ECONOMIC ANALYSIS REPORT
FOR THE COMBUSTION
MACT FAST-TRACK RULEMAKING

Economics, Methods, and Risk Analysis Division
Office of Solid Waste
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EXECUTIVE SUMMARY

INTRODUCTION

On April 19, 1996, the U.S. Environmental Protection Agency (EPA) proposed revisions for air emission standards for certain hazardous waste combustion units. Several elements of the proposal were placed on a 'fast-track' to be promulgated at an earlier date than the rest. These elements include the following: (1) the comparable fuel exclusion: a conditional exclusion from RCRA for fuels that are generated as a hazardous waste, but which are similar to some currently used fossil fuels; (2) waste minimization and pollution prevention incentives available to facilities to allow additional time to meet compliance dates; (3) new RCRA permit modification provisions and (4) Notification of Intent to Comply requirements.

The purpose of the fast-track is to provide additional time for states and facilities to begin developing the necessary changes in programs and industrial processes before promulgation of the air emission standards. For the comparable fuel exclusion, facilities will be able to begin reviewing their waste to determine if they generate or manage comparable fuels. The waste minimization and pollution prevention incentives allow facilities additional time to develop approaches for using source reduction and recycling options as an alternative means of complying with the emission standards. The RCRA permit modification provisions include streamlined procedures that are expected to facilitate facilities' requests to change their existing RCRA permits, and for states to review the permit modification requests. Finally, the Notification of Intent to Comply (NIC) requirements serve as a planning and outreach tool for achieving compliance with the standards.

This report assesses the economic impacts of these four fast-track elements on hazardous waste generators, fuel blenders, and combustion facilities. The costs and savings discussed in this report are one-time estimates unless otherwise indicated. The report is organized as follows:

- Chapter 1 assesses impacts of the comparable fuel exclusion;
- Chapter 2 considers the waste minimization incentives;
- Chapter 3 reviews the streamlined RCRA permitting modifications; and
- Chapter 4 examines other potential impacts of the fast-track rulemaking, including the NIC requirements and non-monetary effects.

The remainder of this Executive Summary summarizes overall economic impacts and findings from each of the four chapters.

ECONOMIC IMPACT OF THE FAST-TRACK RULEMAKING

Each component of the fast-track rule will likely have distinct economic impacts on states and hazardous waste generators and combustors. These impacts are summarized in Exhibit ES-1. As the exhibit indicates, the fast-track may result in an overall savings of approximately $11 million to $36 million for generators, a cost of approximately $4.5 million to $16.5 million for combustors, and a savings of approximately $0 to $1.5 million for states.

Exhibit ES-1
SUMMARY OF ECONOMIC IMPACTS (in millions)

Category	Generators	Combustors	States
Comparable Fuels[a]	Savings of $11 to $36[b]	Cost of $3 to $13	N/A
Permit Modifications[c]	N/A	Savings of $3.5	Savings of $0 to $1.5
Notice of Intent	N/A	Cost of $5 to $7[d]	Cost of $.04[e]
Waste Minimization[f]	--	--	--
Total Economic Impact by Category	**Savings of $11 to $36**	**Cost of $4.5 to $16.5**	**Savings of $0 to $1.5**

Notes:
a Savings and costs of the comparable fuel exclusion are annual estimates.
b Generator savings from the comparable fuel exclusion include savings from the diversion of recycled wastes.
c The streamlined permit modification procedures result in one-time savings for combustors and states.
d Completion of the Notice of Intent is a one-time cost for combustors that spans two years.
e Approximately 40 states have at least one combustion facility. 40 states*$1,000/state = $40,000.
f For waste minimization, the cost impact of the one year extension is expected to be negligible.

ECONOMIC IMPACT OF THE COMPARABLE FUEL EXCLUSION

Approach

We assess impacts of the comparable fuel exclusion by first identifying waste streams that are likely to meet the comparable fuel specifications and which are currently sent to combustion and solvent recovery facilities. This identification process utilizes detailed waste information from OSW's recent National Hazardous Waste Constituent Survey (NHWCS). We then compare potential cost savings with the additional costs associated with demonstrating eligibility. This allows us to screen out waste streams that meet the technical eligibility requirements but which will not undergo analytical testing due to the cost constraints. Finally, using the information from the comparable fuel identification process, we assess the impacts of the exclusion on generators, fuel blenders, combustion facilities, and solvent recovery units.

Summary of Findings

The major findings from the comparable fuels analysis are as follows:

- **Quantity of Combusted Wastes that Qualify for the Exclusion.** The quantity of currently combusted hazardous wastes that would qualify for the comparable fuel exclusion ranges from approximately 170,000 tons to 215,000 tons per year. These estimates have some potential to overstate the quantity of materials that may qualify for the rule due to the presence of some blended streams. There is also some potential for understatement due to the possibility that wastes could be treated to remove toxic constituents that currently prevent streams from qualifying.

- **Generator Savings.** Generators of relatively large waste streams will find it economical to claim the comparable fuel exclusion because the potential waste management savings exceed the associated analytical costs. Nationally, we expect savings to generators that claim the comparable fuel exclusion to range from $8 to $33 million per year. These savings are made up of avoided hazardous waste combustion costs and revenues from sale of comparable fuels, less the analytical costs.

- **Costs to Fuel Blenders and Combustors.** Commercial blending and combustion facilities that previously managed the wastes qualifying for the comparable fuels exclusion will experience increased costs and reduced revenues as they seek to replace the approximately 93,000 tons of wastes that will be diverted to the comparable fuels market. This represents a reduction of approximately six percent in the total quantity of hazardous waste managed at commercial blending and combustion facilities. The combined impact of reduced receipts for managing hazardous wastes coupled with the costs of replacing these materials with more expensive substitutes, such as conventional fuels, could cost these firms between $3 million and $13 million per year.

- **Quantity of Recyclable Solvents that Qualify for Exclusion.** The quantity of recycled solvents that qualify for the comparable fuel exclusion ranges from approximately 55,000 to 75,000 tons. This represents approximately 10 percent of the total quantity of waste currently sent to solvent recovery facilities.

- **Generator Savings from Waste Diversion.** Large quantity generators whose spent solvents are currently recycled and meet the comparable fuel specifications may find it economical to divert these wastes to combustion facilities rather than recycling facilities. National savings from these diversions are estimated at $3 million per year.

- **Current Waste Management.** Of the total quantity of waste likely to meet the comparable fuels specifications, almost 75 percent is currently burned at combustion facilities while the remaining 25 percent is sent to solvent recycling facilities.

ECONOMIC IMPACT OF WASTE MINIMIZATION INCENTIVES

Approach

To determine the impact of the waste minimization incentives, we consider the economic and technical feasibility of waste minimization opportunities given a one-year extension for compliance with the MACT standards. Waste minimization will be economically feasible as long as the operating and maintenance (O&M) costs for a waste minimization option are less than the O&M costs associated with end-of-pipe control. With regard to technical feasibility, an extra year for compliance may be useful for efforts such as research and development on material substitutions and process changes due to regulatory restrictions. A quantitative comparison of waste minimization costs with end-of-pipe control costs is not possible at this time, however, because the final MACT Standards are still under development.

Summary of Findings

- **On-site combustion facilities are most likely to implement waste minimization options.** The one year extension will provide a greater incentive for facilities with on-site combustion units to implement waste minimization options rather than continue burning hazardous wastes and implement appropriate control technologies. Commercial combustion facilities have few direct opportunities to pursue waste minimization since they have little control over the wastes generated by their customers.

- **Source reduction activities are more likely to require the extension.** The types of waste minimization measures for which facilities request the extension will typically involve product redesign, process redesign, or input substitution.

- **Off-site recycling options are not likely to require the extension.** Most out-of-process waste minimization projects should take significantly less than three years from idea to implementation because most do not disturb product formulation or production schedules. Thus, off-site recycling options will not likely qualify for the extension.

- **Four years is expected to be sufficient time for implementing waste minimization.** Except for the most complex product or process redesign projects, four years should be sufficient time to identify opportunities, conduct bench scale laboratory research, obtain corporate approval, complete scale-up engineering, purchase or construct full-scale equipment, schedule downtime, and install.

ECONOMIC IMPACT OF STREAMLINED RCRA PERMIT MODIFICATION PROCEDURES

Approach

Because operational changes may be necessary to comply with the MACT standards, some hazardous waste combustion facilities will need to request modifications to their RCRA permits. As part of the fast-track rulemaking, EPA is introducing a streamlined procedure for modifying RCRA permits at combustion units. This streamlined approach may result in savings for states and facilities. To determine the overall impact of the approach, we assess the total costs to both facilities and states before and after implementation of the permit modification requirements. We base our economic analysis on data from relevant Information Collection Requests and through discussions with state personnel involved in the permitting process.

Summary of Findings

- **Economic Impact on Combustion Facilities.** Under the existing permitting scheme, national costs to combustion facilities submitting permit modification requests would be approximately $8.1 million. Under the streamlined approach, national costs to facilities are expected to be $4.6 million. The total facility savings are therefore expected to be approximately $3.5 million.

- **Economic Impact on States.** Under the existing permitting scheme, the costs to states would be approximately $4.2 million as a result of permit modification review. Under the streamlined permitting approach, state permit review costs are expected to range from $2.1 million to $3.8 million. In addition, states that adopt the streamlined approach will have to undergo rulemaking and authorization, for a cost that is expected to range from $0.5 million to $0.7 million. States are therefore expected to save $0 million to $1.5 million under the streamlined approach.

- **National Economic Impact.** Aggregating the national costs and savings to states and combustion facilities, the total national savings resulting from the streamlined permitting approach are expected to range from $3 million to $5 million.

OTHER POTENTIAL IMPACTS

Economic Impact of the Notification of Intent to Comply Requirements

We assess the economic impact of the NIC requirements by examining the costs of the activities a combustion facility must undertake to comply with the requirements. These activities include: preparing the draft and final version of the NIC, providing notice of and holding a public meeting, and preparing a progress report. To derive costs for these activities, we used estimates included as part of the Information Collection Request (ICR) for the Fast-Track rulemaking.

Findings

- **Costs of NIC requirements.** Combustion facilities are expected to spend approximately $30,000 to $40,000 each to comply with the NIC requirements. This is a one-time cost that will span two years. The NIC components that constitute the majority of the costs are preparation of the draft NIC, the public meeting, and submission of the progress report. The national costs to combustion facilities are expected to range from $5 million to $7 million over a period of two years. Costs to states to review progress reports, final NICs, and extension requests are expected to be minimal, approximately $1,000 per state.

INTRODUCTION

As part of the fast-track rulemaking for the Hazardous Waste Combustion MACT standards, EPA will include a comparable fuel exclusion for wastes that are similar in composition to conventional fuels.[1] This chapter of the Economic Analysis Report examines the possible impacts of such an exclusion. First, we provide an estimate of the quantity of hazardous wastes that qualify as comparable fuels. We then describe the economic impacts of the comparable fuel exclusion on hazardous waste generators and combustors. Finally, we discuss the possible effects of the comparable fuel exclusion on recycling of hazardous wastes.

QUANTITY OF COMBUSTED WASTES MEETING THE COMPARABLE FUELS CRITERIA

Introduction

In this section, we estimate a quantity of the hazardous waste that qualifies for the comparable fuels exclusion proposed as part of the revised standards for hazardous waste combustors. An estimate of the quantity of comparable fuels is necessary to determine changes in waste burning and recycling behavior and possible price effects due to the exclusion. In addition to estimating a quantity, we identify the composition of the waste streams that qualify for the comparable fuel exclusion and determine which combustion sectors currently handle this waste.

The purpose of the comparable fuel exclusion is to classify as non-hazardous those wastes that are similar to fossil fuels in terms of hazardous characteristics, viscosity, heating value, and low level of toxic contaminants. The exclusion is intended to promote RCRA's resource recovery goals without creating any risks greater than those posed by commonly used commercial fuels.

[1] The comparable fuel exclusion will amend 40 CFR Part 261.4(a)(13).

To qualify for the comparable fuel exclusion, waste streams must be burned as fuel at industrial facilities. In addition, the waste must meet certain physical and constituent specifications. The physical specifications are set for heating value and viscosity. To meet the definition of a comparable fuel, the heating value of a waste must exceed 5,000 Btu per pound, and the viscosity must not exceed 50 cSt as-fired. The constituent specifications for the comparable fuel exclusion set concentration limits for a list of compounds that includes metals, dioxins/furans, polychlorinated biphenyls (PCBs), oxygenates, and other chemicals. Any waste that fails to meet the concentration limit for any one compound on the list cannot be considered a comparable fuel.[2] A complete listing of the comparable fuels standards is included in Appendix A.

Screening Approach

To estimate the quantity of comparable fuels, we used the National Hazardous Waste Constituent Survey (NHWCS) that was conducted for EPA's Hazardous Waste Identification Rule (HWIR).[3] The survey sample consists of the hazardous waste treatment, disposal, and recycling facilities that together manage 90 percent of all hazardous wastes. Estimating the quantity of comparable fuels using the NHWCS involves several steps. First, we screened out waste not managed by incineration or energy recovery. Second, we eliminated waste streams that do not meet EPA's definition of a comparable fuel, which includes three components: viscosity, heating value, and constituent concentrations. Lastly, the estimated quantity based on the sample of facilities in the NHWCS database is scaled to appropriately reflect the *total* wastes managed by combustion facilities. This overall screening process is illustrated in Exhibit 1.

Because some data necessary to perform the screens are missing from NHWCS, we calculated low-end and high-end quantities at each screening level. The low-end and high-end estimates differ based on assumptions we made with regard to missing data in the survey. The high-end quantity for the screens assumes those streams with missing values for key parameters would in fact qualify for the exclusion; the low-end quantity only includes those streams with reported acceptable values for all required test parameters. *For illustrative purposes, except where noted, high-end, unscaled quantities of waste are reported in the text and exhibits illustrating the approach. The results section scales these to reflect national totals.*

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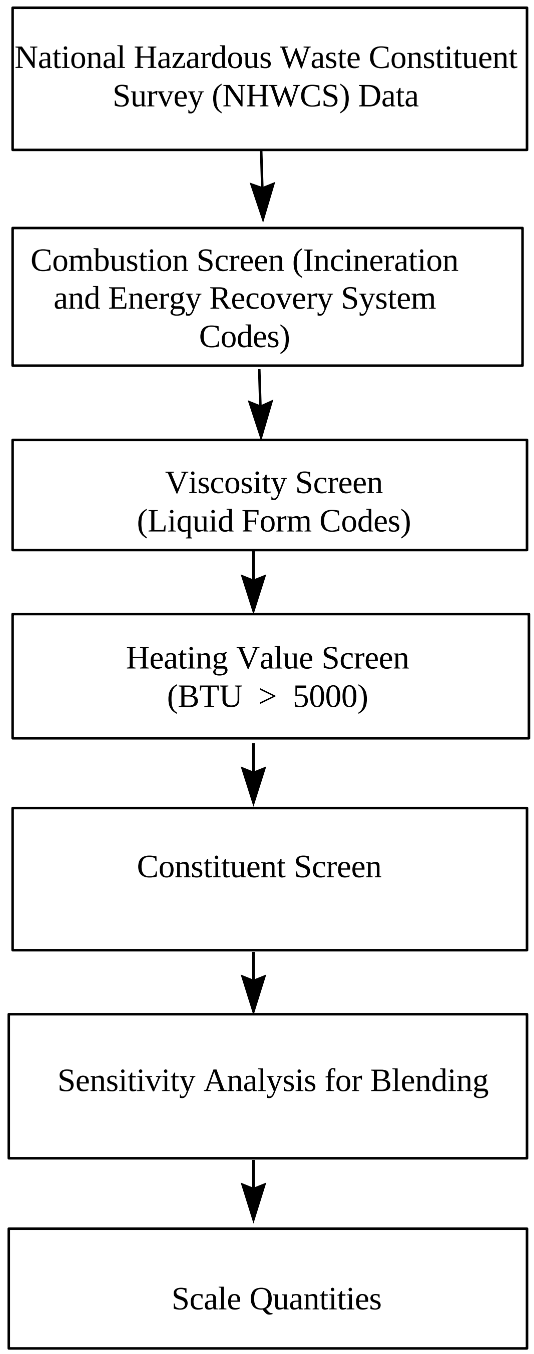
[2] However, a waste can be treated (but not blended) to meet the constituent specifications as long as the waste already meets the heating value and viscosity specifications.

[3] Although the Biennial Reporting System (BRS) is the most comprehensive hazardous waste database, it does not contain chemical concentrations. Concentration data are necessary to determine if a hazardous waste qualifies for the comparable fuel exclusion; thus we relied on the NHWCS instead of BRS.

Exhibit 1

APPROACH FOR ESTIMATING HAZARDOUS WASTE QUANTITIES THAT WILL MEET COMPARABLE FUEL EXCLUSION



Combusted Waste Screen

Our initial step in the analysis involved identifying waste streams managed by combustion. Since the data from the NHWCS included wastes managed at all types of TSDFs, we first identified the records for all waste streams that were combusted. We assumed the combustion streams to be those that had BRS System Codes for incineration (M041 through M049) and energy recovery (M051 through M059). Exhibit 2 identifies the distribution of wastes by type of combustion (i.e., on-site incineration, commercial incineration, or on-site BIFs, or cement kilns), system code, and form code (i.e., liquids, solids, and sludges). As Exhibit 2 indicates, the largest quantity of wastes are combusted in on-site incinerators, followed by cement kilns, on-site BIFs, and commercial incinerators. Appendix B-1 provides more detailed breakdowns of combusted waste quantities.

Screens for Comparable Fuel Specifications

The data screens discussed below are based on the comparable fuel specifications delineated in the fast-track MACT rulemaking. To be considered a comparable fuel, a combusted hazardous waste must meet specifications related to viscosity, heating value, and constituent concentration. Because the NHWCS was designed for HWIR and not for identifying comparable fuels under the Combustion MACT rule, we had to make several simplifying assumptions. These are discussed below.

Viscosity Screen

The first comparable fuel characteristic for which we screened was viscosity. The comparable fuel specifications include a numerical measure for viscosity indicating that the waste is a liquid. A viscosity measurement, however, was not requested as part of the NHWCS. As a proxy for viscosity, we used the BRS Liquid Form Codes (B100s and B200s) to identify wastes that are likely to meet the viscosity specification.[4]

For the viscosity screen, the low-end estimate included only those waste streams with liquid form codes, as well as those waste streams with a missing form code field and a corresponding system code indicating liquid waste incineration (M041) or energy recovery (M051). The high-end estimate included all combusted waste streams that met the liquid form criteria or had missing form code fields. Exhibit 3 identifies those combusted wastes that meet the viscosity criteria. The viscosity screen removed between 520,000 and 815,000 tons of waste from the total combusted (see Appendix B-2 for more detailed breakdowns of quantities meeting the viscosity screen).

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[4] EPA indicated that using B100 and B200 Form Codes as a proxy for the viscosity specification in the comparable fuel exclusion was an appropriate assumption for this analysis (Ms. Krolewski, Personal Communication, April 7, 1997).

Exhibit 2

WASTES IN NHWCS THAT MEET THE COMBUSTION SCREEN

Combustion Method	System Type	Quantity Waste Managed (by System Type, in tons)	Percent Waste Managed (by System Type)
On-Site Incineration	M041: Incineration - liquids	872,772	79%
	M042: Incineration - sludges	56,812	5%
	M043: Incineration - solids	16,603	1%
	M044: Incineration - gases	17,199	2%
	M049: Incineration - type unknown	148,355	13%
	Total: On-Site Incineration	1,111,741	100%
Commercial Incineration	M041: Incineration - liquids	51,015	59%
	M042: Incineration - sludges	11,199	13%
	M043: Incineration - solids	23,778	28%
	M049: Incineration - type unknown	0	0 %
	Total: Commercial Incineration	85,992	100%

Exhibit 2 (continued)

WASTES IN NHWCS THAT MEET THE COMBUSTION SCREEN

Combustion Method	System Type	Quantity Waste Managed (by System Type, in tons)	Percent Waste Managed (by System Type)
Energy Recovery Kilns	M051: Energy Recovery - liquids	595,475	88%
	M052: Energy Recovery - sludges	4,519	1%
	M053: Energy Recovery - solids	72,076	11%
	M059: Energy Recovery - type unknown	0	0%
	Total: Energy Recovery	672,070	100%
On-site Boilers and Industrial Furnaces (BIFs)	M051: Energy Recovery - Liquids	555,104	100%
	M052: Energy Recovery - Sludges	0	0%
	M053: Energy Recovery - Solids	0	0%
	M059: Energy Recovery - type unknown	0	0%
	Total: On-site BIFs	555,104	100%
Total: All Combustion Methods		2,424,907	

Note: Quantities are high-end, unscaled NHWCS totals.

Heating Value Screen

The comparable fuels specifications state that the heating value of a waste must exceed 5,000 Btu/lb. Since heating value was included in the NHWCS, we were able to apply this value to identify wastes meeting the heating value requirements. As shown in the schematic in Exhibit 1, we applied this screen to all wastes meeting the combustion and viscosity screens. The low-end heating value included only those waste streams that had a heating value that exceeded 5,000 Btu/lb. The high-end heating value estimate included waste streams that had a heating value that exceeded 5,000 Btu/lb and also any that had missing heating value fields. Exhibit 4 identifies those combusted wastes that meet both the heating value and viscosity criteria (Appendix B-3 provides additional information). The heating value screen removed between 380,000 and 650,000 tons of waste.

Constituent Screen

The comparable fuel exclusion also includes constituent specifications for nitrogen, halogens, fourteen metals, dioxin/furans, PCBs, oxygenates, and other primarily organic constituents that may be found in combusted waste streams. For each chemical, EPA has set a concentration or maximum detection limit that a waste stream must meet to be considered a comparable fuel.[5] Any combusted waste stream that meets the viscosity and heating value specifications, but fails to meet the limit for any single chemical, will not qualify as a comparable fuel.

IEc screened the NHWCS constituent data for the compounds EPA designated in the comparable fuel specifications. To calculate the quantities meeting the constituent criteria, we excluded any waste stream containing a listed constituent that exceeded the concentration limit set in the specifications. The low-end constituent estimate also excluded those streams where a constituent was listed but did not include a concentration measurement. Exhibit 5 identifies those wastes that meet the constituent and heating value and viscosity and combustion limits (see Appendix B-4 for more details). The constituent screen removed between 1,600,000 and 2,200,000 tons of waste. For a perspective on why waste streams failed the constituent screen, Exhibit 6 identifies those compounds that most often exceeded the concentration limits set in the constituent specifications. As Exhibit 6 indicates, halogen is the compound that most often causes waste streams in NHWCS to fail the constituent specifications. At a limit of 25 parts per million, halogen causes approximately 391,000 tons of hazardous waste to fail the constituent specifications.

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[5] Under the comparable fuel exclusion, constituent levels in the potential comparable fuel must be corrected to a 10,000 Btu/lb heating value prior to comparison with the constituent specifications. The purpose of this provision is to ensure that a facility burning a comparable fuel does not feed more total mass of hazardous constituents than if it burned fossil fuels. The constituent levels in the NHWCS data are not corrected to a 10,000 Btu/lb heating value; however the average heating value of the combusted waste streams in NHWCS is approximately 10,000 Btu/lb.

Exhibit 3

WASTES IN NHWCS THAT MEET THE VISCOSITY SCREEN (AND COMBUSTION SCREEN)

Combustion Method	Quantity Waste Managed (by Combustion Method, in tons)	Percent Waste Managed (by Combustion Method)	Percent Reduction from Combustion to Viscosity Screen
On-Site Incineration	839,064	44%	25%
Commercial Incineration	53,361	3%	38%
Energy Recovery (Kilns)	594,521	31%	12%
On-Site BIFs	418,813	22%	25%
Total:	1,905,759	100%	21%

Note: Quantities are high-end, unscaled NHWCS totals.

Exhibit 4

WASTES IN NHWCS THAT MEET THE HEATING VALUE SCREEN (AND VISCOSITY AND COMBUSTION SCREENS)

Combustion Method	Quantity Waste Managed (by Combustion Method, in tons)	Percent Waste Managed (by Combustion Method)	Percent Reduction from Viscosity to Heating Value Screen	Average Heating Value (for Streams Above 5,000 Btu/lb)
On-Site Incineration	485,299	32%	42%	10,801
Commercial Incineration	43,068	3%	19%	11,378
Energy Recovery (Kilns)	585,972	38%	1%	12,683
On-Site BIFs	410,632	27%	2%	11,848
Total: All Management Methods	1,524,971	100%	20%	11,741

Note: Quantities are high-end, unscaled NHWCS totals.

Exhibit 5

WASTES IN NHWCS THAT MEET THE CONSTITUENT SCREEN (AND VISCOSITY AND HEATING VALUE AND COMBUSTION SCREENS)

Combustion Method	Quantity Waste Managed (by Combustion Method, in tons)	Percent Reduction from Heating Value to Constituent Screen	Average Heating Value (for Streams Above 5,000 Btu/lb)
On-Site Incineration	18,952	96%	12,876
Commercial Incineration	7,317	83%	11,289
Energy Recovery (Kilns)	55,085	90%	13,321
On-Site BIFs	60,398	85%	13,041
Total: All Combustion Methods	142,292	91%	13,028

Note: Quantities are high-end, unscaled NHWCS totals.

Exhibit 6

COMPOUNDS CAUSING WASTES TO FAIL CONSTITUENT SCREEN

Compound	Quantity (in tons)
Halogen	391,205
Benzene	52,948
Chromium	46,116
Methylethyl ketone	41,099
Phenol	38,853
Mercury	33,283
Carbon disulfide	32,114
Arsenic	24,792
Toluene	22,349
Silver	16,701
Cadmium	16,642
Lead	16,642
Barium	15,733

Notes:

- The metals listed are those that most often exceeded the concentration levels set in the specifications.

* The chemicals listed may not independently have caused a waste stream to fail the concentration specification. That is, a waste stream may have exceeded a concentration specification for mercury and chromium. In such a case, the quantity of the waste stream will be included in the quantities of both mercury and chromium.

** Quantities are high-end, unscaled NHWCS totals.

Waste Code Screen

EPA has determined that wastes containing dioxins should not be eligible for an exclusion from the definition of solid waste. In particular, waste codes F020, F021, F022, F023, F026, and F028 have been designated as "inherently waste-like" under 40 CFR 261.(d) and therefore are not eligible for the comparable fuel exclusion. None of the waste streams in NHWCS that cleared the constituent screen contained these waste codes; therefore, the quantity of waste that meets the comparable fuel exclusion in our analysis does not appear to be affected significantly by the 'inherently waste-like' designation.

National Estimates of Comparable Fuel Quantities

The analyses we have performed provide an estimate of the quantity of currently combusted hazardous wastes that would meet the comparable fuel exclusion. Exhibit 7 summarizes the screening process results under both the upper and lower bound scenarios. *The quantities in Exhibit 7 have been scaled to represent national estimates.* In addition, Appendix C is a listing of all the NHWCS streams that might qualify for exclusion. Examination of these exhibits suggests that between 168,481 tons and 213,438 tons of the waste meet the basic screening criteria for the exclusion.[6] These estimates represent national totals based on scaling up the estimates from the NHWCS in Appendix C to reflect national totals. Because the NHWCS included most of the waste currently combusted, the scaling factors used for these estimates yield only modest increase in the NHWCS totals.

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[6] We used the ratio of total nationally combusted wastes in the 1993 BRS (3,689,287 tons) to combusted waste reported by respondents to the NHWCS (2,424,907 tons) to derive a factor for scaling the NHWCS to national totals. The scaling figure to bring NHWCS estimates up to the total hazardous waste universe is therefore: 3,689,287 tons/2,424,907 tons = 1.5. We used the 1993 BRS quantity because the NHWCS data is based on waste streams generated in 1993.

Exhibit 7

RESULTS FROM SCREENING ANALYSIS FOR COMBUSTED WASTES

Screening Level	Low-End Quantity (tons)	High-End Quantity (tons)
Combusted Wastes Meeting	3,689,287	
Viscosity	2,414,759	2,858,639
and Heating Value	1,873,015	2,287,457
and Constituent	168,481	213,438
Total Comparable Fuels	**168,481**	**213,428**

The estimates of quantities that would qualify for the comparable fuels exclusion are subject to two additional uncertainties. First, in the rulemaking EPA places certain limitations on the blending of wastes to meet the comparable fuel exclusion. The exclusion states that a hazardous waste must meet the hazardous constituent and heating value specifications prior to any blending. Some of the materials identified above may not qualify for the exclusion because they have been subjected to blending prior to being reported in the NHWCS. Second, some of the streams that do not qualify might be managed in ways that would make them eligible for the exclusion. For example, the rule allows blending to meet viscosity standards and certain types of treatment can be used to lower constituent concentrations to acceptable levels. As a result, the estimates of affected quantities also have the potential to understate the quantity of wastes that may qualify for the exclusion. This section provides some limited sensitivity analysis of these issues.

Our analysis of blending suggests that removal of wastes subjected to blending could significantly reduce the quantity of material qualifying for the comparable fuels exclusion. Data in the NHWCS indicates that blended materials could account for up to 131,070 tons of the 213,438 tons of material that potentially meets the viscosity, heating value, and constituent criteria (Exhibit 8). This includes materials received by commercial burners that are reported in the NHWCS to have been blended, as well as "mixed" wastes managed at on-site facilities.[7] If only the portion of the material that meets the comparable fuel standards before blending qualifies for the exclusion, the total comparable fuels quantity could drop significantly. Due to the lack of data on the individual streams that were blended, however, we are unable to predict exactly how much the quantity of materials qualifying for the exclusion would fall due to this effect.

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[7] We identified wastes as blended if the waste stream was received from a fuel blender or transfer facility. However, the NHWCS includes characteristic waste streams that are representative of other waste streams managed at that particularly facility. These characteristic streams are not necessarily representative of other facilities from which similar wastes are received. While this introduces some uncertainty into the estimates of blended material quantities, it does not bias the estimate in any systematic manner.

Exhibit 8 ADJUSTED COMPARABLE FUEL QUANTITIES CONSIDERING BLENDING	
	Quantities (tons)
Total Comparable Fuels	**213,438**
Blended Portion:	131,070
- Blended Off-Site	58,351
- Mixed On-Site	72,719
Lower Bound of Comparable Fuels	**82,368**
Potential Increase due to blending for Viscosity (2 facilities in NHWCS)	1,552
Upper Bound of Comparable Fuels	**214,990**

We also performed some limited analysis of the extent to which qualifying waste quantities could increase due to provisions of the rule permitting certain types of management that would allow wastes not currently meeting the criteria to be blended or treated to the point where they do qualify. This analysis was limited to an assessment of the potential impact of blending to meet the viscosity standard. Waste stream data were not available to support an analysis of the extent to which treatment could be used to lower constituent concentrations to the proposed levels for exclusion.

Our analysis of the potential for blending to meet viscosity requirements suggests this practice does not have the potential to dramatically increase the quantities of material that might qualify for the exclusion. Only two facilities have wastes that fail to qualify only because they cannot meet the viscosity requirements. These streams represent only 1,500 tons of additional material at the national level.

Overall, the analysis of data from the NHWCS suggests that the total quantities of materials qualifying for the comparable fuels exemption at most represent a relatively small percentage of the material currently combusted. Even if blended materials are included in the estimate, only about six percent of the total combusted materials will qualify, and this number could drop substantially if only portions of the blended materials qualify. The only major remaining uncertainty is the extent to which treatment to meet the constituent requirement could be used to increase the quantity of qualifying material. This is both a technical and an economic issue. First, the waste must be amenable to removal of the constituents that cause the waste to fail the constituent criteria. Second, the net cost of removing this material and then selling the comparable fuel must be less than the cost of current hazardous waste combustion. This information is not currently available.

ECONOMIC EFFECTS OF THE COMPARABLE FUELS EXCLUSION

The comparable fuels exclusion will result in a variety of economic impacts on generators and managers of hazardous wastes. For generators, there are two major potential effects. First, these facilities will have lower waste management costs due to the increased value of their waste. Second, some facilities have the potential to exit the RCRA Subtitle C program completely. These positive benefits for the generators, however, represent potential negative impacts on firms engaging in the blending or burning of the materials that will be diverted to the comparable fuels market.

An additional consideration is whether it would be economical for generators to begin managing their wastes as comparable fuels. This would require that the costs of gaining the exclusion are less than the value of the comparable fuels themselves plus the avoided costs of incineration. We evaluated this question using a break-even analysis, and concluded that virtually all the wastes that meet the technical specifications for comparable fuels are above the break-even quantity for recovering the costs of gaining the exclusion.[8] As a result, virtually all the material would be expected to flow into the comparable fuels market, even when costs of gaining the exclusion are taken into account. In fact, the analytic costs for the exclusion are not high relative to the overall savings from sale of comparable fuels and avoided hazardous waste incineration costs.

Generator Savings

Our analysis suggests that virtually all generators whose wastes qualify for the comparable fuels exclusion will experience net reductions in waste management costs. There are two primary factors that result in economic benefits for generators and one principle cost. First, for those waste streams that qualify for the comparable fuel exclusion, generators will avoid the costs of hazardous waste combustion. Second, generators may be able to sell their comparable fuel waste streams to fuel blenders for use as a blending agent or directly to fuel users for use in energy recovery. The primary cost to generators is the waste stream analysis required as part of the comparable fuels exclusion. Total savings for generators can be estimated by using these three factors in conjunction with data from the NHWCS survey.

For an individual generator, the savings due to the rule can be calculated using the following relationships.

$$S_T = (S_{inc} + S_{cfe})(Q_{CF}) - (C_a * S_G) .$$

where:

S_T = Total savings to generator.

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[8] A description of this break-even analysis is included as Appendix 6.

S_{inc} = Savings from avoided hazardous waste incineration of clean liquid wastes.

S_{cfe} = Revenues of using/selling comparable fuel for energy.

Q_{CF} = Total quantity of comparable fuels based on BEQ analysis.

C_A = Analytical costs for the comparable fuel exclusion.

S_G = Number of generator streams that qualify as comparable fuels.

We conducted the analysis of generator savings assuming generators face incremental analytical costs of $1,800 per waste stream (DPRA 1997).[9] Comparable fuels are assumed to be saleable at prices ranging from $36.50 to $78.20 per ton, based on their value for replacing coal and residual fuel oil (EIA 1997). Generators are currently assumed to pay between zero and $75 per ton to have relatively clean liquids combusted at hazardous waste facilities (Welch 1997).[10] Total national savings for generators are estimated by aggregating the savings to all individual generators whose wastes meet the comparable fuels standards (maximum of 213,438 tons per year).

Exhibit 9 illustrates the potential savings to generators whose wastes qualify for the comparable fuels exclusion. Based on the ranges for comparable fuel prices and current costs of combustion, we estimate that generators will save a total of between approximately $8 million and $33 million per year as a result of the exclusion. For some facilities comparable fuel savings have the potential to represent in excess of $1 million per year. The savings illustrated in Exhibit 9 are pre-tax savings. If we take into consideration the corporate tax rate of 35 percent, the post-tax savings would equate to approximately 65 percent of the monetary estimates in Exhibit 9 (CCH 1997).[11]

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[9] The analytical costs of $1,800 per waste stream are derived from laboratory average prices for sampling of metals, organics, halogens and physical specifications. The analytical costs do not include sampling for every constituent listed in the comparable fuel specifications (see Appendix A). Therefore, the costs may be somewhat underestimated. At the same time, however, process knowledge of a waste stream, which alleviates the need for some constituent sampling, is also not accounted for in the analytical costs. On the whole, accounting for both of these factors, we expect that $1,800 per waste stream is a reasonable estimate.

[10] We use zero as the lower bound cost of combustion because very clean waste liquids can be used as a substitute for fuel at cement kilns. In this type of situation, the combustor may take very clean waste free of charge from a generator rather than purchase fuel for its processes.

[11] We have not projected post-tax impacts because data on the actual tax rates of individual firms or categories of firms were not readily available. Devotion of further resources to this effort was not deemed to be a cost-effective use of EPA resources.

EXHIBIT 9: POTENTIAL GENERATOR SAVINGS DUE TO THE COMPARABLE FUELS EXCLUSION

Generator Facility Number	Number of Comparable Fuel Streams	Total Quantity of Comparable Fuels	Potential Revenues from Sale/Use of Comparable Fuel		Avoided Incineration Costs		Analytic Costs	Pre-Tax Savings	
		(in tons)	Lower Bound $36.50/ton	Upper Bound $78.20/ton	Lower Bound $0.00/ton	Upper Bound $75.00/ton	$1800/stream	Lower Bound	Upper Bound
1	1	429	$15,659	$33,548	$0	$32,175	$1,800	$13,859	$63,923
2	1	1,034	$37,741	$80,859	$0	$77,550	$1,800	$35,941	$156,609
3	1	3,072	$112,128	$240,230	$0	$230,400	$1,800	$110,328	$468,830
4	3	6,702	$244,623	$524,096	$0	$502,650	$5,400	$239,223	$1,021,346
5	2	2,712	$98,988	$212,078	$0	$203,400	$3,600	$95,388	$411,878
6	1	3,162	$115,413	$247,268	$0	$237,150	$1,800	$113,613	$482,618
7	1	1,336	$48,764	$104,475	$0	$100,200	$1,800	$46,964	$202,875
8	1	502	$18,323	$39,256	$0	$37,650	$1,800	$16,523	$75,106
9	1	1,826	$66,649	$142,793	$0	$136,950	$1,800	$64,849	$277,943
10	1	25	$913	$1,955	$0	$1,875	$1,800	($888)	$2,030
11	1	466	$17,009	$36,441	$0	$34,950	$1,800	$15,209	$69,591
12	2	2,052	$74,898	$160,466	$0	$153,900	$3,600	$71,298	$310,766
13	1	200	$7,300	$15,640	$0	$15,000	$1,800	$5,500	$28,840
14	1	2,228	$81,322	$174,230	$0	$167,100	$1,800	$79,522	$339,530
15	2	676	$24,674	$52,863	$0	$50,700	$3,600	$21,074	$99,963
16	1	1,024	$37,376	$80,077	$0	$76,800	$1,800	$35,576	$155,077
17	1	1,802	$65,773	$140,916	$0	$135,150	$1,800	$63,973	$274,266
18	2	4,085	$149,103	$319,447	$0	$306,375	$3,600	$145,503	$622,222
19	2	1,770	$64,605	$138,414	$0	$132,750	$3,600	$61,005	$267,564
20	3	4,632	$169,068	$362,222	$0	$347,400	$5,400	$163,668	$704,222
21	2	4,502	$164,323	$352,056	$0	$337,650	$3,600	$160,723	$686,106
22	1	415	$15,148	$32,453	$0	$31,125	$1,800	$13,348	$61,778
23	2	8,221	$300,067	$642,882	$0	$616,575	$3,600	$296,467	$1,255,857
24	3	16,978	$619,697	$1,327,680	$0	$1,273,350	$5,400	$614,297	$2,595,630
25	2	7,420	$270,830	$580,244	$0	$556,500	$3,600	$267,230	$1,133,144
26	2	4,402	$160,673	$344,236	$0	$330,150	$3,600	$157,073	$670,786
27	2	6,171	$225,242	$482,572	$0	$462,825	$3,600	$221,642	$941,797
28	1	1,271	$46,392	$99,392	$0	$95,325	$1,800	$44,592	$192,917
29	1	3,574	$130,451	$279,487	$0	$268,050	$1,800	$128,651	$545,737
30	2	2,578	$94,097	$201,600	$0	$193,350	$3,600	$90,497	$391,350
31	1	5,608	$204,692	$438,546	$0	$420,600	$1,800	$202,892	$857,346
32	2	2,836	$103,514	$221,775	$0	$212,700	$3,600	$99,914	$430,875
33	2	1,199	$43,764	$93,762	$0	$89,925	$3,600	$40,164	$180,087
34	2	3,988	$145,562	$311,862	$0	$299,100	$3,600	$141,962	$607,362
35	1	5,430	$198,195	$424,626	$0	$407,250	$1,800	$196,395	$830,076
36	1	7,284	$265,866	$569,609	$0	$546,300	$1,800	$264,066	$1,114,109
37	1	2,222	$81,103	$173,760	$0	$166,650	$1,800	$79,303	$338,610
38	1	3,719	$135,744	$290,826	$0	$278,925	$1,800	$133,944	$567,951
39	1	9,375	$342,188	$733,125	$0	$703,125	$1,800	$340,388	$1,434,450
40	3	4,329	$158,009	$338,528	$0	$324,675	$5,400	$152,609	$657,803
41	1	1,035	$37,778	$80,937	$0	$77,625	$1,800	$35,978	$156,762
Totals (unscaled)	**63**	**142,292**	**$5,193,658**	**$11,127,234**	**$0**	**$10,671,900**	**$113,400**	**$5,080,258**	**$21,685,734**
Potential National Generator Savings (scaled):								**$7,620,387**	**$32,528,602**

An additional potential source of savings for generators is the possibility of completely exiting the RCRA Subtitle C program. However, our analysis suggests these savings are likely to be small because few facilities are expected to exit. Facilities are only able to exit RCRA if all the hazardous wastes that they manage qualify for the exclusion. At most, the NHWCS suggests there are only six facilities for which all the combusted streams qualify, and this number would be an overstatement of exiting facilities if they generate other RCRA streams that are not currently combusted. Moreover, some of these six facilities may manage small waste streams that are not included in NHWCS and do not qualify for the comparable fuel exclusion, also preventing full RCRA exit. As a result, we believe the savings from facilities exiting the RCRA system will be relatively insignificant when compared to the savings on current combustion costs.

Impacts of Comparable Fuel Exclusion on Fuel Blenders and Hazardous Waste Combustion Facilities

The savings for generators from the comparable fuel exclusion translate directly into lost revenues or increased costs for fuel blenders and commercial combustion facilities. Blenders who previously used the clean liquids will either have to pay more to obtain these materials or will have to replace them with conventional fuels. Similarly, combustion facilities that previously were either paid to accept these materials or who obtained them at no cost will have to pay for replacement fuels. Commercial combustion facilities and blenders will have to replace approximately 93,000 tons per year of material diverted to the comparable fuels market.[12] This represents about six percent of the hazardous waste currently managed at commercial combustion and blending facilities. The net aggregate impact on these facilities could range from between $3 million and $13 million per year when we include both the replacement fuel costs and the lost revenues for accepting liquid hazardous wastes.[13] Thus, the comparable fuel exclusion results in savings for hazardous waste generators and decreased revenue for fuel blenders and combustion facilities.

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[12] The sum of the scaled upper-bound quantities of comparable fuels at cement kilns and commercial incinerators is approximately 93,000 tons. As shown in Exhibit B-4, the sum of the unscaled comparable fuel quantities for cement kilns and commercial incinerators is approximately 62,000 tons. To calculate national totals, we use the scaling factor: 1.5 * 62,000 tons = 93,000 tons.

[13] The lower bound assumes that the only impact is the need to purchase coal (EIA 1997) to replace the diverted fuels (i.e., that the facilities received no payment for accepting the clean liquid streams). The upper bound assumes that they lose $75 in revenues on each of the 93,000 tons and they have to purchase residual fuel oil to replace these materials.

QUANTITY OF SOLVENT RECOVERY WASTES MEETING THE COMPARABLE FUELS CRITERIA

In this section, we assess the extent to which the comparable fuels exclusion will divert wastes from recycling to combustion. We first identify those annually recycled waste streams meeting the comparable fuel specifications. We also estimate the national quantity these waste streams represent. Next, for each recycled waste stream that qualifies as a comparable fuel, we assess whether the potential savings from diversion to combustion is greater than the costs of claiming the exclusion. From this analysis, we determine potential net savings for generators in reduced waste management costs.

Approach for Analyzing Recycled Waste Streams

To develop an estimated quantity of recycled wastes that qualifies for the comparable fuels criteria, we used the same screening approach applied in the combusted waste streams analysis. As with the combusted waste stream analysis, we used data in the NHWCS as the basis for our estimates. Before conducting the screening analysis, we identified waste streams sent to solvent recovery facilities. We focused on these waste streams because solvents are the most likely recycled hazardous wastes that could alternatively be burned as fuel. We then screened out waste streams that do not meet EPA's definition of a comparable fuel, which includes three components: viscosity, heating value, and constituent concentrations.

Next, we considered potential net savings to generators of diverting comparable fuels from solvent recycling to combustion. We estimate gross savings by adding the avoided costs of recycling to revenues associated with selling the comparable fuel to a combustion facility. We then subtract the analytical costs associated with claiming the exemption from the gross savings, to estimate the generator's net savings. Calculating the net savings for each generator is analogous to the approach used for generators of combusted waste streams. Namely, for an individual generator, the net savings can be calculated with the following equation.

$$S_T = (S_{sr} + S_{cfe})(Q_{CF}) - (C_A * S_G)$$

where:

S_T = Total savings to the generator.

S_{sr} = Savings from avoided solvent recycling costs.

S_{cfe} = Revenues of using/selling comparable fuel for energy.

Q_{CF} = Total quantity of comparable fuels based on BEQ analysis.

C_A = Analytical costs for the comparable fuel exclusion.

S_G = Number of generator streams that qualify as comparable fuels.

We conducted the analysis of generator savings assuming generators face incremental analytical costs of $1,800 per waste stream (DPRA 1997). Comparable fuels are assumed to be saleable at prices ranging from $36.50 to $78.20 per ton, based on their value for replacing coal and residual fuel oil (EIA 1997). Generators are currently assumed to pay between zero and $75 per ton to have relatively clean liquids combusted at hazardous waste facilities (Welch 1997). These bounds are reasonable estimates for avoided solvent recycling costs because generators send wastes to solvent recovery facilities only if such costs are less than the cost to combust the waste streams. Total national savings for generators are estimated by aggregating the savings to all individual generators whose wastes are currently recycled and meet the comparable fuels standards (upper bound of 73,547 tons per year).

National Estimates of Waste Diversion from
<u>Recycling to Clean Fuels Markets</u>

We used the screening analysis to develop upper and lower bounds on waste quantities that may be diverted from recycling to combustion as a result of the comparable fuels exclusion. Between 24,965 and 32,543 tons of wastes reported in the NHWCS that were sent to solvent recovery facilities meet the basic screening criteria for the exclusion. On a national basis, this corresponds to between 56,421 and 73,547 tons.[14] This represents approximately 10 percent of the total quantity of waste currently sent to solvent recovery facilities.

Recycled waste streams generally meet the viscosity and heating value screens, but tend to fail the comparable fuel constituent specifications. Exhibit 10 summarizes national waste quantities meeting the screens under both the upper and lower bound scenarios. From the exhibit, we see that approximately 90 percent of the waste streams that fail the comparable fuel specifications is due to the constituent concentration requirements. Appendix E contains a more detailed listing of all the recycled waste streams in the NHWCS by form code, source code, and waste code the might qualify for the exclusion.

[14] We scaled the NHWCS quantities by 2.26, the ratio of total hazardous wastes sent to solvent recovery facilities in the 1993 BRS (673,298 tons) to solvent recovery wastes reported in the NHWCS (297,990 tons).

Exhibit 10 RESULTS FROM SCREENING ANALYSIS FOR RECYCLED SOLVENTS		
Screening Level	**Low-End Quantity (tons)**	**High-End Quantity (tons)**
Solvent Recycling Wastes Meeting	673,298	
Viscosity	632,468	656,838
and Heating Value	543,168	621,283
and Constituent	56,421	73,547
Total Comparable Fuels	**56,421**	**73,547**

Most generators whose waste streams qualify for the comparable fuel exclusion will find it economic to divert these wastes from recycling to combustion. Exhibit 11 illustrates the results from the generator savings analysis. Using a lower bound on recycling costs, our analysis finds that potential revenues and savings exceed costs for 20 of the 23 generators. Using a higher recycling cost assumption, we find that all generators whose wastes qualify for the comparable fuels exclusion will divert the wastes to combustion and experience net reductions in waste management costs.

Total national savings for generators could range from between $3 million and $200 million per year. This very wide range in potential savings is due to uncertain solvent recycling costs. A variety of factors affect recycling costs, including: the water content of the spent solvent stream; ease of separation of solvent from contaminant; ability to use the recovered product; scale of the recovery operation; and value of virgin and/or recovered product. Because the solvents that meet the comparable fuel specifications have lower contaminant levels, the lower end of the savings estimate is probably more realistic. In addition, the waste streams not included in the NHWCS are generally smaller quantity waste streams whose costs may exceed potential savings. Therefore, the scaling factor we use to derive national figures may overestimate the percentage of large waste streams that could be diverted from solvent recovery to combustion. Because the upper bound estimate is largely comprised of large waste streams, the lower bound national generator savings estimate of $3 million per year is probably more accurate.

Characteristics of Waste Streams

EPA examined the characteristics of certain waste streams to assess the possible fate of wastes that meet the comparable fuel specifications. This analysis examined waste streams received in 1993 by Safety-Kleen, a waste management company, and categorized them according to waste

EXHIBIT 11: POTENTIAL GENERATOR SAVINGS FROM SOLVENT RECOVERY WASTES DIVERTED AS COMPARABLE FUELS

Generator Facility Number	Number of Comparable Fuel Streams	Total Quantity of Comparable Fuels	Potential Revenues from Sale/Use of Comparable Fuel		Avoided Solvent Recycling Costs		Analytic Costs	Pre-Tax Savings	
		(in tons)	Lower Bound $36.50/ton	Upper Bound $78.20/ton	Lower Bound $0/ton	Upper Bound $75/ton	$1800/stream	Lower Bound	Upper Bound
1	4	6,723	$245,390	$525,739	$0	$18,404,213	$7,200	$238,190	$18,922,751
2	1	2,360	$86,140	$184,552	$0	$6,460,500	$1,800	$84,340	$6,643,252
3	1	2,939	$107,274	$229,830	$0	$8,045,513	$1,800	$105,474	$8,273,542
4	1	1,749	$63,839	$136,772	$0	$4,787,888	$1,800	$62,039	$4,922,859
5	1	1,749	$63,839	$136,772	$0	$4,787,888	$1,800	$62,039	$4,922,859
6	1	2,080	$75,920	$162,656	$0	$5,694,000	$1,800	$74,120	$5,854,856
7	1	1,593	$58,145	$124,573	$0	$4,360,838	$1,800	$56,345	$4,483,610
8	1	1,593	$58,145	$124,573	$0	$4,360,838	$1,800	$56,345	$4,483,610
9	1	717	$26,171	$56,069	$0	$1,962,788	$1,800	$24,371	$2,017,057
10	1	588	$21,462	$45,982	$0	$1,609,650	$1,800	$19,662	$1,653,832
11	1	2,465	$89,973	$192,763	$0	$6,747,938	$1,800	$88,173	$6,938,901
12	1	2,465	$89,973	$192,763	$0	$6,747,938	$1,800	$88,173	$6,938,901
13	1	1,903	$69,460	$148,815	$0	$5,209,463	$1,800	$67,660	$5,356,477
14	1	18	$657	$1,408	$0	$49,275	$1,800	($1,143)	$48,883
15	1	23	$840	$1,799	$0	$62,963	$1,800	($961)	$62,961
16	1	22	$803	$1,720	$0	$60,225	$1,800	($997)	$60,145
17	1	685	$25,003	$53,567	$0	$1,875,188	$1,800	$23,203	$1,926,955
18	1	79	$2,884	$6,178	$0	$216,263	$1,800	$1,084	$220,640
19	1	865	$31,573	$67,643	$0	$2,367,938	$1,800	$29,773	$2,433,781
20	1	686	$25,039	$53,645	$0	$1,877,925	$1,800	$23,239	$1,929,770
21	1	857	$31,281	$67,017	$0	$2,346,038	$1,800	$29,481	$2,411,255
22	1	178	$6,497	$13,920	$0	$487,275	$1,800	$4,697	$499,395
23	1	206	$7,519	$16,109	$0	$563,925	$1,800	$5,719	$578,234
Totals: (unscaled)	**26**	**32,543**	**$1,187,820**	**$2,544,863**	**$0**	**$89,086,463**	**$46,800**	**$1,141,020**	**$91,584,525**
Potential National Generator Savings (scaled):								**$2,578,094**	**$206,932,037**

Note: The upper bound on avoided solvent recycling costs is represented by the combustion price for liquid hazardous waste. This is a reasonable assumption because generators send wastes to solvent recovery facilities only if these costs are less than the cost to combust these waste streams.

code and management practice. Wastes characterized as Ignitable (EPA Hazardous Waste Code D001) or as Non-halogenated Solvents (Waste Code F003) were considered proxies for a comparable fuel. Specific findings of the study include:

- Approximately 66 percent of the D001 wastes received by Safety Kleen in 1993 were eventually combusted; approximately 25% of the wastes were managed by solvent recovery.

- A majority (78 percent) of the D001 wastes from Small Quantity Generators are combusted through energy recovery.

- Nearly all of the F003 wastes received by Safety Kleen in 1993 were combusted, with 11.6 percent of these wastes managed by energy recovery.

These findings indicate that most of the wastes managed by Safety-Kleen that have comparable fuel characteristics are currently combusted. Therefore, management methods of Safety-Kleen wastes that qualify for the comparable fuel exclusion will unlikely change significantly.

REGULATORY FLEXIBILITY ANALYSIS OF THE COMPARABLE FUEL EXCLUSION

The comparable fuel exclusion is unlikely to adversely affect small businesses for two important reasons. First, comparable fuels comprise a relatively small percentage (approximately five percent) of total combusted hazardous wastes.[15] Therefore, the comparable fuel exclusion should not significantly affect prices or waste management behavior. Second, the comparable fuel exclusion is basically deregulatory for hazardous waste generators. Therefore, small business generators will not incur any additional costs from this exclusion. However, small quantity generators (sending waste streams of less than 50 tons) will not likely benefit from the comparable fuel exclusion in the same way that large quantity generators will benefit because the implementation costs (e.g., sampling and analysis) are more likely to exceed potential savings.[16] The impacts on specific sectors within the hazardous waste combustion market are listed below:

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[15] Approximately 170,000 to 215,000 tons of hazardous waste that is currently combusted qualifies for the comparable fuel exclusion.

[16] However, a small quantity generator may not necessarily be classified as a small business.

- **Combustion Facilities.** The comparable fuel exclusion is unlikely to have significant impacts on combustion facilities because a very small percentage (approximately four percent) of these facilities are identified as small businesses. Of those combustion facilities that are considered small businesses, some may benefit from the exclusion by exiting Subtitle C if they are only burning wastes that qualify as comparable fuels.

- **Fuel Blenders.** The comparable fuel exclusion is unlikely to have significant impacts on small entities that are fuel blenders because only a small percentage (about ten percent) of the waste these facilities handle will qualify for the comparable fuel exclusion.[17]

- **Hazardous Waste Generators.** The comparable fuel exclusion is unlikely to adversely affect small businesses that are generators of hazardous wastes. In fact, some generators may benefit from the comparable fuel exclusion for two reasons. First, these facilities will generally have lower waste management costs due to the increased value for their waste. Second, some generators have the potential to exit the Subtitle C system completely, thereby avoiding these costs. However, some small quantity generators (sending waste streams of less than 50 tons) will not likely benefit from the comparable fuel exclusion because the implementation costs (e.g., sampling and analysis) will be greater than the potential savings.

[17] Fuel blenders handle several types of waste streams, the majority of which are sent to solvent recovery facilities and to kilns. Of the total hazardous wastes sent to kilns and solvent recovery facilities (approximately 1.3 million tons), approximately 150,000 tons qualify for the comparable fuel exclusion.

BACKGROUND

As part of the Combustion Fast-Track Rulemaking, EPA is proposing to allow facilities to apply for up to a one year extension to the three year compliance period in cases where facilities require additional time to reduce hazardous wastes entering combustion feedstreams. The purpose of this extension is to encourage facilities to implement pollution prevention and environmentally sound recycling as a means for achieving compliance with the hazardous waste combustion MACT standards rather than implementing end-of-pipe controls. EPA is developing this extension because past studies indicate that tight compliance deadlines may preclude facilities from exploring waste minimization alternatives, which tend to take more time than simply installing air pollution control equipment.[1]

Combustion facilities can therefore comply with the MACT standards by:

- Purchasing and installing air pollution control devices (APCDs) within three years after the MACT standards are promulgated;
- Implementing waste minimization in combination with APCDs within four years after the MACT standards are promulgated; or
- Implementing waste minimization measures to fully meet the emission standards within four years after the MACT standards are promulgated.

[1] For facilities that need more than four years to implement waste minimization measures, EPA may allow a longer period to come into compliance by entering into consent agreements or consent orders with such facilities.

Affected Facilities

While any hazardous waste facility may take advantage of this extension (if certain requirements are met), on-site combustion facilities are the most likely to apply for the extension. The reason for this is because commercial combustion facilities have few direct opportunities to pursue waste minimization due to the fact that they have no direct control over the industrial processes of their customers. For this reason, the analysis of this provision is limited to on-site combustion facilities.[2]

EXPECTED IMPACTS

On-site combustion facilities will apply for the extension if waste minimization opportunities are technically and economically feasible, and if they cannot be implemented within the three-year period for compliance.[3] The number of facilities for which these criteria are met are unknown at this time because a more comprehensive waste minimization analysis that is being conducted for the full Combustion MACT Regulatory Impact Assessment is still ongoing. However, the one-year extension will make waste minimization options more attractive than suggested by a simple cost comparison from the standpoints of both technical and economic feasibility.

Technical Feasibility

Facilities with on-site combustion units will have more time to explore waste minimization options. Allowing industry extra time to make changes constrained by research and development challenges for materials substitution, regulatory restrictions on process changes (e.g., FDA for pharmaceuticals), and other complexities will encourage increased use of waste minimization measures. The types of waste minimization measures for which facilities request the extension will typically involve product redesign, process redesign, or input substitution. Most out-of-process waste minimization projects should take significantly less than three years from idea to implementation because most do not disturb product formulation or production schedules. Thus, off-site recycling options will not likely qualify for the extension (Tellus 1997).

Except for the most complex product or process redesign projects, four years should be sufficient time to identify opportunities, conduct bench scale laboratory research, obtain corporate

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[2] The waste minimization and waste management alternatives analysis for the full RIA will also evaluate generators that ship hazardous waste to off-site combustion facilities.

[3] This extension cannot be applied for unless the process changes and other measures cannot otherwise be installed within the three year compliance period.

approval, complete scale-up engineering, purchase or construct full-scale equipment, schedule downtime, and install. From a technical feasibility standpoint, a project should not take more than four years -- and should not need an extension -- unless unexpected technical difficulties or corporate policy decisions block the project (Tellus 1997).

An example from Polaroid, one of the more innovative companies in the P2 arena, is instructive. Polaroid implemented a broad, ambitious P2 program, but was disappointed with its early results in reducing the most hazardous chemicals. However, after three years, progress was made. James Ahearn, Senior Manager of Environmental Programs in the Research Divisions explains that reductions in chemical use are relatively slow because they require wholesale changes in the way products are manufactured or in the products themselves. According to Ahearn, "changes to the manufacturing process require two to three years, from concept to implementation."[4] Polaroid's experience suggests that four years should be sufficient time for most process and product redesign projects, even in an industry with complex, specialized products and high quality standards.

Economic Feasibility

Deferring the cost of making process changes or implementing other waste minimization measures for one year also makes these options more attractive from an economic standpoint. For waste minimization options that require capital equipment for process changes, deferring such purchases for one year will effectively change the net present value of the cost of this equipment, thus making in-process recycling and source reduction options more viable. In addition, postponing end-of-pipe APCD investments will also make implementing some waste minimization in combination with some end-of-pipe control more attractive. As long as the operating and maintenance (O&M) costs for the waste minimization option are less than the O&M costs associated with end-of-pipe control, facilities will pursue the waste minimization option, i.e., where:

$$C_{WM} < (1+r)\, C_{APCD} + OM_{APCD}$$

where:

C_{WM} = Cost of capital equipment associated with waste minimization option

C_{APCD} = Cost of end-of-pipe control technology

OM_{APCD} = Annual operating and maintenance costs associated with end-of-pipe control

r = facility's discount rate

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[4] Nash, Jennifer, Karen Nutt, James Maxwell, and John Ehrenfeld. "Polaroid's Environmental Accounting and Reporting System: Benefits and Limitations of a TQEM Measurement Tool." *Total Quality Environmental Management* 2(1):3-15, 1992.

Thus, if a facility is contemplating a waste minimization project that qualities for a compliance extension, the facility should include these implicit savings in its financial analysis of the project. The savings will improve the project's financial performance, and make the facility more likely to undertake it (Tellus 1997).

INTRODUCTION

As part of this rulemaking, EPA is introducing a streamlined procedure for modifying RCRA permits at hazardous waste combustion units. The rationale for a streamlined approach is to minimize the cost and delay for combustion facilities in requesting modifications to their RCRA permits. The approach enables facilities and states to engage in a more efficient permitting scheme than the existing RCRA one.

The purpose of this chapter is to consider the total savings or costs associated with the streamlined permitting approach. To accomplish this we assess the total costs to both facilities and states before and after implementation of the permit modification requirements. This discussion therefore includes two main sections. The first section examines the costs of the permit modification process to facilities and states under the baseline permitting scheme. The second section assesses the costs to facilities and states under the streamlined permitting approach. The costs and savings discussed in this chapter are one-time estimates unless otherwise indicated.

COSTS WITHOUT THE STREAMLINED PERMITTING APPROACH

If the MACT standards were promulgated without inclusion of revised permit modification procedures, combustion facilities and states would have to use the existing RCRA permitting structure. Therefore, to determine the savings associated with the streamlined permitting approach, we must first assess the costs to facilities and states associated with permit modification under the baseline permitting scheme.

Costs to Combustion Facilities

In trying to achieve compliance with the MACT standards, combustion facilities may have to make significant changes to their design or operations. Any such change to a RCRA facility must be reflected in a revised RCRA permit. As such, combustion facilities will incur costs through preparation of a permit modification request. There are three classes of RCRA permit modifications. Class 1 modification requests are relatively minor and encompass routine changes and correction of errors at a RCRA permitted facility. Class 2 modifications cover more complex changes such as moderate operational adjustments to account for changes in waste feed. Class 3 modifications involve substantial changes to facility operating conditions or waste management practices and are subject to approximately the same review and public participation procedures as initial permit applications.

Because of the likely complexity of operational and equipment changes, permit modifications resulting from the MACT standards would likely qualify as Class 2 or 3 modifications under the baseline permitting structure. Therefore, to determine the costs without the streamlined approach presented in the Combustion rule, it is necessary to assess the costs associated with Class 2 or 3 modifications to facilities and states.

The "ICR for Part B Applications" includes costs to complete and review permit modification requests (EPA 1996).[1] According to the ICR, the cost to a facility to prepare a Class 2 or 3 permit modification request is approximately $35,000.[2] Using this figure, we can calculate an estimate for what the national costs to combustion facilities would be if the streamlined permit modification were not in place. There are approximately 230 combustion systems in the U.S.; if all 230 combustion systems apply for a permit modification, the national costs to facilities to have their permits modified would be approximately $8.1 million.[3] This estimate does not include two variables that could affect national costs. First, not all facilities will have to modify their combustion process, and as such apply for a permit modification, in order to meet the MACT standards. Second, because they were not available for this analysis, costs associated with holding a public meeting to discuss permit modifications are not included. The net impact of these two uncertainties is difficult to predict because the first variable would lower the total estimate and the second would raise it.

Costs to States

States incur costs in the RCRA permit modification process through review of the modification request. Under the baseline permitting approach, states would review modification requests from combustion facilities as either Class 2 or Class 3 modifications.[4] According to the"ICR

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[1] Costs in the ICR are not specific to the permit modification requests that combustion facilities will need to make based on the MACT standards. However, they are a useful proxy for costs to combustion facilities.

[2] All of the costs in this report are one-time costs unless otherwise indicated.

[3] 230 combustion systems * $35,000/permit modification request = $8.1 million.

[4] Some states do not yet have the Class 1,2,3 permitting approach in place and use the minor-major permitting classification. Modifications to combustion facilities for the MACT standards that are considered Class 1 would be processed as minor modifications, and Class 2 or 3 modifications would be processed as major modifications.

for Part B Applications," the cost to a permitting agency to review each Class 2 or 3 modification for a combustion system is approximately $2,400. Based on conversations with state permitting officials, combustion facilities may have to request approximately five permit modifications in order to alter their operations to comply with the MACT standards. Based on these estimates, total review for a typical Class 2 or 3 permit modification request would therefore be approximately $12,000. However, discussions with state officials indicate that permit modification requests from combustion facilities attempting to comply with the MACT standards will be more complex then typical modifications. Therefore, we estimate that permit modification reviews will cost approximately $18,000, which is 50 percent more than a typical Class 2 or 3 review under the existing permitting scheme.[5] Assuming that all 230 combustion facilities submit the modification requests, the national cost estimates to states would be approximately $4.2 million.[6]

Exhibit 12

PERMIT MODIFICATION COSTS TO FACILITIES AND STATES UNDER BASELINE PERMITTING SCHEME

	Preparation of Class 2 or 3 permit modification	**Review of Class 2 or 3 permit modification**
Per Combustion Facility	$35,000	NA
Combustion Facilities: Subtotal	$8.1 million	NA
Per State	NA	$18,000
States: Subtotal	NA	$4.2 million
Total:	**$12.3 million**	

COSTS WITH THE STREAMLINED PERMITTING APPROACH

Under Part 1 of the MACT Standards, the EPA has streamlined the RCRA permit modification procedures for combustion facilities needing to comply with the standards. The agency has accomplished this by determining that changes that combustion facilities make to achieve compliance with the MACT standards can be classified as Class 1 modifications to their RCRA permits.[7] Accordingly, combustion facilities in states that adopt the streamlined approach will not

[5] The 50 percent increase is our best estimate based on discussions with state officials concerning the review of a combustion facility permit modification request.

[6] 230 facilities * $18,000/facility = $4.2 million.

[7] RCRA permit modification requirements for combustion facilities will also include prior approval and a time default for approval from the permitting agency.

have to undertake the more costly Class 2 or 3 modification procedures under the existing permit modification system. This section considers the savings that may accrue to facilities and states as a result of the streamlined permitting scheme.

Costs to Facilities

Preparing Class 1 RCRA permit modification requests is much less costly than Class 2 or 3 requests. According to "ICR for Part B Applications," the preparation of a Class 1 permit modification request is approximately $5,000.[8] Approximately half of the 38 states with combustion facilities are expected to adopt the streamlined permitting approach.[9] Therefore, approximately half of the 230 combustion facilities are expected to submit Class 1 permit modification requests and half are expected to submit Class 2 or 3 requests. The national cost for combustion facilities to submit permit modification requests to achieve compliance with the standards is therefore approximately $4.6 million.[10] As the permit modification costs to combustion facilities under the baseline scheme are approximately $8.1 million, the streamlined permitting approach results in a savings of approximately $3.5 million.

Exhibit 13

COMBUSTION FACILITY SAVINGS FROM THE STREAMLINED PERMITTING APPROACH

	Baseline Permitting Approach	**Streamlined Permitting Approach**		**National Facility Savings Due to the Streamlined Approach**
		Class 1	**Class 2 or 3**	
Per Combustion Facility	$35,000	$5,000	$35,000	
National Facility Costs	$8.1 million	$4.6 million		**$3.5 million**

[8] Five permit modification requests at a cost of $1,000 each.

[9] Personal conversation with Andy O'Palko, Permitting Coordinator for the MACT standards, EPA (May 15, 1997).

[10] Approximately 115 facilities * ($5,000/permit) = $575,000 for Class 1 modifications. Approximately 115 facilities * $35,000/permit = $4,025,000. The total cost is therefore $4.6 million.

Costs to States

This section considers the costs to the states of adopting and implementing the streamlined permitting option. To do this, states will have to:

- Conduct a rulemaking to incorporate the new permitting requirements into their regulations; and
- Seek EPA authorization for the streamlined program.
- Review permit modification requests from combustion facilities.

State Rulemaking

An "Information Collection Request (ICR) on State Program Authorization" conducted by EPA details the steps and associated costs of incorporating a program change into state regulation (EPA 1993). Exhibit 14 lists the major activities involved in modifying a states' regulations, and the hours and costs associated with these activities. As Exhibit 14 indicates, the average cost per state for RCRA program rulemaking is approximately $19,000.

Receiving EPA Authorization

After a program change undergoes state rulemaking, it must then be authorized by EPA. The state must submit several documents in applying for program modification authorization from EPA.[11] As reported in the ICR, the average cost for a state to apply for and receive EPA authorization to modify their existing program is approximately $9,000 (see Exhibit 15).

[11] The procedures for revision of State programs are delineated in 40 CFR Part 271.21.

Exhibit 14

STATE PROGRAM AUTHORIZATION: BASE PROGRAM DEVELOPMENT

	Average Hours per State			
	Managerial Hours	**Technical Hours**	**Clerical Hours**	**Average Total Cost per State**
INFORMATION COLLECTION ACTIVITY				
STATE PROGRAM AUTHORIZATION: BASE PROGRAM DEVELOPMENT				
Miscellaneous Program Elements				
Read the regulations	7.50	22.50	0.00	$886.43
Obtain a letter from the Governor	5.50	5.00	0.50	$337.59
Prepare copies of all applicable State				
statutes and regulations	2.50	6.00	27.50	$664.87
Revise submission, if it is				
materially changed	6.50	32.00	9.00	$1,250.54
Sub-total: Miscellaneous Program Elements	22.00	65.50	37.00	$3,139.42
Program Description				
Read the regulations	3.50	7.00	0.00	$316.30
Prepare a program description	40.00	162.50	25.00	$6,283.70
Sub-total: Program description	43.50	169.50	25.00	$6,600.00
Attorney General's Statement				
Read the regulations	3.50	14.50	0.00	$524.95
Prepare a statement by the State				
Attorney General	4.50	135.00	23.00	$4,255.84
Sub-total: Attorney General's Statement	8.00	149.50	23.00	$4,780.78
Memorandum of Agreement (MOA) with EPA				
Read the regulations	3.50	3.50	0.00	$218.93
Prepare a MOA between the State and EPA	40.00	80.00	23.00	$3,958.65
Sub-total: Memorandum of Agreement	43.50	83.50	23.00	$4,177.58
TOTAL	**117.00**	**468.00**	**108.00**	**$18,697.77**

Source: ICR on State Program Authorization (EPA, 1993)

Exhibit 15 STATE PROGRAM AUTHORIZATION: REVISION APPLICATIONS				
	Average Hours per State			Average Total Cost per State
	Managerial Hours	Technical Hours	Clerical Hours	
INFORMATION COLLECTION ACTIVITY				
STATE PROGRAM AUTHORIZATION: REVISION APPLICATIONS				
Read the regulations	2.00	4.00	0.00	$180.74
Notify EPA of any proposed modification	3.00	2.00	2.00	$189.73
Prepare and submit a copy of the program change				
and a schedule for approval	9.00	10.00	7.50	$702.90
Prepare and submit modified revisions				
of the program components	15.00	100.00	7.50	$3,415.08
Prepare a statement by the State Attorney General	11.50	40.00	9.00	$1,646.75
Prepare a revised MOA between the State and EPA	4.00	25.00	5.00	$909.17
Prepare and submit other documents as requested by EPA	10.00	20.00	5.00	$978.45
For an extension, demonstrate that the State has				
made a good faith effort to meet deadlines and				
that its legislative or rulemaking procedures				
render the State unable to do so	5.00	8.00	4.00	$456.01
For an additional extension, prepare and				
submit a proposed timetable for the requisite				
regulatory and/or statutory revisions	5.00	2.00	4.00	$289.09
Notify EPA of transfer of program, including				
submission of revised organizational charts	2.00	6.00	2.50	$273.76
TOTAL	**66.5**	**217**	**46**	**$9041.68**
Source: ICR on State Program Authorization (EPA, 1993)				

Summary of Rulemaking and Authorization Costs

Based on the figures in the ICRs, the total cost of modifying a RCRA program is approximately $28,000. Base program development accounts for approximately $19,000, or approximately two-thirds, while EPA authorization costs $9,000, or one-third the total.

To validate the ICR estimates, we contacted several states with RCRA authorized programs and discussed rulemaking and authorization costs. State representatives indicated that, while it is extremely difficult to estimate the costs of the rulemaking and authorization processes, they could provide rough estimates. The average of the figures we have received from states is close to the estimate based on the ICRs (See Exhibit 16). NYSDEC estimates that one full time equivalent (FTE) at a rate of $45,000 per year is necessary for rulemaking and authorization. Ohio provided an estimate of one-half of an FTE at a rate of $70,000 per year. Texas has a lower approximation of 800 hours at an average hourly rate of $35 per hour, for a total cost of $28,000. The average cost to a state for rulemaking and authorization based on these estimates is therefore approximately $36,000.[12] Each state indicates that the rulemaking process is approximately twice as costly as pursuing authorization, therefore we estimated $24,000 per state for state rulemaking and $12,000 per state for authorization.

It is important to note that states generally pursue rulemaking and authorization for RCRA rules as a 'package' or 'cluster'. Rather than a single modification, a cluster contains several rule changes in order to streamline the approval process. The costs in Exhibit 16 represent a cluster of rule changes and therefore are upper bound approximations for rulemaking and authorization.

Only those states that regulate combustion units and choose to adopt the streamlined modification system would have to undergo rulemaking and authorization for the streamlined permitting process. There are currently 38 states that have at least one MACT-regulated combustion unit. According to EPA estimates, approximately half of the states with MACT-regulated combustion units will not alter their current permitting system. The other half will continue to implement the baseline permitting scheme. Therefore, the estimated national costs for the rulemaking and authorization are expected to be at least $532,000 and unlikely to exceed approximately $685,000.[13]

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[12] ($45,000 + $35,000 + $28,000)/3 = $36,000.

[13] 38 states/2 = 19. 19 states * $36,000 per state = $685,000. Based on the ICR figures, the lower bound is approximately $532,000.

Exhibit 16

COST TO STATES FOR RULEMAKING AND EPA AUTHORIZATION

	ICR Estimate (average cost per state)	**IEc Estimate (average cost per state)**
State Rulemaking	$19,000	$24,000
Receiving EPA Authorization	$9,000	$12,000
Total per State	**$28,000**	**$36,000**
Total for 19 states	**$532,000**	**$685,000**

Processing Permit Modification Requests

The fast-track rulemaking states that modifications to RCRA permits allowing facilities to make changes to come into compliance with the MACT Standards will constitute Class 1 modifications with prior notification and a time default for approval. If a state does not review a permit modification within 90 days (with a possible 30 extra days) of submission, the permit receives automatic approval. Typically, Class 1 modification requests are relatively minor and encompass routine changes and correction of errors at a RCRA permitted facility. According to the "ICR for Part B Applications," the costs to review a Class 1 RCRA modification is $37 (EPA 1996). Because of the likely complexity of operational and equipment changes under the MACT Combustion rule, however, review of RCRA permit modifications for combustion facilities will probably be more expensive than for typical Class 1 modifications. Permitting agencies may need to review five significant changes: air pollution control device (APCD) configuration, trial burn data, temperature controls, VOC control systems, and monitoring plans. Therefore, we estimate that states may have to review five permit modification requests.

We received several estimates from state representatives with regard to the review of RCRA permit modifications for combustion units due to the MACT standards. Discussions with engineers in Ohio EPA's Division of Hazardous Waste Management suggest that review of each of the five types of combustion system modification (e.g., APCD configuration) request could cost $2,800.[14] Because we estimate the need for approximately five modifications, the total cost to review permit modification requests would therefore be approximately $14,000 per combustion facility. Engineers with the state of Louisiana provided slightly lower estimates for the review of permit modification requests from RCRA combustion facilities. They estimated a range of $9,000 to $15,000 per permit

[14] 80 hours of technical and administrative review at $35/hour.

review. Finally, Missouri estimated permit review costs at a range of $5,000 to $15,000. These state estimates indicate that the costs to review RCRA permit modification requests for a combustion facility are slightly less than a review of a Class 2 or 3 under the existing permitting scheme. Therefore, the lower bound for review of a combustion facility Class 1 permit modification request under the streamlined approach is approximately $200 and the upper bound is $15,000.[15] Exhibit 17 displays the cost estimates for permit review. For those states that use the streamlined permitting approach to review modification requests, the total cost will range from $25,000 to $1.7 million.[16] For those states that do not adopt the streamlined approach, the total cost would be approximately $2.1 million.[17] Therefore, the total review cost for permit modification requests from combustion

Exhibit 17
COSTS TO REVIEW PERMIT MODIFICATION REQUESTS

	Lower Bound	Upper Bound
Review cost per Class 1 Permit Modification Request	$200	$15,000
Subtotal: National Class 1 Modification Reviews	$25,000	$1.7 million
Review cost per Class 2 or 3 Permit Modification Request	$18,000	$18,000
Subtotal: National Class 2 or 3 Modification Reviews	$2.1 million	$2.1 million
Total: National Review Costs under Streamlined Permitting Approach	$2.1 million	$3.8 million
Total: National Review Costs under Existing Permitting Approach	$4.2 million	$4.2 million
National Review Savings	**$2.1 million**	**$0.4 million**

15 Approximately $40 per Class 1 permit modification review. $40/modification * 5 modifications = $200.

16 Half of the 38 states with combustion facilities will adopt the streamlined permitting approach. Therefore, approximately half of the 230 combustion facilities will submit Class 1 modification requests. 115 facilities * $200/facility = $25,000. 115 facilities * $15,000/facility = $1.7 million.

17 115 facilities x $18,000/facility = $2.1 million.

facilities will range from $2.1 to $3.8 million.[18] Because review costs under the existing permitting scheme are approximately $4.2 million, the national review savings are expected to range from $0.4 million to $2.1 million.

SUMMARY

The majority of the savings resulting from the streamlined permitting approach will accrue to combustion facilities, due to the fact that they will be able to submit a Class 1 permit modification request as opposed to a Class 2 or 3 modification request. States will generate modest savings as a result of decreased review costs; however, these savings will be partially offset by the rulemaking and authorization costs required to implement the streamlined permitting approach. Overall, the streamlined permitting approach will save combustion facilities approximately $3.5 million and states $0 million to $1.5 million. The total national savings as a result of the streamlined approach are therefore expected to range from $3 million to $5 million.

Exhibit 18
Total Economic Impact of the Streamlined Permitting Approach (in millions)

	Baseline Permitting Approach	**Streamlined Permitting Approach**
Total: Facility Permitting Costs	$8.1	$4.6
Total: Facility Savings With Streamlined Approach	$3.5	
Subtotal: State Rulemaking and Authorization Costs	$0	$0.5 to $0.7
Subtotal: State Permit Review Costs	$4.2	$2.1 to $3.8
Total: State Costs	$4.2	$2.6 to $4.2
Total: State Savings With Streamlined Approach	$0 to $1.5	
Total Costs of Permit Modifications	**$12.3**	**$6.8 to $9.1**
Total Savings due to Streamlined Approach	**$3 to $5**	

Note: States will not implement the streamlined approach if it is not cost-effective; therefore the upper bound of total costs to states under the streamlined approach does not exceed total costs under the existing permitting scheme.

[18] Because states may charge facilities for the cost of permit review, the lower bound estimate may be more accurate.

ECONOMIC IMPACT OF THE NOTIFICATION OF INTENT TO COMPLY REQUIREMENTS

Background

As part of the MACT standards, hazardous waste combustion facilities will have to submit a Notification of Intent to Comply (NIC) to their permitting agency.[1] The primary purpose of the NIC is to serve as a planning and outreach tool for achieving compliance with the standards. The NIC documents the anticipated changes in design or operation that a combustion facility may make in order to come into compliance with the MACT standards.[2] Specifically, the contents of the NIC include a description of waste minimization and emission control techniques being considered and their effectiveness, a description of the emission monitoring techniques being considered, and an outline of key dates for activities the source would need to accomplish in order to operate within the MACT standards.

Prior to submitting a final NIC to the permitting agency, hazardous waste combustion facilities are required to hold an informal meeting with the public to discuss their plans for achieving compliance with the MACT standards. Facilities will have to provide notice of this meeting through a newspaper advertisement, a visible and accessible sign at or near the site, a broadcast media announcement, and a letter to the facility's mailing list. In addition, the facility will have to post a sign-up sheet at the public meeting.

[1] The Notification of Intent to Comply requirements revise Subpart EEE (National Emission Standards for Hazardous Air Pollutants From Hazardous Waste Combustors) of Part 63 of the Clean Air Act.

[2] Sources must indicate in the NIC if they intend to comply with the MACT standards. If they do not intend to comply, they must stop burning hazardous waste within two years of the standards being promulgated.

With regard to timing, the NIC meeting must be held no later than 10 months following promulgation of the standards. The draft NIC must be made available at least 30 days prior to the meeting. The final NIC is due to the permitting agency within one year of promulgation of the final standards. The final NIC should be revised as necessary based on the discussions from the public meeting and final engineering decisions about the source's operation. In addition to the NIC, sources must submit a progress report that tracks their actions toward compliance with the standards. The progress report must be submitted to the permitting agency on or before two years after promulgation of the standards.

The NIC meeting can be combined with other public meetings that a combustion facility may have to conduct. For instance, if a facility is facing RCRA pre-application meetings for permit initiation or renewal, they can hold one meeting that would serve both the RCRA requirements and the Clean Air Act NIC requirements. The NIC requirements are not, however, tied to the Title V permitting process, due mainly to the fact that the timing of the Title V process may not be compatible with the NIC requirements.

Economic Impact of the NIC Requirements

We can assess the economic impact of the NIC requirements based on cost estimates developed as part of an Information Collection Request for the Fast-Track rulemaking. Exhibit 19 delineates the various tasks and costs associated with the NIC on a per facility and national basis. We have calculated lower and upper bound estimates. The lower bound assumes that combustion facilities will not have to modify their draft NIC based on the public meeting nor request extensions of compliance for control installation or waste minimization purposes. The upper bound assumes that combustion facilities will have to complete the entire NIC process, including requests for extensions. Both bounds represent one-time costs that will span two years. The lower bound cost for combustion facilities to complete the NIC process is approximately $30,000 and the upper bound is approximately $40,000. The major cost components faced by combustion facilities are preparation of the draft NIC (approximately $14,000), the public meeting (approximately $10,000) and submission of the progress report (approximately $5,000).

The national cost of the NIC process to facilities is derived by multiplying the facility costs by 173, which is the number of hazardous waste combustion facilities in the country. As the exhibit indicates, the national costs of the NIC to facilities is estimated to range from approximately $5 million to $7 million. Costs to states to review progress reports, final NICs, and extension requests are expected to be minimal, at approximately $1,000 per state (EPA 1997).

Exhibit 19

COSTS ASSOCIATED WITH THE NOTIFICATION OF INTENT TO COMPLY

Item	Cost (per facility)	
	Lower Bound	**Upper Bound**
Prepare the draft NIC	$14,365	$14,365
Provide public notice of the meeting through a newspaper announcement, a sign, a broadcast announcement, and a notice to the mailing list	$1,480	$1,480
Hold public meeting	$10,520	$10,520
Modify the draft NIC, based on public input, and submit it to the permitting agency	$0	$5,620
Prepare and submit the progress report	$5,050	$5,050
Prepare and submit the request for the one-year extension of compliance due to installation of controls	$0	$1,645
Prepare and submit the request for the one-year extension of compliance for waste minimization purposes	$0	$1,645
TOTAL COST PER FACILITY (over two years)	**$31,415**	**$40,325**
TOTAL NATIONAL COST (over two years)	**$5,435,000**	**$6,975,000**

Source: Information Collection Request for the Fast-Track rulemaking (U.S.EPA, December 1997).

NON-MONETARY EFFECTS ASSOCIATED WITH THE FAST-TRACK PROVISIONS

In addition to the cost savings discussed in other sections of this report, the fast-track items of the MACT Combustion Standards could yield certain non-monetary benefits. Impacts on human health risks and the environment also must be considered.

Non-Monetary Benefits

Non-monetary benefits may result from each of the three fast-track items discussed in this report:

- **Comparable Fuels Exclusion:** By excluding relatively clean wastes from the definition of a hazardous waste, EPA is reducing unnecessary regulatory burden and allowing agencies and facilities to focus their resources on higher permitting and regulatory priorities.[3]

- **Waste Minimization:** Allowing facilities to apply for an extra year to plan for waste minimization may further encourage pollution prevention and recycling instead of end-of-pipe treatment.

- **Permit Modification**: Changes to state RCRA programs and the review of RCRA permit modification requests are often lengthy procedures that demand effort from both industrial facilities and state agencies. Streamlining the permit modification process will likely shorten these processes: facilities will be able to comply with their RCRA permits and the Combustion MACT standards in a timely manner, and states should be able to expedite the authorization process necessary to review permit modification requests.

Increases in Risk to Human Health and the Environment

EPA does not believe that the fast-track items of the MACT standards will lead to significant increases in the risk to human health and the environment. It is possible, however, that the comparable fuel exclusion could lead to a slight increase in risk. The exclusion may create a market for the sale of relatively clean wastes as a substitute for fossil fuel in energy recovery processes. If such a market evolves, it is possible that generators will sell wastes that qualify for the comparable fuel exclusion rather than pursue waste minimization efforts. Under this scenario, handling and management of additional materials that, through waste minimization,

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[3] The comparable fuel exclusion does entail a degree of burden for facilities, including analytical testing and recordkeeping. However, EPA believes that these requirements may be less burdensome than those associated with handling and managing hazardous wastes.

might otherwise have been reduced in quantity could potentially pose some incremental risk to human health and the environment.[4] The exclusion might also lead to an increase in risk to human health and the environment because of increased combustion in non-RCRA regulated units. These units generally have less stringent pollution control measures in place than RCRA regulated units and therefore may be more likely to allow contaminated releases to the environment.[5] EPA, however, believes that, given the relatively low toxicity of materials qualifying for the comparable fuels exclusion, any change in risk is likely to be *de minimis*.

[4] As discussed in EPA's "Investigation of the Impact of the Comparable Fuels Exclusion on Recycling and Combustion," EPA does not believe that the exclusion will significantly affect waste minimization efforts. The effect, however, depends on factors such as the price of fossil fuels and the market value of comparable fuels.

[5] Wastes that qualify for the comparable fuel exclusion will not be considered hazardous, however, they may still contain components that could cause contamination if released to the environment.

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Appendix A

COMPARABLE FUEL TECHNICAL CRITERIA

§261.38 Comparable/Syngas Fuel Exclusion.--Wastes that meet the following comparable fuel requirements are not solid wastes:

(a) *Comparable fuel specifications*.-- (1) *Physical specifications*.--(i) *Heating value*. The heating value must exceed 5,000 BTU/lbs. (11,500 J/g). (ii) *Viscosity*. The viscosity must not exceed: 50 cSt as-fired.

(2) *Constituent specifications*. For compounds listed below, the specification levels and, where non-detect is the specification, minimum allowable detection limits are: [see Exhibit A-1].

Exhibit A-1

DETECTION AND DETECTION LIMIT VALUES FOR COMPARABLE FUEL SPECIFICATION

Chemical Name	CAS Number	Concentration Limit (mg/kg at 10,000 BTU/lb)	Minimum Allowable Detection Limit (mg/kg)
Total Nitrogen as N	na	4300	-
Total Halogens as Cl	na	520	-
Total Organic Halogens as Cl	na	25 or individual halogenated organics listed below	-
Polychlorinated biphenyls, total [Arocolors, total][a]	1336-36-3	non-detect	1.4
Cyanide, total	57-12-5	non-detect	1.0
Metals			
Antimony, total	7440-36-0	7.9	-
Arsenic, total	7440-38-2	0.23	-
Barium, total	7440-39-3	23	-
Beryllium, total	7440-41-7	1.2	-
Cadmium, total	7440-43-9	1.2	-
Chromium, total	7440-47-3	2.3	-
Cobalt	7440-48-4	4.6	-
Lead, total	7439-92-1	31	-
Manganese	7439-96-5	1.2	-
Mercury, total	7439-97-6	0.24	-
Nickel, total	7440-02-0	49	-
Selenium, total	7782-49-2	0.14	-
Silver, total	7440-22-4	2.3	-
Thallium, total	7440-28-0	23	-
Hydrocarbons			
Benzo[a]anthracene	56-55-3	1100	-

Exhibit A-1

DETECTION AND DETECTION LIMIT VALUES FOR COMPARABLE FUEL SPECIFICATION

Chemical Name	CAS Number	Concentration Limit (mg/kg at 10,000 BTU/lb)	Minimum Allowable Detection Limit (mg/kg)
Benzene	71-43-2	3900	-
Benzo[b]fluoranthene	205-99-2	960	-
Benzo[k]fluoranthene	207-08-9	1900	-
Benzo[a]pyrene	50-32-8	960	-
Chrysene	218-01-9	1400	-
Dibenzo[a,h]anthracene	53-70-3	960	-
7,12-Dimethylbenz[a]anthracene	57-97-6	1900	-
Fluoranthene	206-44-0	1900	-
Indeno(1,2,3-cd)pyrene	193-39-5	960	-
3-Methylcholanthrene	56-49-5	1900	-
Naphthalene	91-20-3	3000	-
Toluene	108-88-3	35000	-
Oxygenates			
Acetophenone	98-86-2	1900	-
Acrolein	107-02-8	37	-
Allyl alcohol	107-18-6	30	-
Bis(2-ethylhexyl)phthalate [Di-2-ethylhexyl phthalate]	117-81-7	1900	-
Butyl benzyl phthalate	85-68-7	1900	-
o-Cresol [2-Methyl phenol]	95-48-7	220	-
m-Cresol [3-Methyl phenol]	108-39-4	220	-
p-Cresol [4-Methyl phenol]	106-44-5	220	-
Di-n-butyl phthalate	84-74-2	1900	-
Diethyl phthalate	84-66-2	1900	-
2,4-Dimethylphenol	105-67-9	1900	-
Dimethyl phthalate	131-11-3	1900	-
Di-n-octyl phthalate	117-84-0	960	-
Endothal	145-73-3	100	-
Ethyl methacrylate	97-63-2	37	-
2-Ethoxyethanol [Ethylene glycol monoethyl ether]	110-80-5	100	-
Isobutyl alcohol	78-83-1	37	-
Isosafrole	120-58-1	1900	-
Methyl ethyl ketone [2-Butanone]	78-93-3	37	-
Methyl methacrylate	80-62-6	37	-
1,4-Naphthoquinone	130-15-4	1900	-
Phenol	108-95-2	1900	-

Exhibit A-1 DETECTION AND DETECTION LIMIT VALUES FOR COMPARABLE FUEL SPECIFICATION			
Chemical Name	**CAS Number**	**Concentration Limit (mg/kg at 10,000 BTU/lb)**	**Minimum Allowable Detection Limit (mg/kg)**
Propargyl alcohol [2-Propyn-1-01]	107-19-7	30	-
Safrole	94-59-7	1900	-
Sulfonated Organics			
Carbon disulfide	75-15-0	non-detect	37
Disulfoton	298-04-4	non-detect	1900
Ethyl methanesulfonate	62-50-0	non-detect	1900
Methyl methanesulfonate	66-27-3	non-detect	1900
Phorate	298-02-2	non-detect	1900
1,3-Propane sultone	1120-71-4	non-detect	100
Tetraethyldithiopyrophosphate [Sulfotepp]	3689-24-5	non-detect	1900
Thiophenol [Benzenethiol]	108-98-5	non-detect	30
O,O,O-Triethyl phosphorothioate	126-68-1	non-detect	1900
Nitrogenated Organics			
Acetonitrile [Methyl cyanide]	75-05-8	non-detect	37
2-Acetylaminofluorene [2-AAF]	53-96-3	non-detect	1900
Acrylonitrile	107-13-1	non-detect	37
4-Aminobiphenyl	92-67-1	non-detect	1900
4-Aminopyrridine	504-24-5	non-detect	100
Aniline	62-53-3	non-detect	1900
Benzidine	92-87-5	non-detect	1900
Dibenz[a,j]acridine	224-42-0	non-detect	1900
O,O-Diethyl O-pyrazinyl phophoro- thioate [Thionazin]	297-97-2	non-detect	1900
Dimethoate	60-51-5	non-detect	1900
p-(Dimethylamino)azobenzene [4-Dimethylaminoazobenzene]	60-11-7	non-detect	1900
3,3'-Dimethylbenzidine	119-93-7	non-detect	1900
α,α-Dimethylphenethylamine	122-09-8	non-detect	1900
3,3'-Dimethoxybenzidine	119-90-4	non-detect	100
1,3-Dinitrobenzene [m-Dinitrobenzene]	99-65-0	non-detect	1900
4,6-Dinitro-o-cresol	534-52-1	non-detect	1900
2,4-Dinitrophenol	51-28-5	non-detect	1900
2,4-Dinitrotoluene	121-14-2	non-detect	1900
2,6-Dinitrotoluene	606-20-2	non-detect	1900
Dinoseb [2-sec-Butyl-4,6-dinitrophenol]	88-85-7	non-detect	1900

Exhibit A-1

DETECTION AND DETECTION LIMIT VALUES FOR COMPARABLE FUEL SPECIFICATION

Chemical Name	CAS Number	Concentration Limit (mg/kg at 10,000 BTU/lb)	Minimum Allowable Detection Limit (mg/kg)
Diphenylamine	122-39-4	non-detect	1900
Ethyl carbamate [Urethane]	51-79-6	non-detect	100
Ethylenethiourea (2- Imidazolidinethione)	96-45-7	non-detect	110
Famphur	52-85-7	non-detect	1900
Methacrylonitrile	126-98-7	non-detect	37
Methapyrilene	91-80-5	non-detect	1900
Methomyl	16752-77-5	non-detect	57
2-Methyllactonitrile [Acetone cyanohydrin]	75-86-5	non-detect	100
Methyl parathion	298-00-0	non-detect	1900
MNNG (N-Metyl-N-nitroso-N'-nitroguanidine)	70-25-7	non-detect	110
1-Naphthylamine, [α-Naphthylamine]	134-32-7	non-detect	1900
2-Naphthylamine, [β-Naphthylamine]	91-59-8	non-detect	1900
Nicotine	54-11-5	non-detect	100
4-Nitroaniline, [p-Nitroaniline]	100-01-6	non-detect	1900
Nitrobenzene	98-95-3	non-detect	1900
p-Nitrophenol, [p-Nitrophenol]	100-02-7	non-detect	1900
5-Nitro-o-toluidine	99-55-8	non-detect	1900
N-Nitrosodi-n-butylamine	924-16-3	non-detect	1900
N-Nitrosodiethylamine	55-18-5	non-detect	1900
N-Nitrosodiphenylamine, [Diphenylnitrosamine]	86-30-6	non-detect	1900
N-Nitroso-N-methylethylamine	10595-95-6	non-detect	1900
N-Nitrosomorpholine	59-89-2	non-detect	1900
N-Nitrosopiperidine	100-75-4	non-detect	1900
N-Nitrosopyrrolidine	930-55-2	non-detect	1900
2-Nitropropane	79-46-9	non-detect	30
Parathion	56-38-2	non-detect	1900
Phenacetin	62-44-2	non-detect	1900
1,4-Phenylene diamine, [p-Phenylenediamine]	106-50-3	non-detect	1900
N-Phenylthiourea	103-85-5	non-detect	57
2-Picoline [alpha-Picoline]	109-06-8	non-detect	1900
Propythioracil [6-Propyl-2-thiouracil]	51-52-5	non-detect	100
Pyridine	110-86-1	non-detect	1900

Exhibit A-1

DETECTION AND DETECTION LIMIT VALUES FOR COMPARABLE FUEL SPECIFICATION

Chemical Name	CAS Number	Concentration Limit (mg/kg at 10,000 BTU/lb)	Minimum Allowable Detection Limit (mg/kg)
Strychnine	57-24-9	non-detect	100
Thioacetamide	62-55-5	non-detect	57
Thiofanox	39196-18-4	non-detect	100
Thiourea	62-56-6	non-detect	57
Toluene-2,4-diamine [2,4-Diaminotolune]	95-80-7	non-detect	57
Toluene-2,6-diamine [2,6-Diaminotolune]	823-40-5	non-detect	57
o-Toluidine	95-53-4	non-detect	2200
p-Toluidine	106-49-0	non-detect	100
1,3,5-Trinitrobenzene, [sym-Trinitobenzene]	99-35-4	non-detect	2000
Halogenated Organics			
Allyl chloride	107-05-1	non-detect	37
Aramite	140-57-8	non-detect	1900
Benzal chloride [Dichloromethyl benzene]	98-87-3	non-detect	100
Benzyl chloride	100-44-77	non-detect	100
Bis(2-chloroethyl)ether [Dicholoroethyl ether]	111-44-4	non-detect	1900
Bromoform [Tribromomethane]	75-25-2	non-detect	37
Bromomethane [Methyl bromide]	74-83-9	non-detect	37
4-Bromophenyl phenyl ether [p-Bromo diphenyl ether]	101-55-3	non-detect	1900
Carbon tetrachloride	56-23-5	non-detect	37
Chlordane	57-74-9	non-detect	14
p-Chloroaniline	106-47-8	non-detect	1900
Chlorobenzene	108-90-7	non-detect	37
Chlorobenzilate	510-15-6	non-detect	1900
p-Chloro-m-cresol	59-50-7	non-detect	1900
2-Chloroethyl vinyl ether	110-75-8	non-detect	37
Chloroform	67-66-3	non-detect	37
Chloromethane [Methyl chloride]	74-87-3	non-detect	37
2-Chloronaphthalene [beta-Chloronaphthalene]	91-58-7	non-detect	1900
2-Chlorophenol [o-Chlorophenol]	95-57-8	non-detect	1900
Chloroprene [2-Chloro-1,3-butadiene]	1126-99-8	non-detect	37
2,4-D [2,4-Dichlorophenoxyacetic acid]	94-75-7	non-detect	7.0
Diallate	2303-16-4	non-detect	1900

Exhibit A-1

DETECTION AND DETECTION LIMIT VALUES FOR COMPARABLE FUEL SPECIFICATION

Chemical Name	CAS Number	Concentration Limit (mg/kg at 10,000 BTU/lb)	Minimum Allowable Detection Limit (mg/kg)
1,2-Dibromo-3-chloropropane	96-12-8	non-detect	37
1,2-Dichlorobenzene [o-Dichlorobenzene]	95-50-1	non-detect	1900
1,3-Dichlorobenzene [m-Dichlorobenzene]	541-73-1	non-detect	1900
1,4-Dichlorobenzene [p-Dichlorobenzene]	106-46-7	non-detect	1900
3,3'-Dichlorobenzidine	91-94-1	non-detect	1900
Dichlorodifluoromethane [CFC-12]	75-71-8	non-detect	37
1,2-Dichloroethane [Ethylene dichloride]	107-06-2	non-detect	37
1,1-Dichloroethylene [Vinylidene chloride]	75-35-4	non-detect	37
Dichloromethoxy ethane [Bis(2-chloroethoxy)methane	111-91-1	non-detect	1900
2,4-Dichlorophenol	120-83-2	non-detect	1900
2,6-Dichlorophenol	87-65-0	non-detect	1900
1,2-Dichloropropane [Propylene dichloride]	78-87-5	non-detect	37
cis-1,3-Dichloropropylene	10061-01-5	non-detect	37
trans-1,3-Dichloropropylene	10061-02-6	non-detect	37
1,3-Dichloro-2-propanol	96-23-1	non-detect	30
Endosulfan I	959-98-8	non-detect	1.4
Endosulfan II	33213-65-9	non-detect	1.4
Endrin	72-20-8	non-detect	1.4
Endrin aldehyde	7421-93-4	non-detect	1.4
Endrin Ketone	53494-70-5	non-detect	1.4
Epichlorohydrin [1-Chloro-2,3-epoxy propane]	106-89-8	non-detect	30
Ethylidene dichloride [1,1-Dichloroethane]	75-34-3	non-detect	37
2-Fluoroacetamide	640-19-7	non-detect	100
Heptachlor	76-44-8	non-detect	1.4
Heptachlor epoxide	1024-57-3	non-detect	2.8
Hexachlorobenzene	118-74-1	non-detect	1900
Hexachloro-1,3-butadiene [Hexachlorobutadiene]	87-68-3	non-detect	1900
Hexachlorocyclopentadiene	77-47-4	non-detect	1900
Hexachloroethane	67-72-1	non-detect	1900

Exhibit A-1

DETECTION AND DETECTION LIMIT VALUES FOR COMPARABLE FUEL SPECIFICATION

Chemical Name	CAS Number	Concentration Limit (mg/kg at 10,000 BTU/lb)	Minimum Allowable Detection Limit (mg/kg)
Hexachlorophene	70-30-4	non-detect	46000
Hexachloropropene [Hexachloropropylene]	1888-71-7	non-detect	1900
Isodrin	465-73-6	non-detect	1900
Kepone [Chlordecone]	143-50-0	non-detect	3600
Lindane [gamma-Hexachlorocyclohexane] [gamma-BHC]	58-89-9	non-detect	1.4
Methylene chloride [Dichloromethane]	75-09-2	non-detect	37
4,4'-methylene-bis(2-chloroaniline)	101-14-4	non-detect	100
Methyl iodide [Iodomethane]	74-88-4	non-detect	37
Pentachlorobenzene	608-93-5	non-detect	1900
Pentachloroethane	76-01-7	non-detect	37
Pentachloronitrobenzene [PCNB] [Quintobenzene] [Quintozene]	82-68-8	non-detect	1900
Pentachlorophenol	87-86-5	non-detect	1900
Pronamide	23950-58-5	non-detect	1900
Silvex [2,4,5-Trichlorophenoxypropionic acid]	93-72-1	non-detect	7.0
2,3,7,8-Tetrachlorodibenzo-p-dioxin [2,3,7,8-TCDD]	1746-01-6	non-detect	30
1,2,4,5-Tetrachlorobenzene	95-94-3	non-detect	1900
1,1,2,2-Tetrachloroethane	79-34-5	non-detect	37
Tetrachloroethylene [Perchloroethylene]	127-18-4	non-detect	37
2,3,4,6-Tetrachlorophenol	58-90-2	non-detect	1900
1,2,4-Trichlorobenzene	120-82-1	non-detect	1900
1,1,1-Trichloroethane [Methyl chloroform]	71-55-6	non-detect	37
1,1,2-Trichloroethane [Vinyl trichloride]	79-00-5	non-detect	37
Trichloroethylene	79-01-6	non-detect	37
Trichlorofluoromethane [Trichlormonofluoromethane]	75-69-4	non-detect	37
2,4,5-Trichlorophenol	95-95-4	non-detect	1900
2,4,6-Trichlorophenol	88-06-2	non-detect	1900
1,2,3-Trichloropropane	96-18-4	non-detect	37
Vinyl Chloride	75-01-4	non-detect	37

Appendix B

COMBUSTED WASTES IN THE NATIONAL HAZARDOUS WASTE CONSTITUENT SURVEY (NHWCS) MEETING THE COMPARABLE FUELS CRITERIA

Appendix B-1

WASTES IN NHWCS THAT MEET THE COMBUSTION SCREEN

Combustion Method	System Type	Form Code	Quantity Waste Managed (by System Type, in tons)	Percent Waste Managed (by System Type)
On-Site Incineration	M041: Incineration - liquids	B100s: Inorganic Liquids	590,548	68%
		B200s: Organic Liquids	248,516	28%
		B300s: Inorganic Solids	0	0%
		B400s: Organic Solids	0	0%
		B500s: Inorganic Sludges	714	<1%
		B600s: Organic Sludges	32,994	4%
		Subtotal*	872,772	100%
	M042: Incineration - sludges	B100s: Inorganic Liquids	0	0%
		B200s: Organic Liquids	0	0%
		B300s: Inorganic Solids	0	0%
		B400s: Organic Solids	1,125	2%
		B500s: Inorganic Sludges	19,079	34%
		B600s: Organic Sludges	36,608	64%
		Subtotal	56,812	100%
	M043: Incineration - solids	B100s: Inorganic Liquids	0	0%
		B200s: Organic Liquids	0	0%
		B300s: Inorganic Solids	6,237	38%

* The subtotal does not always sum due to unknown form codes.

Appendix B-1 (continued)

WASTES IN NHWCS THAT MEET THE COMBUSTION SCREEN

Combustion Method	System Type	Form Code	Quantity Waste Managed (by System Type, in tons)	Percent Waste Managed (by System Type)
On-Site Incineration (continued)	M043: Incineration - solids (continued)	B400s: Organic Solids	10,366	62%
		B500s: Inorganic Sludges	0	0%
		B600s: Organic Sludges	0	0%
		Subtotal	16,603	100%
	M044: Incineration - gases	**Subtotal**	17,199	100%
	M049: Incineration - type unknown	B100s: Inorganic Liquids	0	0%
		B200s: Organic Liquids	0	0%
		B300s: Inorganic Solids	0	0%
		B400s: Organic Solids	0	0%
		B500s: Inorganic Sludges	148,355	100%
		B600s: Organic Sludges	0	0%
		Subtotal	148,355	100%
	Total: On-Site Incineration		1,111,741	
Commercial Incineration	M041: Incineration - liquids	B100s: Inorganic Liquids	8,452	17%
		B200s: Organic Liquids	40,956	80%
		B300s: Inorganic Solids	0	0%
		B400s: Organic Solids	0	0%
		B500s: Inorganic Solids	0	0%

Appendix B-1 (continued)

WASTES IN NHWCS THAT MEET THE COMBUSTION SCREEN

Combustion Method	System Type	Form Code	Quantity Waste managed (by System Type, in tons)	Percent Waste Managed (by System Type)
Commercial Incineration (continued)	M041: Incineration - liquids (continued)	B600s: Organic Sludges	1,607	3%
		Subtotal	51,015	100%
	M042: Incineration - sludges	B100s: Inorganic Liquids	0	0%
		B200s: Organic Liquids	0	0%
		B300s: Inorganic Solids	0	0%
		B400s: Organic Solids	0	0%
		B500s: Inorganic Sludges	24	<1%
		B600s: Organic Sludges	11,175	>99%
		Subtotal	11,199	100%
	M043: Incineration - solids	B100s: Inorganic Liquids	0	100%
		B200s: Organic Liquids	3,953	17%
		B300s: Inorganic Solids	12,590	53%
		B400s: Organic Solids	6,704	28%
		B500s: Inorganic Sludges	0	0%
		B600s: Organic Sludges	531	2%
		Subtotal	23,778	100%
	M049: Incineration - type unknown	B100s: Inorganic Liquids	0	0%

Appendix B-1 (continued)

WASTES IN NHWCS THAT MEET THE COMBUSTION SCREEN

Combustion Method	System Type	Form Code	Quantity Waste Managed (by System Type, in tons)	Percent Waste Managed (by System Type)
Commercial Incineration (continued)	M049: Incineration - type unknown (continued)	B200s: Organic Liquids	0	0%
		B300s: Inorganic Solids	0	0%
		B400s: Orgnanic Solids	0	0%
		B500s: Inorganic Sludges	0	0%
		B600s: Organic Sludges	0	0%
		Subtotal	0	100%
	Total: Commercial Incineration		85,992	
Energy Recovery (Kilns)	M051: Energy Recovery - liquids	B100s: Inorganic Liquids	0	0%
		B200s: Organic Liquids	593,015	>99%
		B300s: Inorganic Solids	0	0%
		B400s: Organic Solids	0	0%
		B500s: Inorganic Sludges	0	0%
		B600s: Organic Sludges	2,460	<1%
		Subtotal	595,475	100%
	M052: Energy Recovery - sludges	B100s: Inorganic Liquids	0	0%
		B200s: Organic Liquids	0	0%
		B300s: Inorganic Solids	0	0%

Appendix B-1 (continued)

WASTES IN NHWCS THAT MEET THE COMBUSTION SCREEN

Combustion Method	System Type	Form Code	Quantity Waste Managed (by System Type, in tons)	Percent Waste Managed (by System Type)
Energy Recovery (Kilns) (continued)	M052: Energy Recovery - sludges (continued)	B400s: Organic Solids	0	0%
		B500s: Inorganic Sludges	0	0%
		B600s: Organic sludges	4,519	100%
		Subtotal	4,519	100%
	M053: Energy Recovery - solids	B100s: Inorganic Liquids	0	0%
		B200s: Organic Liquids	1,506	2%
		B300s: Inorganic Solids	19,867	28%
		B400s: Organic Solids	49,197	68%
		B500s: Inorganic Sludges	0	0%
		B600s: Organic Sludges	1,506	2%
		Subtotal	72,076	100%
	M059: Energy Recovery - type unknown	B100s: Inorganic Liquids	0	0%
		B200s: Organic Liquids	0	0%
		B300s: Inorganic Solids	0	0%
		B400s: Organic Solids	0	0%
		B500s: Inorganic Sludges	0	0%

Appendix B-1 (continued)

WASTES IN NHWCS THAT MEET THE COMBUSTION SCREEN

Combustion Method	System Type	Form Code	Quantity Waste Managed (by System Type, in tons)	Percent Waste Managed (by System Type)
Energy Recovery (Kilns) (continued)	M059: Energy Recovery - type unknown (continued)	B600s: Organic Sludges	0	0%
		Subtotal	0	0%
	Total:Energy Recovery		672,070	
On-site Boilers and Industrial Furnaces (BIFs)	M051: Energy Recovery - Liquids	B100s: Inorganic Liquids	0	0%
		B200s: Organic Liquids	418,813	75%
		B300s: Inorganic Solids	0	0%
		B400s: Organic Solids	7,043	1%
		B500s: Inorganic Sludges	0	0%
		B600s: Organic Sludges	129,248	23%
		Subtotal	555,104	100%
	M052: Energy Recovery - Sludges	B100s: Inorganic Liquids	0	0%
		B200s: Organic Liquids	0	0%
		B300s: Inorganic Solids	0	0%
		B400s: Organic Solids	0	0%
		B500s: Inorganic Sludges	0	0%
		B600s: Organic Sludges	0	0%
		Subtotal	0	0%
	M053: Energy Recovery - Solids	B100s: Inorganic Liquids	0	0%

Appendix B-1 (continued)

WASTES IN NHWCS THAT MEET THE COMBUSTION SCREEN

Combustion Method	System Type	Form Code	Quantity Waste Managed (by System Type, in tons)	Percent Waste Managed (by System Type)
On-Site BIFs (continued)	M053: Energy Recovery - Solids (continued)	B200s: Organic Liquids	0	0%
		B300s: Inorganic Solids	0	0%
		B400s: Organic Solids	0	0%
		B500s: Inorganic Sludges	0	0%
		B600s: Inorganic Sludges	0	0%
		Subtotal	0	0%
	M059: Energy Recovery - type unknown	B100s: Inorganic Liquids	0	0%
		B200s: Organic Liquids	0	0%
		B300s: Inorganic Solids	0	0%
		B400s: Organic Solids	0	0%
		B500s: Inorganic Sludges	0	0%
		B600s: Organic Sludges	0	0%
		Subtotal	0	0%
Total: On-site BIFs			555,104	N/A
Total: All Management Methods			2,424,907	N/A
Note: Quantities are high-end, unscaled NHWCS totals.				

Appendix B-2

WASTES IN NHWCS THAT MEET THE VISCOSITY SCREEN (AND COMBUSTION SCREEN)

Combustion Method	Form Code	Quantity Waste Managed (by Combustion Method, in tons)	Percent Waste Managed (by Combustion Method)	Percent Reduction from Combustion to Viscosity Screen
On-Site Incineration	B100s: Inorganic Liquids	590,548	70%	0%
	B200s: Organic Liquids	248,516	30%	0%
	B201: Concentrated solvent-water solution	7,820	1%	N/A*
	B202: Halogenated (e.g. chlorinated) solvent	20,199	2%	N/A
	B203: Nonhalogenated solvent	29,901	4%	N/A
	B204: Halogenated/nonhalo-genated solvent mixture	65,740	8%	N/A
	B207: Concentrated aqueous solution of other organics	20,847	2%	N/A
	B211: Paint thinner or petroleum distillates	0	0%	N/A
	B219: Other organic liquids	86,297	10%	N/A
	Other B200s	17,712	2%	N/A
	B300s: Inorganic Solids	0	0%	100%
	B400s: Organic Solids	0	0%	100%
	B500s: Inorganic Sludges	0	0%	100%

* Combustion screen (Exhibit 2) covered B200s, not B200 subdivisions (e.g., B201, B202).

Appendix B-2 (continued)

WASTES IN NHWCS THAT MEET THE VISCOSITY SCREEN (AND COMBUSTION SCREEN)

Combustion Method	Form Code	Quantity Waste Managed (by Combustion Method, in tons)	Percent Waste Managed (by Combustion Method)	Percent Reduction from Combustion to Viscosity Screen
On-Site Incineration (continued)	B600s: Organic Sludges	0	0%	100%
	Subtotal	839,064	100%	25%
Commercial Incineration	100s: Inorganic Liquids	8,452	16%	0%
	B200s: Organic Liquids	44,909	84%	0%
	B201: Concentrated solvent-water solution	9,809	18%	N/A
	B202: Halogenated (e.g. chlorinated) solvent	636	1%	N/A
	B203: Nonhalogenated solvent	8,477	16%	N/A
	B204: Halogenated/nonhalogen-ated solvent mixture	19,364	36%	N/A
	B207: Concentrated aqueous solution of other organics	1,462	3%	N/A
	B211: Paint thinner or petroleum distillates	0	0%	N/A
	B219: Other organic liquids	2,138	4%	N/A
	Other B200s	3,025	6%	N/A
	B300s: Inorganic Solids	0	0%	100%
	B400s: Organic Solids	0	0%	100%
	B500s: Inorganic Sludges	0	0%	100%
	B600s: Organic Sludges	0	0%	100%
	Subtotal	53,361	100%	38%

Appendix B-2 (continued)

WASTES IN NHWCS THAT MEET THE VISCOSITY SCREEN (AND COMBUSTION SCREEN)

Combustion Method	Form Code	Quantity Waste Managed (by Combustion Method, in tons)	Percent Waste Managed (by Combustion Method)	Percent Reduction from Combustion to Viscosity Screen
Energy Recovery (Kilns)	100s: Inorganic Liquids	0	0%	0%
	B200s: Organic Liquids	594,521	100%	0%
	B201: Concentrated solvent-water solution	0	0%	N/A
	B202: Halogenated (e.g. chlorinated) solvent	4,985	1%	N/A
	B203: Nonhalogenated solvent	22,360	4%	N/A
	B204: Halogenated / nonhalogenated solvent mixture	387,873	65%	N/A
	B207: Concentrated aqueous solution of other organics	31,596	5%	N/A
	B211: Paint thinner or petroleum distillates	11,003	2%	N/A
	B219: Other organic liquids	120,270	20%	N/A
	Other B200s	16,434	3%	N/A

Appendix B-2 (continued)

WASTES IN NHWCS THAT MEET THE VISCOSITY SCREEN (AND COMBUSTION SCREEN)

Combustion Method	Form Code	Quantity Waste Managed (by Combustion Method, in tons)	Percent Waste Managed (by Combustion Method)	Percent Reduction from Combustion to Viscosity Screen
Energy Recovery (continued)	B300s: Inorganic Solids	0	0%	100%
	B400s: Organic Solids	0	0%	100%
	B500s: Inorganic Sludges	0	0%	100%
	B600s: Organic Sludges	0	0%	100%
	Subtotal	594,521	100%	12%
On-Site BIFs	B100s: Inorganic Liquids	0	0%	0%
	B200s: Organic Liquids	418,813	100%	0%
	B201: Concentrated solvent-water solution	-2	0%	N/A
	B202: Halogenated (e.g. chlorinated) solvent	0	0%	N/A
	B203: Nonhalogenated solvent	19,880	5%	N/A
	B204: Halogenated / nonhalogenated solvent mixture	3,980	1%	N/A
	B207: Concentrated aqueous solution of other organics	53,380	13%	N/A
	B211: Paint thinner or petroleum distillates	4,632	<1%	N/A

Appendix B-2 (continued)

WASTES IN NHWCS THAT MEET THE VISCOSITY SCREEN (AND COMBUSTION SCREEN)

Combustion Method	Form Code	Quantity Waste Managed (by Combustion Method, in tons)	Percent Waste Managed (by Combustion Method)	Percent Reduction from Combustion to Viscosity Screen
On-Site BIFs (continued)	B219: Other organic liquids	285,438	68%	N/A
	Other B200s	52,958	13%	N/A
	B300s: Inorganic Solids	0	0%	100%
	B400s: Organic Solids	0	0%	100%
	B500s: Inorganic Sludges	0	0%	100%
	B600s: Organic Sludges	0	0%	100%
	Subtotal	418,813	100%	25%
Total: All Combustion Methods		1,905,759		21%

Note: Quantities are high-end, unscaled NHWCS totals.

Appendix B-3

WASTES IN NHWCS THAT MEET THE HEATING VALUE SCREEN (AND VISCOSITY AND COMBUSTION SCREENS)

Combustion Method	Form Code	Quantity Waste Managed (by Combustion Method, in tons)	Percent Waste Managed (by Combustion Method)	Percent Reduction from Viscosity to Heating Value Screen	Average Heating Value (for streams above 5,000 Btu/lb)
On-Site Incineration	100s: Inorganic Liquids	264,138	54%	55%	--
	B200s: Organic Liquids	221,161	46%	11%	10,801
	B201:Concentrated solvent-water solution	7,820	2%	0%	9,243
	B202: Halogenated (e.g. chlorinated) solvent	19,511	1%	3%	--
	B203: Nonhalogenated solvent	29,901	4%	0%	12,757
	B204: Halogenated/ nonhalogenated solvent mixture	50,528	10%	23%	10,218
	B207: Concentrated aqueous solution of other organics	12,688	3%	39%	10,519
	B211: Paint thinner or petroleum distillates	0	0%	0%	N/A
	B219: Other organic liquids	83,001	17%	4%	9,922
	Other B200s	17,712	4%	0%	11,451
	Subtotal	485,299	100%	42%	10,801

Appendix B-3 (continued)

WASTES IN NHWCS THAT MEET THE HEATING VALUE SCREEN (AND VISCOSITY AND COMBUSTION SCREENS)

Combustion Method	Form Code	Quantity Waste Managed (by Combustion Method, in tons)	Percent Waste Managed (by Combustion Method)	Percent Reduction from Viscosity to Heating Value Screen	Average Heating Value (for streams above 5,000 Btu/lb)
Commercial Incineration	100s: Inorganic Liquids	132	<1%	98%	12,000
	B200s: Organic Liquids	42,936	>99%	4%	11,376
	B201: Concentrated solvent-water solution	8,767	20%	11%	10,689
	B202: Halogenated (e.g., chlorinated) solvent	636	1%	0%	10,000
	B203: Nonhalo-genated solvent	8,477	20%	0%	12,197
	B204: Halogenated/nonhalogenated solvent mixture	19,364	45%	0%	10,634
	B207: Concentrated aqueous solution of other organics	551	1%	62%	7,900
	B211: Paint thinner or petroleum distillates	0	0%	0%	N/A
	B219: Other organic liquids	2,138	5%	0%	12,014
	Other B200s	3,004	7%	1%	14,550
	Subtotal:	43,068	100%	19%	11,378
Energy Recovery (Kilns)	100s: Inorganic Liquids	0	0%	0%	N/A
	B200s: Organic Liquids	585,972	100%	1%	11,848

Appendix B-3 (continued)

WASTES IN NHWCS THAT MEET THE HEATING VALUE SCREEN (AND VISCOSITY AND COMBUSTION SCREENS)

Combustion Method	Form Code	Quantity Waste Managed (by Combustion Method, in tons)	Percent Waste Managed (by Combustion Method)	Percent Reduction from Viscosity to Heating Value Screen	Average Heating Value (for streams above 5,000 Btu/lb)
Energy Recovery (Kilns) (continued)	B201: Concentrated solvent-water solution	0	0%	0%	N/A
	B202: Halogenated (e.g. chlorinated) solvent	2,273	<1%	54%	9,116
	B203: Nonhalogenated solvent	22,360	4%	0%	10,722
	B204: Halogenated/nonhalogenated solvent mixture	382,581	65%	1%	11,880
	B207: Concentrated aqueous solution of other organics	31,596	5%	0%	11,018
	B211: Paint thinner or petroleum distillates	11,003	2%	0%	14,889
	B219: Other organic liquids	120,270	21%	0%	12,518
	Other B200s	15,887	3%	3%	12,048
	Subtotal:	585,972	100%	1%	11,848
On-Site BIFs	100s: Inorganic Liquids	0	0%	0%	0
	B200s: Organic Liquids	410,632	100%	2%	12,935
	B201: Concentrated solvent-water solution	0	0%	0%	0

Appendix B-3 (continued)

WASTES IN NHWCS THAT MEET THE HEATING VALUE SCREEN (AND VISCOSITY AND COMBUSTION SCREENS)

Combustion Method	Form Code	Quantity Waste Managed (by Combustion Method, in tons)	Percent Waste Managed (by Combustion Method)	Percent Reduction from Viscosity to Heating Value Screen	Average Heating Value (for streams above 5,000 Btu/lb)
On-Site BIFs (continued)	B202: Halogenated (e.g., chlorinated) solvent	0	0%	0%	0
	B203: Nonhalo-genated solvent	19,880	5%	0%	14,075
	B204: Halogenated/non halogenated solvent mixture	3,980	1%	0%	16,160
	B207: Concentrated aqueous solution of other organics	53,380	13%	0%	10,472
	B211: Paint thinner or petroleum distillates	4,632	1%	0%	18,000
	B219: Other organic liquids	285,438	70%	0%	14,042
	Other B200s	44,777	11%	15%	13,250
	Subtotal:	410,632	100%	2%	12,935
Total: All Combustion Methods		1,524,971	100%	20%	11,741

Note: Quantities are high-end, unscaled NHWCS totals.

Appendix B-4

WASTES IN NHWCS THAT MEET THE CONSTITUENT SPECIFICATIONS (AND HEATING VALUE AND VISCOSITY AND COMBUSTION SCREENS)

Combustion Method	Form Code	Quantity Waste Managed (by CombustionMethod, in tons)	Percent Waste Managed by Combustion Method	Percent Reduction from Heating Value to Constituent Screen	Average Heating Value (for streams above 5,000 Btu/lb)
On-Site Incineration	100s: Inorganic Liquids	0	0%	100%	N/A
	B200s: Organic Liquids	18,952	100%	87%	12,876
	B201: Concentrated solvent-water solution	3,140	23%	28%	9,622
	B202: Halogenated (e.g.chlorinated) solvent	0	0%	100%	N/A
	B203: Nonhalogenated solvent	594	8%	93%	12,418
	B204: Halogenated/ nonhalogenated solvent mixture	4,265	30%	85%	14,674
	B207: Concentrated aqueous solution of other organics	5,066	18%	67%	11,292
	B211: Paint thinner or petroleum distillates	0	0%	0%	N/A

Appendix B-4 (continued)

WASTES IN NHWCS THAT MEET THE CONSTITUENT SPECIFICATIONS (AND HEATING VALUE AND VISCOSITY AND COMBUSTION SCREENS)

Combustion Method	Form Code	Quantity Waste Managed (by Combustion Method, in tons)	Percent Waste Managed by Combustion Method	Percent Reduction from Heating Value to Constituent Screen	Average Heating Value (for streams above 5,000 Btu/lb)
On-Site Incineration (continued)	B219: Other organic liquids	4,842	39%	90%	13,418
	Other B200s	1,045	4%	93%	N/A
	Subtotal:	18,592	100%	98%	12,876
Commercial Incineration	100s: Inorganic Liquids	0	0%	100%	N/A
	B200s: Organic Liquids	7,317	100%	77%	11,289
	B201: Concentrated solvent-water sol.	3,356	46%	50%	10,648
	B202: Halogenated (e.g. chlorinated) solvent	0	0%	100%	N/A
	B203: Nonhalogenated solvent	3,636	50%	56%	12,781
	B204: Halogenated/ nonhalogenated solvent mixture	0	0%	100%	N/A
	B207: Concentrated aqueous solution of other organics	0	0%	100%	N/A
	B211: Paint thinner or petroleum distillates	0	0%	0%	N/A
	B219: Other organic liquids	322	4%	39%	13,371

Appendix B-4 (continued)

WASTES IN NHWCS THAT MEET THE CONSTITUENT SPECIFICATIONS (AND HEATING VALUE AND VISCOSITY AND COMBUSTION SCREENS)

Combustion Method	Form Code	Quantity Waste Managed (by Combustion Method, in tons)	Percent Waste Managed by Combustion Method	Percent Reduction from Heating Value to Constituent Screen	Average Heating Value (for streams above 5,000 Btu/lb)
Commercial Incineration (continued)	Other B200s	0	0%	100%	
	Subtotal	7,317	100%	77%	11,289
Energy Recovery (Kilns)	100s: Inorganic Liquids	0	0%	0%	N/A
	B200s: Organic Liquids	55,085	100%	86%	13,321
	B201: Concentrated solvent-water solution	0	0%	0%	N/A
	B202: Halogenated (e.g. chlorinated) solvent	0	0%	100%	N/A
	B203: Nonhalogenated solvent	3,070	8%	78%	12,471
	B204: Halogenated/ non-halogenated solvent mixture	46,410	87%	82%	13,176
	B207: Concentrated aqueous solution of other organics	2,447	4%	91%	N/A
	B211: Paint thinner or petroleum distillates	0	0%	100%	N/A
	B219: Other organic liquids	2,913	5%	96%	14,306
	Other B200s	245	<1%	98%	
	Subtotal:	55,085	100%	86%	13,321
On-Site BIFs	B100s: Inorganic Liquids	0	0%	0%	0
	B200s: Organic Liquids	60,398	100%	80%	13,041

Appendix B-4 (continued)

WASTES IN NHWCS THAT MEET THE CONSTITUENT SPECIFICATIONS (AND HEATING VALUE AND VISCOSITY AND COMBUSTION SCREENS)

Combustion Method	Form Code	Quantity Waste Managed (by Combustion Method, in tons)	Percent Waste Managed by Combustion Method	Percent Reduction from Heating Value to Constituent Screen	Average Heating Value (for streams above 5,000 Btu/lb)
	B201: Concentrated solvent-water sol.	0	0%	0%	0
	B202: Halogenated (e.g. chlorinated) solvent	0	0%	0%	0
	B203: Nonhalogenated solvent	3,169	6%	79%	8,150
	B204: Halogenated/ nonhalogenated solvent mixture	0	0%	100%	0
	B207: Concentrated aqueous solution of other organics	5,225	7%	88%	10,576
	B211: Paint thinner or petroleum distillates	4,431	6%	0%	18,000
	B219: Other organic liquids	24,160	40%	88%	14,391
	Other B200s	23,413	41%	37%	12,333
	Subtotal	60,398	100%	80%	13,041
Total: All Combustion Methods		142,292		92%	13,028

Note: Quantities are high-end, unscaled NHWCS totals.

Appendix C

QUANTITY OF WASTE MEETING THE COMPARABLE FUEL EXCLUSION

Appendix C

QUANTITY OF WASTE MEETING THE COMPARABLE FUELS EXCLUSION

Generator Facility Number	Treatment Facility Type	Waste Codes	Waste Quantity (tons)	Blended (yes/no/ mixed)
1	Off-Site BIF	D004, F001,F002,F003,F005	1,271	no
2	Off-Site BIF	D001,D004,D005,D006,D007,D008,D010,F001,F002,F003,F004,F005, F010,F024,K022,K048,K049,K050, K051, K052	3,574	no
2	Off-Site BIF	D001,D002,D004,D005,D006,D007,D008,D009,D010,D011,D012,D013,D015, D016,D018,D019,D020,D021,D022,D023	1,824	yes
2	Off-Site BIF	D001,D004,D005,D006,D007,D008,D009,D010,D018,D021,D035,F001, F002,F003,F005,K001,K027,K048, K049,K050	754	no
2	Off-Site BIF	D001,D006,D007,D008,F001,F002, F003,K048,K049,K051	632	no
3	Off-Site BIF	D001,D035	5,609	yes
3	Off-Site BIF	D018	851	no
3	Off-Site BIF	D001	1,986	no
3	Off-Site BIF	D001	329	no
3	Off-Site BIF	D001,D008,D009,D018	870	no
4	Off-Site BIF	D001,D004,D005,D006,D007,D008,D010,D011,D018,D035,D039,D040,F001, F002,F003,F005	2,085	no
5	Off-Site BIF	D001,F002,F003,F005	1,904	no
5	Off-Site BIF	F001,D002,F003,F005	5,430	yes
5	Off-Site BIF	D001,F002,F003,F005	7,284	yes
5	Off-Site BIF	D001,D018	2,222	no
5	Off-Site BIF	D001,D004,D005,D006	1,443	yes
5	Off-Site BIF	D001,F001,F003,F005	1,443	yes
5	Off-Site BIF	F001,F002,F003,F005	1,443	yes
6	Off-Site BIF	D001,F003	3,720	no
7	Off-Site BIF	F001	9,375	yes
8	Off-Site BIF	D001	1,035	no

Generator Facility Number	Treatment Facility Type	Waste Codes	Waste Quantity (tons)	Blended (yes/no/ mixed)
9	Commercial Incinerators	D001,F003	1,826	yes
10	Commercial Incinerators	D001,F003,F005	26	no
11	Commercial Incinerators	D001,F003,F005	466	no
12	Commercial Incinerators	D001,D008,F003,F005	2,052	yes
13	Commercial Incinerators	D001,F001,F002,F003,F005	182	no
14	Commercial Incinerators	D001,D002,D006,D007,D008	18	no
15	Commercial Incinerators	D001,F001,F002,F003,F005,K068	250	no
15	Commercial Incinerators	D001,D007,D008,F001,F002,F003, F004	797	no
15	Commercial Incinerators	D001,D004,D005,F001,F002,F003, F004	676	no
16	Commercial Incinerators	D001,F003	494	no
17	Commercial Incinerators	D001	530	no
18	On-Site BIF	D001,D018,D019,D021,D022,D027,D028,D034,D040,D043,K019,K020	1,802	no
19	On-Site BIF	D001	2,800	mixed
20	On-Site BIF	D001	1,285	no
21	On-Site BIF	D001	403	no
22	On-Site BIF	K104,U220	1,368	no
23	On-Site BIF	D001,D018	4,631	mixed
24	On-Site BIF	D001,D018,D025	1,888	no
24	On-Site BIF	D001,D018	2,614	mixed
25	On-Site BIF	D001,D018,D021,D026,D038	415	no
26	On-Site BIF	D001	3,956	mixed
26	On-Site BIF	D001	4,265	no
27	On-Site BIF	D001	7,567	mixed
27	On-Site BIF	D001	4,881	no
27	On-Site BIF	D001,D002,D003,D018,D026	4,530	mixed
28	On-Site BIF	D001	7,420	mixed
29	On-Site BIF	D001,D002	4,402	mixed

Generator Facility Number	Treatment Facility Type	Waste Codes	Waste Quantity (tons)	Blended (yes/no/ mixed)
30	On-Site BIF	D001F003	4,093	mixed
31	On-Site BIF	D001	691	no
31	On-Site BIF	D001,D018	1,387	no
32	On-Site Incinerator	D001	429	no
33	On-Site Incinerator	F002	1,034	no
34	On-Site Incinerator	D001,F002,F003,F005	2,617	mixed
34	On-Site Incinerator	D001,F003,F005	455	no
35	On-Site Incinerator	D001	498	no
35	On-Site Incinerator	D001	1,705	no
35	On-Site Incinerator	F003	2,846	mixed
35	On-Site Incinerator	U188	458	no
35	On-Site Incinerator	U240	1,195	no
36	On-Site Incinerator	D001,D002,D003,D005,D006,D018,D022,D025,D028, D035,D038,D039,D040, F002,F003,F005	693	no
37	On-Site Incinerator	D001,D002,D003,D004,D005,D006,D007,D008,D090,D010,D011,D014,D018, D019,D020,D021,D022,D023,D024,D025,D026,D027	575	no
37	On-Site Incinerator	D001,D002,D004,D005,D006,D007,D008,D090,D010,D011,D018,D019,D020, D021,D022,D023,D024,D025,D026,D027	1,446	yes
38	On-Site Incinerator	D001,D002	1,012	no
38	On-Site Incinerator	D007	520	no
38	On-Site Incinerator	D001,D002,D003	1,630	no
39	On-Site Incinerator	D001,D002	1,336	mixed
39	On-Site Incinerator	D001,F003	502	no
		TOTAL (unscaled)	**142,292**	

Generator Facility Number	Treatment Facility Type	Waste Codes	Waste Quantity (tons)	Blended (yes/no/ mixed)
		TOTAL (scaled)	**213,438**	

Appendix D

BREAK-EVEN ANALYSIS

BREAKEVEN QUANTITY ANALYSIS

This appendix describes the basic approach for conducting the breakeven quantity (BEQ) analysis. While generators of hazardous wastes benefit from the comparable fuels exclusion due to reduced waste management costs, generators claiming the exclusion also need to comply with sampling and analysis, notification and certification, and recordkeeping requirements in order for their fuels to be excluded. The breakeven quantity represents the quantity for which the potential savings equal the costs. Due to uncertainties associated with potential revenues and avoided costs, we calculate upper and lower bounds of the BEQ.

To calculate the BEQ, we use the following equation:

$$Q_{CF}(P_{CF} + P_I) - C_A = 0$$

where:

P_{CF} = Price of comparable fuel.
Q_{CF} = Quantity of comparable fuel.
C_A = Analytical costs.
P_I = Price of combustion.

In calculating a BEQ range, we analyze comparable fuel as a substitute for residual fuel and coal. These additional assumptions were used:

- Analytical costs: $1,800 per waste stream.
- Heat content of comparable fuel: 13,025 Btu/lb.
- Heat content of residual fuel: 18,711 Btu/lb.
- Price of residual fuel oil: $3/MBtu.
- Price of coal: $1/MBtu.
- "Clean" liquid combustion price: $0 to $75/ton.

Appendix E

RECYCLED SOLVENTS IN NHWCS MEETING THE COMPARABLE FUEL CRITERIA

Appendix E-1

QUANTITY OF WASTE CURRENTLY SENT TO SOLVENT RECYCLING THAT MEETS THE COMPARABLE FUELS EXCLUSION

Waste Stream Origin	Waste Codes	Waste Quantity (tons)
Off-site	D001,F003	610
Off-site	D001,F003,F005	3,805
Off-site	F003	459
Off-site	D001,F003	1,849
On-site	F002	2,360
Off-site	D001	2,939
Off-site	D002	1,749
Off-site	F002	1,749
Off-site	D001,F003	2,080
Off-site	D001,D0018,D039	1,593
Off-site	D001,D0018,D039	1,593
Off-site	D001	718
Off-site	D001,D022,D035,D039	589
Off-site	D001	2,465
Off-site	D001,D0018,D039	2,465
On-site	D001	1,903
Off-site	D001,D006,D007,F003,F005	18
Off-site	D001,D039	23
Off-site	D001,D018,D039	22
Off-site	D001,F005	685
Off-site	D001	80
Off-site	D001	865
Off-site	F003	206
Off-site	F003	686
Off-site	F003	856
Off-site	F005	178
	TOTAL (unscaled)	**32,543**
	TOTAL (scaled)	**73,547**

Appendix E-2

RECYCLED WASTES IN NHWCS THAT MEET THE SOLVENT RECOVERY SCREEN*

Management Method	System Type	Form Code	Quantity Waste Managed (by System Type, in tons)	Percent Waste Managed (by System Type)
Solvent Recovery	M021: Fractionation/Distillation	B100s: Inorganic Liquids	0	0%
		B200s: Organic Liquids	168,532	100%
		B300s: Inorganic Solids	0	0%
		B400s: Organic Solids	0	0%
		B500s: Inorganic Sludges	0	0%
		B600s: Organic Sludges	0	<1%
		Subtotal	168,532	100%
	M022: Thin Film Evaporation	B100s: Inorganic Liquids	0	0%
		B200s: Organic Liquids	67,076	100%
		B300s: Inorganic Solids	0	0%
		B400s: Organic Solids	0	0%
		B500s: Inorganic Sludges	0	0%
		B600s: Organic Sludges	0	0%
		Subtotal	67,076	100%
	M023: Solvent Extraction	B100s: Inorganic Liquids	0	0%
		B200s: Organic Liquids	0	0%
		B300s: Inorganic Solids	0	0%

* Wastes managed by solvent recovery were included in the combustion screen to determine what percentage of these wastes could potentially be diverted to combustion.

Appendix E-2 (continued)

RECYCLED WASTES IN NHWCS THAT MEET THE SOLVENT RECOVERY SCREEN

Management Method	System Type	Form Code	Quantity Waste Managed (by System Type, in tons)	Percent Waste Managed (by System Type)
Solvent Recovery (continued)	M023: Solvent Extraction (continued)	B400s: Organic Solids	0	0%
		B500s: Inorganic Sludges	0	0%
		B600s: Organic Sludges	0	0%
		Subtotal	0	0%
	M024: Other Solvent Recovery	B100s: Inorganic Liquids	516	0%
		B200s: Organic Liquids	4585	0%
		B300s: Inorganic Solids	0	0%
		B400s: Organic Solids	0	0%
		B500s: Inorganic Sludges	0	0%
		B600s: Organic Sludges	0	0%
		Subtotal	5101	0%
	M029: Solvent Recovery - type unknown	B100s: Inorganic Liquids	0	0%
		B200s: Organic Liquids	53,309	86%
		B300s: Inorganic Solids	0	0%
		B400s: Organic Solids	0	0%
		B500s: Inorganic Sludges	0	0%

Appendix E-2 (continued)

RECYCLED WASTES IN NHWCS THAT MEET THE SOLVENT RECOVERY SCREEN

Management Method	System Type	Form Code	Quantity Waste Managed (by System Type, in tons)	Percent Waste Managed (by System Type)
Solvent Recovery (continued)		B600s: Organic Sludges	0	14%
		Subtotal	53,309	100%
	Total: Solvent Recovery		297,990	

Note: Quantities are high-end, unscaled NHWCS totals.

Appendix E-3

RECYCLED WASTES IN NHWCS THAT MEET THE VISCOSITY SCREEN (AND SOLVENT RECOVERY SCREEN)

Management Method	Form Code	Quantity Waste Managed (by Combustion Method, in tons)	Percent Waste Managed (by Combustion Method)	Percent Reduction from Combustion to Viscosity Screen
Solvent Recovery	B100s: Inorganic Liquids	0	0%	100%
	B200s: Organic Liquids	279,853	100%	0%
	B201: Concentrated solvent-water solution	47,181	18%	N/A
	B202: Halogenated (e.g. chlorinated) solvent	36,726	14%	N/A
	B203: Nonhalogenated solvent	123,684	62%	N/A
	B204: Halogenated/nonhalo-genated solvent mixture	2,219	1%	N/A
	B207: Concentrated aqueous solution of other organics	0	0%	100%
	B211: Paint thinner or petroleum distillates	14,400	5%	N/A
	B219: Other organic liquids	23	<1%	N/A
	Other B200s	75	<1%	N/A
	B300s: Inorganic Solids	0	0%	100%
	B400s: Organic Solids	0	0%	100%
	B500s: Inorganic Sludges	0	0%	100%

Appendix E-3 (continued)

WASTES IN NHWCS THAT MEET THE VISCOSITY SCREEN (AND SOLVENT RECOVERY SCREEN)

Solvent Recovery (continued)	B600s: Organic Sludges	0	0%	100%
	Total: Solvent Recovery	279,853	100%	<1%

Note: Quantities are high-end, unscaled NHWCS totals.

Appendix E-4

RECYCLED WASTES IN NHWCS THAT MEET THE HEATING VALUE SCREEN (AND VISCOSITY AND SOLVENT RECOVERY SCREENS)

Management Method	Form Code	Quantity Waste Managed (by Combustion Method, in tons)	Percent Waste Managed (by Combustion Method)	Percent Reduction from Viscosity to Heating Value Screen	Average Heating Value (for streams above 5,000 Btu/lb)
Solvent Recovery	100s: Inorganic Liquids	0	0%	0%	0
	B200s: Organic Liquids	274,904	100%	9%	14,667
	B201:Concen-trated solvent-water solution	47,181	18%	0%	15,500
	B202: Halogenated (e.g. chlorinated) solvent	35,834	14%	2%	13,302
	B203: Nonhalogenated solvent	136,028	62%	0%	15,847
	B204: Halogenated/ nonhalogenated solvent mixture	2,219	1%	0%	13,327
	B207: Concentrated aqueous solution of other organics	0	0%	0%	0
	B211: Paint thinner or petroleum distillates	14,400	5%	0%	0
	B219: Other organic liquids	23	<1%	0%	9,433
	Other B200s	76	<1%	1%	12,402
	Total	274,904	100%	<1%	14,667

Note: Quantities are high-end, unscaled NHWCS totals.

Appendix E-5

RECYCLED WASTES IN NHWCS THAT MEET THE CONSTITUENT SPECIFICATIONS (AND HEATING VALUE AND VISCOSITY AND SOLVENT RECOVERY SCREENS)

Management Method	Form Code	Quantity Waste Managed (by Combustion Method, in tons)	Percent Waste Managed by Combustion Method	Percent Reduction from Heating Value to Constituent Screen	Average Heating Value (for streams above 5,000 Btu/lb)
Solvent Recovery	B100s: Inorganic Liquids	0	0%	0%	0
	B200s: Organic Liquids	32,543	100%	87%	15,124
	B201: Concentrated solvent-water solution	1,749	5%	100%	11,476
	B202: Halogenated (e.g.chlorinated) solvent	5,857	15%	97%	14,093
	B203: Nonhalogenated solvent	16,220	57%	79%	15,283
	B204: Halogenated/ nonhalogenated solvent mixture	0	0%	100%	0
	B207: Concentrated aqueous solution of other organics	718	2%	0%	15,487
	B211: Paint thinner or petroleum distillates	2,946	8%	100%	13,594
	B219: Other organic liquids	0	0%	100%	0
	Other B200s	5,052	13%	0%	12,639
	Total	32,543	100%	87%	14,439

Note: Quantities are high-end, unscaled NHWCS totals.