for 7.5 million tons per year of coal combustion wastes. Assuming a total cost of about $130 per ton for disposal, the estimated additional costs would be $975 million annually.

In addition to the increased costs for land disposal of these materials, there also is the cost of revenues to utilities from by-product sales, and the increased cost to the users of these materials in obtaining substitutes. A study by the electric utility industry estimates the value of the coal combustion ash material in the range of $50 to $80 million in 1986. The value estimate was based upon the savings accrued by virtue of eliminating the cost of extracting other natural geologic materials from quarries and open pit mines. Converting this estimate to current dollars results in a range of $78 to $125 million annually, not counting any increase in volume or possible real increases in the cost of substitutes. The impact of the proposed Regulatory Determination, assuming a 75% loss of markets, would be in the range of $58 to $94 million, or a mid-point value of $75 million annually.

Given the public's sensitivity to risks, real or imagined, from hazardous wastes, designation of utility combustion wastes as hazardous wastes is likely to have substantial effects in reducing by-product use.

D. ADJUSTMENT FOR FUTURE GROWTH IN COAL BASED GENERATION

The EPA cost estimates are based on 1993 waste quantities. The cost estimates do not account for future growth in electricity generation coal use and waste generation beyond those 1993 levels.

The DOE Energy Information Administration has projected electricity generation energy consumption by coal combustion as follows:[3]

Projected Increase in Coal Use for Electric Generation

Year	Electric generation, quads consumed from coal	Period-to-period Increase	Percent of Base Year	Present Value @ 7%
1993	16.89			
2000	19.85	2.96	17.5	17.5

Utility Power Plants. February 1988. p. 6-34.

[3] Energy Information Administration. Annual Energy Outlook 2000. Table A2. The 1963 figure is from the Annual Energy Outlook 1996. The 2000 figure is extrapolated between 1998 and 2005.

2005	22.13	2.28	13.4	9.6
2010	22.54	0.41	2.4	1.2
2015	23.28	0.74	4.4	1.6
2020	24.01	0.73	4.3	1.1
		TOTAL	42.0%	31.0%

Between 1993 and 2020 the EIA projected consumption of energy by electric generators from combustion of coal grows by 42 percent.

As a result of hazardous waste regulation, this increase in waste generation also would incur incremental costs for land disposal in conformance with the proposed concept of national management standards. (The alternative would be to assume that hazardous waste regulation would have the effect of capping coal consumption for electricity at current levels). In order to estimate an average annualized cost factor, the projected growth in coal consumption was discounted to a present value estimate at a 7% discount rate. In present value terms, the addition is estimated at 31%. This estimate is conservative, because over half of the projected growth from the 1993 base has already occurred by 2000.

Applying this growth factor to both the comanaged and separately managed waste would result in increased annual costs of $181 million, as shown below.

Incremental Costs for Future Growth in Coal Consumption

	$ millions	
	No Growth	Adjustment for Growth
Comanaged Waste	$302	+$94
Separately Managed Waste	$234	+$87
Loss of Beneficial Reuse Markets	$0	+ 0
TOTAL	$536	+181

These costs represent only the incremental costs associated with hazardous waste regulation. They assume that the baseline costs for management of future wastes would be incurred in the absence of any new regulation.

E. ADJUSTMENT FOR THE COST OF CLOSURE OF CURRENT LAND DISPOSAL FACILITIES THAT WOULD NOT MEET THE NEW NATIONAL MANAGEMENT STANDARDS

The 1999 EPA cost and economic impact analysis did not address the cost of closure of the currently operating waste facilities that do not meet the proposed concept of national management standards. The 1999 study does include the discounted annualized value of the cost of closure of the new facilities needed to be constructed. These costs are assumed to occur at the end of their projected 40-year useful life.

Under the alternative Regulatory Determination, all landfills and impoundment that currently do not have synthetic or composite liners would be out of compliance, and subject to a closure requirement.

Annual Waste Volumes That Would be Out of Compliance

	Million Tons
Landfill	
Comanaged	27.6
Separate	11.9
	39.5
Impoundments	
Comanaged	24.4
Separate	2.3
	26.7
TOTAL	**66.2**

Using the estimates derived from the 1999 EPA report, 66.2 million tons per year of coal combustion wastes are currently being disposed in unlined or clay-lined facilities that would not meet the proposed concept of national management standards.

Because EPA did not address closure costs, the estimates for these facilities were developed based upon the cost factors from the USWAG study performed by Econometric Research. These cost factors were presented as a range of costs for Subtitle C closure. These cost factors have been updated to year 2000 dollars. At the minimum end of the cost range, the annualized cost for closure of these facilities is $245 million, shown in the table below:

Annualized Cost Estimate for Closure of Waste Disposal Facilities Out of Compliance

Type of Facility	**Cost of Closure ($ per annual ton)**	**Annual Tons (millions)**	**Annual Costs ($ millions)**
Surface Impoundments	$7.80 – 23.01	20.8	162.2
Landfills	$3.28 – 7.64	25.2	82.7
	TOTAL	**46.0**	**$245 million**

In addition to closure costs, currently operating waste facilities would incur costs due to the premature abandonment of the remaining unused capacity at existing facilities. In many cases, the initial capital costs have not been fully amortized. In economic terms, these costs could be viewed as sunk costs, but in financial terms, there would be a real impact either in higher electricity prices or reduced earnings. If EPA's assumption of a 40-year capital recovery period is valid, these costs could be significant. However, because of the lack of information, these costs have not been estimated in this analysis.

F. ADJUSTMENT FOR THE COST OF POSSIBLE FUTURE RCRA CORRECTIVE ACTION OR SUPERFUND REMEDIATION AT HISTORICAL DISPOSAL SITES

A Subtitle C Regulatory Determination may have implications for the coal combustion waste that has been generated and disposed of in the past. If similar waste is to be prospectively managed as

hazardous waste, groups or individuals living near historical disposal sites of coal combustion waste may request their governmental authorities to have such waste treated similarly. This could result in significant quantities of historic coal combustion waste being subject to corrective action under RCRA or subject to Superfund.

1. Historical Quantities of Coal Combustion Waste

The tonnage of historic coal combustion waste through 2000 is staggering:

Million Tons

	Utilities	Industrial	Resid/Com	FGD Waste	Total
1900-1950	203	157	91	---	451
1951-1960	160	128	80	---	368
1961-1970	351	100	37	---	488
1971-1980	524	83	13	34	654
1981-1990	722	75	8	204	1,009
1991-2000	896	83	7	274	1260
Historic Total	2,856	626	236	512	4,230

When these totals are adjusted for the estimated amount that has been sold for beneficial use (250 million tons) and the estimated amount (based on 1983 EPA study) that was emitted to the air as particulates (about 400 million tons) the historic total would be reduced to about 3.58 billion tons.

While it is highly unlikely that all of the historical coal combustion waste would be subject to remediation, it is equally unlikely that there would be no remedial action if coal combustion waste is regulated as a hazardous waste under Subtitle C of RCRA. For purposes of developing a potential range of estimates, three scenarios were considered:

< If only 1% of the total 3.58 billion tons in historical disposal sites required remediation, the remediation cost could range from $4.7 billion (based upon an average cost for full RCRA Subtitle C landfill of $130 per ton).

< If remediation of 10% of the total of 3.58 billion tons were required, the cost would range would be estimated at $47 billion.

The Regulatory Determination does not address the issue of remedial action that may be needed at historical sites. Neither did the EPA 1999 cost and economic impact study. An earlier EPA study (in 1988) did provide a cost estimate of the potential universe of costs for remediation of historical disposal sites.

Costs for remediation of a landfill site (including excavation and transfer to a Subtitle C facility) were estimated to be about $2.0 billion for a power plant of 500 MW. For surface impoundments the estimated cost was about $2.1 billion. EPA concluded the analysis:

> "If this type of corrective action were required at all power plants, compliance costs for the industry would be enormous. At a cost of about $2 billion per plant, industry-wide costs would exceed one trillion dollars."

IV. RELATIONSHIP OF COSTS AND ECONOMIC IMPACTS TO ELECTRICITY DEREGULATION AND MARKET COMPETITION

The 1999 EPA cost analysis fails to address the effects of deregulation of the electricity industry and the emergence of competitive markets. These trends will significantly affect the economic impact of an alternative Regulatory Determination. The EPA 1999 cost and economic analysis did not reflect the new competitive market environment in several significant ways, and as a result, it seriously under-represented the impacts of hazardous waste regulation of coal combustion wastes.

A. RELATIONSHIP OF HIGHER COSTS FOR COAL WASTE MANAGEMENT TO ELECTRICITY PRICES

The 1999 EPA cost and economic study contains an analysis of the impacts of higher waste management costs on the financial viability of coal-fired plants. The partial budgeting analysis is based upon ratio analysis of pro forma operating and financial statements, assuming representative plants. The EPA analysis concludes that total annual costs in the pro-forma financial statement would increase by 1.5-1.8% of revenues, which in turn would reduce profitability (before tax) from 13% to 11.2-11.5%, with no increase in electricity prices. Similar results were developed for medium and small coal plants, with an upper bound impact of 2.6% on small coal generating plants.

The analysis is based upon the comparison of costs to total revenues from sales to ultimate consumers. This comparison is completely misleading because it assumes:

(1) continuation of a vertically integrated utility (generation, transmission and distribution); and,

(2) electricity pricing based upon traditional regulated rates of return rather than market-based pricing.

In a deregulated, competitive market, the costs of hazardous waste regulation need to be assessed relative to generation prices that are set in competitive markets.

The EPA analysis is predicated on an electricity price of $71 per MWH. This is about 2.5 times projected generation prices developed by the Department of Energy in its analysis of the Administration's proposal for electricity deregulation. The DOE projected generation prices are:

Projected Generation Prices

	1997 $/MWH
2000	$27.80
2005	$29.70
2010	$28.80
2015	$29.20

The estimated cost hazardous waste regulation, including the adjustments for revised technical assumptions and changes in scope that were not addressed in the EPA 1999 analysis, needs to be compared relative to generation prices. Using this approach, it is estimated that the

annualized cost of the hazardous waste regulation represents 3.4% of generating revenues.

Relationship of Higher Coal Combustion Waste Management Costs to Electricity Generation Revenues

Estimated Annual Cost of Compliance	$13.8 billion
Projected 2000 Coal-Based Generation	1,890 Million MWH
Cost Per MWH	$ 7.30
Projected 2000 Generator Price	$27.80 /MWH
IMPACT	**26.2%**

A 26.2% impact on the revenues of coal-based generation could have a severe impact on its competitive position. The impacts on smaller coal plants would be even higher. For example, the EPA 1999 report shows a range of 50% between the impact on a large 1,000 Mw plant and a small (less than 200 MW) facility.

B. EFFECT OF HIGHER COSTS FOR COAL COMBUSTION WASTE MANAGEMENT ON COMPETITIVE MARKETS

The EPA 1999 analysis assumes that, in a world of a vertically integrated industry subject to cost of service regulation, the increased cost of coal combustion waste management can be fully absorbed from profits with no impact on price, and no loss of coal-based generation capacity.

In a competitive electricity market, these assumptions and conclusions are no longer valid. The DOE analysis supporting the Administration's electricity deregulation proposal is premised on the fact that the price of electricity in competitive generation markets would be set at the marginal cost of generation needed to match demand within that market area. The increased cost for coal combustion waste disposal (resulting from hazardous waste regulation) would increase the marginal costs of coal-fired generation. If coal-based electricity was the marginal supplier of electricity within a particular market area:

(1) the marginal cost of electricity supply in that market would increase, resulting in an increase in the market price paid by consumers; or,

(2) the marginal cost of certain coal-fired generation facilities would become uncompetitive relative to alternative sources of supply (e.g., new gas-fired turbines, distributed generation, etc), and as a result, the coal-fired generation facility would be shut down.

In reality, a combination of both events would occur. The relative mix of higher prices or shut down capacity would depend upon the particular supply and demand characteristics of each electricity market area. Quantifying these effects would require extensive modeling that is beyond the scope of this analysis. In any event, there would be increased prices and shut down capacity, contrary to the simplistic conclusions in the EPA 1999 cost analysis.

V. COMPARISON OF WASTE VOLUMES

Section 3001 of RCRA established a special procedure for the determination of hazardous waste

regulation of coal combustion wastes, as well as certain other high volume wastes from mining and mineral processing. This procedure was, in part, in recognition of the large volumes of such wastes.

The impact of a decision by the EPA to regulate coal combustion wastes as a hazardous waste would be staggering, in volume terms, relative to the current size of the hazardous waste industry in the U.S.

The 1999 EPA cost and economic impact study estimated 82.4 million tons of waste generated from fossil fuel combustion in 1993. Regulating these wastes as hazardous would expand the volume of Subtitle C hazardous waste by orders of magnitude.

For comparative purposes, according to the EPA National Biennial RCRA Hazardous Waste Report (based on 1997 data) only 2.5 million tons of RCRA hazardous waste are reported as being disposed in landfills and surface impoundments per year.

Also, for comparative purposes, the 1200 sites on the Superfund NPL list are estimated to have a total content of about 40-45 million tons of hazardous waste. Thus, one year's worth of coal combustion waste would represent about twice the amount of all the hazardous waste in the sites currently on the Superfund NPL list.

A. COST AS A PORTION OF GENERATION (NATIONAL)

Nationally, 1.89 billion MWH are produced annually via coal-based generation. The average generation cost is $27.80 per MWH. Under the final Regulatory Determination, waste disposal is projected to cost a minimum of $1.8 billion per year. This amounts to 3.4% of total generation costs.

B. COST AS A PROPORTION OF GENERATION (BY REGION)

Generation and disposal costs vary significantly by region. This analysis considered regional DOE data on level of generation and respective generations costs. These costs were then applied to an average waste production rate of 0.044 tons per MWH and an assumed per ton treatment cost of $110. The waste treatment costs were compared to generation costs and expressed as percentages. By region, waste treatment costs range from 8.1% to 27.6% of total generation costs.

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