Note to the Reader:

No changes were made to this report in response to review by the Office of Information and Regulatory Affairs (OIRA), Office of Management and Budget (OMB).

ASSESSMENT OF THE POTENTIAL COSTS, BENEFITS, AND OTHER IMPACTS OF THE EXPANSION OF THE RCRA COMPARABLE FUEL EXCLUSION-PROPOSED RULE

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LIST OF ACRONYMS

AWFCO – Automatic Waste Feed Cut-Off

BRS – National Biennial RCRA Hazardous Waste Report (Biennial Reporting System)

CFE – comparable fuels exclusion

CFR – Code of Federal Regulations

CO CEMS – carbon monoxide continuous emissions monitoring system

ECF – emission-comparable fuel

EIA – Energy Information Administration

EPA – Environmental Protection Agency

LWAK – lightweight aggregate kiln

MMBtu – millions of British thermal units

NAICS – North American Industry Classification System

NEI – National Emissions Inventory

NESHAP – National Emission Standards for Hazardous Air Pollutants

NHWCS – National Hazardous Waste Constituent Survey

NPDES – National Pollutant Discharge Elimination System

NSPS – New Source Performance Standards

OLD – Organic Liquid Distribution

OMB – Office of Management and Budget

PAH – polycyclic aromatic hydrocarbon

POTW – Publicly Owned Treatment Works

RCRA – Resource Conservation and Recovery Act

SPCC - Spill Prevention, Control and Countermeasure

VOC – volatile organic compound

EXECUTIVE SUMMARY

BACKGROUND AND OVERVIEW

Under the comparable fuels exclusion (CFE) rule established by EPA in September 1998 (the 1998 CFE Rule), any hazardous waste-derived fuel that met certain specifications comparable to fossil fuels, such as levels of hazardous constituents, viscosity, and heating value, would be exempt from the regulatory definition of hazardous waste as long as affected facilities complied with requirements delineated by the rule regarding sampling and analysis, notification and certification, and recordkeeping. EPA is now proposing a rule to expand this exclusion to include fuels that are produced from a hazardous waste but which generate emissions when burned in an industrial boiler that are effectively comparable to emissions from burning fuel oil. The newly excluded fuel under the proposed rule would be called emission-comparable fuel (ECF). This report analyzes the costs, benefits, and other impacts of the proposed rule (referred to as the Agency Selected Approach throughout this document) and two alternative options considered by EPA (referred to as Alternative Option A and Alternative Option B).

ECF under the proposed rule and the two alternative options would be subject to the same constituent concentration limits that apply to comparable fuels, except that the limits for certain hydrocarbons and oxygenates would be waived.[1] In addition, the rule would require boilers that burn ECF to meet the design and operating conditions set forth in 40 CFR 266.10. These conditions include, but are not limited to, the following: (1) the burner must be a watertube steam boiler other than a stoker-fired boiler; (2) carbon monoxide (CO) must be monitored continuously, must be linked to an automatic ECF feed cutoff system, and must not exceed 100 parts per million by volume (ppmv) on an hourly rolling average; (3) the boiler must fire at least 50% primary fuel on a heating value or volume basis, whichever results in a higher volume, and the primary fuel must be fossil fuel or equivalent with a heating value not less than 8,000 Btu/lb; and (4) the ECF must have an as-fired heating value of 8,000 Btu/lb or greater.[2] The Agency Selected Approach and the two alternatives would also require affected facilities to meet various tracking and storage requirements, as outlined in Exhibit ES-1.

[1] Under the proposed rule, the constituent concentration limits for all hydrocarbons and oxygenates are waived, except those for PAHs (polycyclic aromatic hydrocarbons) and naphthalene. PAHs include the following: 3-Methylcholanthrene; 7,12-Dimethylbenz(a)anthracene; Benzo(a)anthracene; Benzo(a)pyrene; Benzo(b) fluoranthene; Benzo(k)fluoranthene; Chrysene; Dibenzo(a,h)anthracene; Fluoranthene; and Indeno(1,2,3-cd)pyrene. For a complete list of hydrocarbons and oxygenates included in the 1998 CFE rule, see Federal Register, Vol. 64, No. 189, September 30, 1999, 53071.

[2] The Preamble for the proposed rule contains additional information on the design and operating conditions required of boilers that burn ECF.

Exhibit ES-1

Summary of the Agency Selected Approach and Two Alternative Options

	Agency Selected Approach	**Alternative Option A**	**Alternative Option B***
ECF Constituent Concentration Limits	Constituent concentration waiver for hydrocarbons and oxygenates listed in the 1998 CFE rule, excluding PAHs and naphthalene.	For the low-end estimate, constituent concentration waiver for hydrocarbons and oxygenates listed in the 1998 CFE rule, excluding PAHs and naphthalene. For the high-end estimate, constituent concentration waiver for hydrocarbons and oxygenates listed in the 1998 CFE rule, including PAHs and naphthalene.	Constituent concentration waiver for hydrocarbons and oxygenates listed in the 1998 CFE rule, excluding PAHs and naphthalene.
ECF Boiler Requirements	Boilers burning ECF must meet the requirements of 40 CFR 266.110.	Boilers burning ECF must meet the requirements of 40 CFR 266.110.	Boilers burning ECF must meet the requirements of 40 CFR 266.110.
ECF Tracking Requirements	Modified version of used oil tracking requirements: • One-time notice indicating intent to use the exclusion • One-time certification of compliance with burner controls (offsite burner only) • Maintain records of ECF shipments • Shipping paper with warning indicating that the material has been conditionally excluded from the regulatory definition of hazardous waste	DSW tracking requirements: • One-time notice indicating intent to use the exclusion • One-time certification of compliance with burner controls (offsite burner only) • Maintain records of ECF shipments • Shipping paper required, but warning on shipping paper not required	Hazardous waste management system requirements: • Manifest for ECF shipped offsite • Offsite burner and transporter need to obtain EPA ID • One-time certification of compliance with burner controls (offsite burner only) • Maintain records of ECF shipments • Warning on shipping paper indicating that the material has been conditionally excluded from the regulatory definition of hazardous waste
ECF Generator/Burner Storage Controls	• Engineered secondary containment system • Inspection/Monitoring of equipment • Leak cessation and containment • Certification of major repairs	• Dikes and berms for secondary containment • Inspection/Monitoring of equipment • Leak cessation and containment • Certification of major repairs	• Engineered secondary containment systems • Inspection/Monitoring of equipment • Leak cessation and containment • Certification of major repairs

Exhibit ES-1

Summary of the Agency Selected Approach and Two Alternative Options

	Agency Selected Approach	**Alternative Option A**	**Alternative Option B***
	• Notification of leaks not required • Detailed report of leaks not required • Develop/Certify/Renew SPCC plan • Renew response plan to EPA Regional Administrator • Operator training (generators and burners that take ECF from another facility)	• Notification of leaks not required • Detailed report of leaks not required • SPCC plan development/renewal not required • Renewal of response plan not required • Operator training (generators and burners that take ECF from another facility)	• Notification of leaks • Detailed reporting of leaks to EPA Regional Administrator • Closure costs and related financial assurance recordkeeping (burner only) • SPCC plan development/renewal not required • Renewal of response plan not required • Groundwater monitoring (offsite burner only) • New permit (offsite burner only) • Operator training (generators and burners that take ECF from another facility)
Air Emissions Controls for Storage/Transfer of ECF	Hazardous waste technology standards as under Organic Liquid Distribution (OLD) NESHAP (40 CFR 63 Subpart EEEE)	Existing Federal/State controls on air emissions (e.g., NESHAP, NSPS, State VOC controls)	Hazardous waste management system emissions requirements under 40 CFR 264/265 Subpart BB (air emissions from equipment leaks) and 40 CFR 264/265 Subpart CC (air emissions from tanks)

* Note: As indicated in our discussion of impacts, we developed low, middle, and high impact estimates for Alternative Option B to account for uncertainty in the impacts likely under this option. We summarize the analytic assumptions that underlie these estimates in the results section of this report.

METHODS OVERVIEW

Under the proposed ECF rule, facilities may realize a number of benefits and costs if they use the exclusion. To estimate these impacts, we followed the analytic process outlined below.

- First, we identified waste streams from the 2003 BRS that could be affected by the exclusion. Based on our analysis of the BRS, we estimate that approximately 5.55 million tons of waste generated by 10,876 facilities could potentially be eligible for the ECF exclusion each year.

- Second, using data from the 1996 National Hazardous Waste Constituent Survey, we estimated the total tonnage of potentially eligible waste (identified from the 2003 BRS) that would qualify for the exclusion.

- Third, we estimate the potential impacts that would be realized by each generator with qualifying waste if it chose to use the exclusion.

- Fourth, for waste generated by facilities that would need to send their waste offsite to use the exclusion, we estimate the potential impacts that receiving facilities would realize if they accepted this waste.[3]

- Finally, based on the impacts realized by generators and receiving facilities, we determine which generators would likely use the exclusion. In making this determination, we assume that generators with a boiler eligible to burn ECF will use the exclusion only if the benefits of doing so outweigh the costs. We assume that the same condition applies to generators that do not have a boiler eligible to burn ECF, but we also assume that these facilities would use the exclusion only if receiving facilities would be willing to accept the ECF of these generators (i.e., if the ECF-related benefits realized by the receiving facilities exceed the corresponding costs).

After identifying the generators that are likely to use the exclusion, we estimate the total social costs and benefits of the proposed rule. We also evaluate the secondary economic impacts the proposed exclusion may have on commercial incinerators and commercial kilns.

SUMMARY OF ANALYTIC RESULTS

The central conclusions of our analysis are as follows:

- **The Agency Selected Approach is projected to yield an estimated $23 million per year in annual net social benefits.**[4] As indicated in Exhibit ES-2, the majority of the

[3] As indicated in Exhibit ES-1, a facility must have a boiler that meets the requirements of 40 CFR 266.110 to burn emission-comparable fuel. Facilities that generate ECF but that do not have a boiler that meets the 266.110 specifications, or that could not be easily modified to meet these specifications, would need to send their emission-comparable fuel offsite to use the exclusion.

savings associated with the proposed exclusion would result from avoided waste management costs. Transportation, boiler retrofits, and analytical costs would represent most of the proposed rules' costs. Under the two alternative options considered by the Agency, annual net social benefits range from $15 million to $25 million.

Exhibit ES-2

Annual Social Benefits and Costs of the Emission-Comparable Fuels Exclusion – 50 States*
(thousands of dollars)

	Agency Selected Approach	**Alternative Option A**		**Alternative Option B**		
		Low	High	Low	Mid	High
Annual Emission-Comparable Fuel Benefits	$35,705	$36,360	$37,447	$20,429	$25,682	$30,770
Fuel Savings, net of baseline fuel recovery	$6,989	$7,058	$7,503	$5,859	$4,165	$6,048
Management Cost Savings	$23,804	$23,886	$24,432	$12,641	$18,635	$21,071
Net Storage Cost Savings	$259	$763	$780	$0	$0	$0
Hazardous Waste Transport Cost Savings	$4,574	$4,574	$4,653	$1,838	$2,874	$3,610
Net Tracking Cost Savings	$79	$79	$79	$91	$8	$41
Annual Emission-Comparable Fuel Costs	($12,321)	($12,374)	($12,667)	($5,725)	($9,597)	($10,330)
Burner Storage Costs	($1,491)	($1,413)	($1,434)	($1,595)	($2,103)	($2,399)
Boiler Retrofit Costs	($2,923)	($2,987)	($3,019)	($2,224)	($2,072)	($2,447)
Waste Stream Analytical Costs	($3,033)	($3,101)	($3,187)	($1,701)	($2,270)	($2,270)
Raw Materials Replacement Cost (for waste recycled in the baseline)	($364)	($364)	($368)	($205)	($215)	($215)
Emissions Comparable Fuel Transport Costs	($4,510)	($4,510)	($4,659)	$0	($2,938)	($3,001)
ANNUAL NET SOCIAL BENEFITS	**$23,384**	**$23,987**	**$24,780**	**$14,705**	**$16,085**	**$20,441**

Note: Estimates reported in year 2005 dollars.
*The figures shown here are national estimates of the annual social benefits and costs of the proposed exclusion assuming that it is adopted by all 50 states. As part of our analysis, we also estimated the annual social benefits and costs of the proposed exclusion in the 16 states with laws that either: (a) prohibit them from promulgating standards that are more stringent than federal regulations; or (b) require them to undertake additional legislative action to enact standards more stringent than federal regulations. Our results for these 16 states represent a lower bound estimate of the rule's impacts.

[4] Because emissions associated with the combustion of excluded waste are expected to be comparable to those associated with conventional fossil fuels, we assume that the proposed rule will lead to no changes in human health and environmental outcomes and that the human health and ecological impacts of the rule are zero. Therefore, net social benefits in this report represent the difference between the cost savings and cost impacts of the proposed exclusion.

- **182,800 tons of potentially eligible waste would qualify as ECF under the Agency Selected Approach each year.** As indicated by Exhibit ES-3, the qualifying tonnages for the two alternative options considered by EPA are similar to this value.

- **Of the 182,800 tons of eligible waste estimated to qualify as ECF on an annual basis, we estimate that generators would exclude 106,500 tons under the Agency Selected Approach.** Approximately, 34,200 tons of this waste represents waste that is newly burned for energy recovery (i.e., waste that was not burned for energy recovery in the baseline). Under the two alternative options, generators that decide to use the exclusion would exclude an estimated 55,400 to 109,400 tons of ECF per year.

- **Commercial incinerators and commercial kilns may experience estimated revenue losses of $3 million and $11 million per year, respectively, under the Agency Selected Approach.** These losses represent approximately 1 percent of the current waste management revenues earned by these facilities on an annual basis.

Exhibit ES-3

Waste Quantities Affected by the Emission-Comparable Fuels Exclusion - 50 States*

	Agency Selected Approach	Alternative Option A		Alternative Option B		
		Low	High	Low	Mid	High
Quantity of Waste Qualifying for ECF Exclusion (tons per year)	182,800	182,800	184,700	182,800	182,800	182,800
Total ECF Excluded (tons per year)	106,500	106,800	109,400	55,400	92,400	92,400
Portion of Excluded Total Not Burned for Energy Recovery in the Baseline and Burned for Energy Recovery under the Rule (tons per year)	34,200	34,500	37,000	28,900	29,700	29,700
Excluded Waste No Longer Sent Offsite for Incineration (tons per year)	12,500	12,500	13,500	11,000	0	11,800
Excluded Waste No Longer Sent Offsite for Energy Recovery (tons per year)	48,400	48,400	48,500	11,600	43,100	43,100

Sources: Based on data from U.S. EPA, 2003 BRS and U.S. EPA, National Hazardous Waste Constituent Survey.

Note: * The figures shown here are estimates of national waste quantities affected by the proposed exclusion assuming that it is adopted by all 50 states. As part of our analysis, we also estimate waste quantities affected by the proposed exclusion in the 16 states with laws that either: (a) prohibit them from promulgating standards that are more stringent than federal regulations; or (b) require them to undertake additional legislative action to enact standards more stringent than federal regulations. Our results for these 16 states represent a lower bound estimate of the rule's impacts.

- **Annual fuel replacement costs for commercial kilns under the Agency Selected Approach are estimated to be approximately $2 million per year.** Waste shifted away from commercial kilns as a result of the proposed rule represents a fuel loss to these facilities. We estimate that the annual cost of replacing this waste fuel under the proposed rule is approximately $2 million per year.

OTHER REGULATORY ISSUES

This analysis of the proposed rule satisfies OMB's requirements for regulatory review under Executive Order 12866 (as amended by Executive Order 13258), which applies to any significant regulatory action. Our analysis of the rule also fulfills the requirements of the following:

- The Regulatory Flexibility Act, as amended by the Small Business Regulatory Enforcement Fairness Act of 1996;

- Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations";

- Executive Order 13045, "Protection of Children from Environmental Health Risks and Safety Risks";

- The Unfunded Mandates Reform Act of 1995;

- Executive Order 13175, "Consultation and Coordination with Indian Tribal Governments";

- Executive Order 13132, "Federalism";

- Executive Order 12630, "Government Action and Interference with Constitutionally Protected Property Rights";

- Executive Order 13211, "Actions Concerning Regulations that Affect Energy Supply, Distribution, Or Use";

- Executive Order 12988, "Civil Justice Reform"; and

- Executive Order 13352, "Facilitation of Cooperative Conservation"

BACKGROUND AND NEED FOR REGULATION

In June of 1998, EPA established the comparable fuels exclusion (CFE), under which fuel-grade wastes with environmental specifications comparable to fossil fuels may be excluded from the regulatory definition of hazardous waste. EPA's rationale behind issuing the exclusion is that "if a comparable fuel [has] legitimate energy value and the same hazardous constituents in comparable concentrations to those in fossil fuel (and satisfies other parameters related to comparability as well), [then] classifying such material as a fuel product and not as a waste promotes RCRA's resource recovery goals without creating any risk greater than those posed by the commonly used commercial fuels."[5] Under the final 1998 CFE rule, any hazardous waste-derived fuel that met certain specifications comparable to fossil fuels, such as levels of hazardous constituents, viscosity, and heating value, would be exempt from the regulatory definition of solid waste. A generating facility must comply with requirements delineated by the rule regarding sampling and analysis, notification and certification, and recordkeeping for its comparable fuel to be excluded. The exclusion could be applied to liquid hazardous waste-derived fuels, but not to solids or used oils.

Since the promulgation of the 1998 CFE rule, several stakeholders have expressed concerns about regulatory constraints that have prevented facilities from using potentially eligible waste streams as comparable fuels. These barriers include analytical costs and over-rigid specifications. The regulated community contends that the removal of these barriers could lead to a significant increase in the volume of waste eligible for the comparable fuels exclusion. In addition, the 2005 OMB report *Regulatory Reform of the U.S. Manufacturing Sector* recommends that EPA remove these barriers to achieve the full potential of the exclusion.

In response to these concerns, EPA is currently examining the effectiveness of the comparable fuels exclusion and is considering adjustments to the 1998 CFE Rule to eliminate regulatory constraints without compromising the protection of human health and the environment. Specifically, EPA is proposing to expand the exclusion to include fuels that are produced from a hazardous waste but which generate emissions when burned in an industrial boiler that are effectively comparable to emissions from burning fuel oil. Such excluded fuel would be called emission-comparable fuel (ECF).

Exhibit 1 summarizes the requirements and conditions of the proposed rule (referred to as the Agency Selected Approach throughout this document) and two regulatory alternatives. As indicated in the exhibit, ECF under the proposed rule would be subject to the same constituent concentration limits that apply to comparable fuels, except that the limits for certain hydrocarbons and oxygenates would be waived.[6] In addition, the Agency Selected Approach and the two alternatives outlined in Exhibit 1 would require boilers that burn ECF to meet the

[5] Federal Register, Vol. 63, No. 118, June 19, 1998, 33783.

[6] Under the proposed rule, the constituent concentration limits for all hydrocarbons and oxygenates are waived, except those for PAHs (polycyclic aromatic hydrocarbons) and naphthalene. PAHs include the following: 3-Methylcholanthrene; 7,12-Dimethylbenz(a)anthracene; Benzo(a)anthracene; Benzo(a)pyrene; Benzo(b) fluoranthene; Benzo(k)fluoranthene; Chrysene; Dibenzo(a,h)anthracene; Fluoranthene; and Indeno(1,2,3-cd)pyrene. For a complete list of hydrocarbons and oxygenates included in the 1998 CFE rule, see Federal Register, Vol. 64, No. 189, September 30, 1999, 53071.

design and operating conditions set forth in 40 CFR 266.10. These conditions include the following: (1) the burner must be a watertube steam boiler other than a stoker-fired boiler; (2) carbon monoxide (CO) must be monitored continuously, must be linked to an automatic ECF feed cutoff system, and must not exceed 100 parts per million by volume (ppmv) on an hourly rolling average; (3) the boiler must fire at least 50% primary fuel on a heating value or volume basis, whichever results in a higher volume, and the primary fuel must be fossil fuel or equivalent with a heating value not less than 8,000 Btu/lb; and (4) the ECF must have an as-fired heating value of 8,000 Btu/lb or greater.[7] The Agency Selected Approach and the two alternatives would also require affected facilities to meet various tracking and storage requirements, as outlined in Exhibit 1.[8]

This report assesses the costs, benefits, and economic impacts associated with the Agency Selected Approach and the two alternative options considered by EPA. The remainder of this report outlines our analysis in the following sections:

- **Baseline generation and management of potential ECF**. This section discusses how we identified the waste streams that could potentially be affected by the ECF exclusion and summarizes these waste streams.

- **Methodology overview**. In this section, we detail the approach used to estimate the economic impacts of the Agency Selected Approach and the two alternative options, including a discussion of the data used and the methodology developed to perform the analysis.

- **Results**. This section presents our estimates of the costs, benefits, and other impacts associated with the Agency Selected Approach and the two alternative options considered by EPA.

- **Equity considerations and other impacts**. In this section, we address equity impacts and other regulatory concerns associated with the proposed ECF exclusion.

[7] The Preamble for the proposed rule contains additional information on the design and operating conditions required of boilers that burn ECF.

[8] In addition to the storage requirements outlined in Exhibit 1 for emission-comparable fuel, EPA also considered the adoption of storage conditions, such as SPCC requirements, for currently excluded comparable fuel. The Agency does not believe that applying SPCC controls is warranted at this time because there is no evidence of improper storage of comparable fuels. Nevertheless, EPA is requesting comments on whether SPCC controls are warranted for comparable fuels that meet the existing comparable fuel exclusion.

Exhibit 1

Summary of the Agency Selected Approach and Two Alternative Options

	Agency Selected Approach	Alternative Option A	Alternative Option B*
ECF Constituent Concentration Limits	Constituent concentration waiver for hydrocarbons and oxygenates listed in the 1998 CFE rule, excluding PAHs and naphthalene.	For the low-end estimate, constituent concentration waiver for hydrocarbons and oxygenates listed in the 1998 CFE rule, excluding PAHs and naphthalene. For the high-end estimate, constituent concentration waiver for hydrocarbons and oxygenates listed in the 1998 CFE rule, including PAHs and naphthalene.	Constituent concentration waiver for hydrocarbons and oxygenates listed in the 1998 CFE rule, excluding PAHs and naphthalene.
ECF Boiler Requirements	Boilers burning ECF must meet the requirements of 40 CFR 266.110.	Boilers burning ECF must meet the requirements of 40 CFR 266.110.	Boilers burning ECF must meet the requirements of 40 CFR 266.110.
ECF Tracking Requirements	Modified version of used oil tracking requirements: • One-time notice indicating intent to use the exclusion • One-time certification of compliance with burner controls (offsite burner only) • Maintain records of ECF shipments • Shipping paper with warning indicating that the material has been conditionally excluded from the regulatory definition of hazardous waste	DSW tracking requirements: • One-time notice indicating intent to use the exclusion • One-time certification of compliance with burner controls (offsite burner only) • Maintain records of ECF shipments • Shipping paper required, but warning on shipping paper not required	Hazardous waste management system requirements: • Manifest for ECF shipped offsite • Offsite burner and transporter need to obtain EPA ID • One-time certification of compliance with burner controls (offsite burner only) • Maintain records of ECF shipments • Warning on shipping paper indicating that the material has been conditionally excluded from the regulatory definition of hazardous waste
ECF Generator/Burner Storage Controls	• Engineered secondary containment system • Inspection/Monitoring of equipment • Leak cessation and containment • Certification of major repairs • Notification of leaks not required • Detailed report of leaks not required	• Dikes and berms for secondary containment • Inspection/Monitoring of equipment • Leak cessation and containment • Certification of major repairs • Notification of leaks not required • Detailed report of leaks not required	• Engineered secondary containment systems • Inspection/Monitoring of equipment • Leak cessation and containment • Certification of major repairs • Notification of leaks • Detailed reporting of leaks to EPA

Exhibit 1

Summary of the Agency Selected Approach and Two Alternative Options

	Agency Selected Approach	Alternative Option A	Alternative Option B*
	• Develop/Certify/Renew SPCC plan • Renew response plan to EPA Regional Administrator • Operator training (generators and burners that take ECF from another facility)	• SPCC plan development/renewal not required • Renewal of response plan not required • Operator training (generators and burners that take ECF from another facility)	Regional Administrator • Closure costs and related financial assurance recordkeeping (burner only) • SPCC plan development/renewal not required • Renewal of response plan not required • Groundwater monitoring (offsite burner only) • New permit (offsite burner only) • Operator training (generators and burners that take ECF from another facility)
Air Emissions Controls for Storage/Transfer of ECF	Hazardous waste technology standards as under Organic Liquid Distribution (OLD) NESHAP (40 CFR 63 Subpart EEEE)	Existing Federal/State controls on air emissions (e.g., NESHAP, NSPS, State VOC controls)	Hazardous waste management system emissions requirements under 40 CFR 264/265 Subpart BB (air emissions from equipment leaks) and 40 CFR 264/265 Subpart CC (air emissions from tanks)

* Note: As indicated in our discussion of impacts, we developed low, middle, and high impact estimates for Alternative Option B to account for uncertainty in the impacts likely under this option. We summarize the analytic assumptions that underlie these estimates in the results section of this report.

BASELINE GENERATION AND MANAGEMENT OF POTENTIAL EMISSION-COMPARABLE FUEL

To evaluate the impact of the ECF rule, it is necessary to characterize the baseline generation and management of waste that might qualify for the proposed exclusion. Using EPA's 2003 National Biennial RCRA Hazardous Waste Report (BRS) database, we identified all waste streams that could potentially be affected by the exclusion. This section summarizes these waste streams.

As indicated above, ECF under the proposed rule would be subject to many of the same specifications that apply to comparable fuels as outlined in the 1998 CFE rule. These include restrictions regarding the waste fuel's viscosity, heating value, and constituent concentrations. Based on the viscosity and heating value requirements of the proposed rule, we assume that only organic liquid wastes could potentially qualify for the ECF exclusion. In addition, among organic liquids, we assume that only those that do not contain halogens or dioxins have the potential to qualify for the proposed exclusion because of the constituent concentration limits set forth in the proposed rule. Applying these assumptions to EPA's 2003 BRS database, our analysis indicates that approximately 41,000 waste streams could potentially qualify for the ECF exclusion, amounting to an estimated 5.55 million tons of waste generated by 10,876 facilities.

Exhibit 2 summarizes this waste by 4-digit NAICS code, as reported in the BRS. The ten industry sectors represented in Exhibit 2 generate approximately 93 percent of all waste that may be affected by the ECF exclusion (i.e., non-halogenated, non-dioxin organic liquids in the 2003 BRS).[9] As shown in Exhibit 2, more than 80 percent of the potentially eligible waste is produced as a result of manufacturing processes (i.e., those with NAICS code beginning with 32), with the remainder generated by the waste treatment and disposal industry (NAICS 5622) and the remediation and other waste management services sector (NAICS 5629). The greatest amount of potentially affected hazardous waste is generated by the petroleum and coal products industry, which represents 50 percent of the potentially affected waste.

[9] For the remainder of the report, we use the terms "potentially eligible," "potentially qualify," or "potentially affected" to describe wastes that are non-halogenated, non-dioxin organic liquids (i.e., waste that may qualify as ECF). Similarly, we describe potentially qualifying waste that meet the ECF criteria under the proposed exclusion as "eligible waste" or "qualifying waste."

Exhibit 2 Waste That Could Potentially Qualify as Emission-Comparable Fuel, by NAICS Code			
NAICS Code	**Industry Description**	**Waste Quantity (tons)**	**Waste Quantity (% of total)**
3241	Petroleum and Coal Products Manufacturing	2,782,900	50%
3251	Basic Chemical Manufacturing	1,295,400	23%
5622	Waste Treatment and Disposal	353,900	6%
3254	Pharmaceutical and Medicine Manufacturing	174,700	3%
3252	Resin, Synthetic Rubber, and Artificial Synthetic Fibers and Filaments Manufacturing	154,500	3%
5629	Remediation and Other Waste Management Services	133,600	2%
3255	Paint, Coating, and Adhesive Manufacturing	91,800	2%
3259	Other Chemical Product and Preparation Manufacturing	70,800	1%
3222	Converted Paper Product Manufacturing	50,200	1%
3261	Plastics Products Manufacturing	33,900	1%
	Subtotal:	5,141,800	93%
All others	Other	409,700	7%
	Total:	5,551,500	100%
Source: U.S. EPA, 2003 BRS. Waste quantities reflect non-halogenated, non-dioxin organic liquids included in the 2003 BRS.			

Exhibit 3 summarizes waste streams that may be affected by the proposed rule (i.e., non-halogenated, non-dioxin organic liquids) by baseline management method. As indicated in Exhibit 3, approximately 40 percent of the potentially affected waste is currently handled using deepwell or underground injection. Energy recovery is the second most prominent management method, followed closely by biological treatment. Waste managed through incineration in the baseline and waste sent to fuel blenders in the baseline each represent 8 percent of the waste potentially affected by the exclusion.

Exhibit 3

Waste That Could Potentially Qualify as Emission-Comparable Fuel, by Baseline Management Method

Management Code	Management Method[1]	Waste Quantity[2] (Tons)	Waste Quantity[2] (%)
H134	Deepwell or underground injection (with or without treatment)	2,161,500	39%
H050	Energy recovery at this site – used as fuel (includes on-site fuel blending before energy recovery)	816,000	15%
H081	Biological treatment with or without precipitation (includes any preparation or final processes for consolidation of residuals)	648,600	12%
H135	Discharge to sewer/POTW or NPDES (with prior storage – with or without treatment)	522,300	9%
H040	Incineration – thermal destruction other than use as a fuel (includes any preparation prior to burning)	465,800	8%
H061	Fuel blending prior to energy recovery at another site (waste generated either onsite or received from offsite)	417,300	8%
H020	Solvents recovery (distillation, extraction, etc.)	110,700	2%
H141	The site receiving this waste stored/bulked and transferred the waste with no treatment or recovery, fuel blending, or disposal at that receiving site	103,100	2%
H039	Other recovery or reclamation for reuse including acid regeneration, organics recovery, etc.	49,400	1%
H123	Settling or clarification (as the major component of treatment)	37,200	1%
	Subtotal:	5,331,900	96%
All other management methods	All other management methods reported in the 2003 BRS	212,100	4%
No management method reported	Waste that did not have an associated management method code	7,500	0%
	Total:	**5,551,500**	**100%**

Source: U.S. EPA, 2003 BRS. Waste quantities reflect non-halogenated, non-dioxin organic liquids included in the 2003 BRS.

Note:

1. As defined by U.S. EPA, *2003 Hazardous Waste Report Instructions and Forms*, October 2003.
2. Totals may not add up due to rounding.

METHODOLOGY OVERVIEW

In this section, we describe our methodology for estimating the impacts of the ECF exclusion. Because these impacts depend significantly on the quantity of waste that facilities are able to exclude from the regulatory definition of hazardous waste under the proposed rule, the first portion of this section focuses on our approach for estimating the tonnage of waste that would qualify for the ECF exclusion. We then present our methodology for estimating the

benefits and costs of excluding this waste from the regulatory definition of hazardous waste under the proposed rule.

Estimating the Quantity of Waste Qualifying for the Emission-Comparable Fuel Exclusion

As indicated above, approximately 5.55 million tons of waste may potentially qualify for the proposed exclusion. Much of this waste, however, will not qualify for the ECF exclusion because it does not meet the constituent or thermal specifications of the rule, as outlined above. Ideally, we would obtain constituent and Btu information on each potentially affected waste stream from the 2003 BRS or other recent data sources and use this information to determine whether each waste stream would qualify for the exclusion. Unfortunately, the 2003 BRS does not contain data related to the constituent concentrations and thermal values of each waste stream. We therefore use data on these two variables from the 1996 National Hazardous Waste Constituent Survey (NHWCS) to estimate the percentage of potentially affected waste that would qualify for the exclusion. Below we summarize the NHWCS and describe how we used data collected through the survey to estimate the tonnage of waste that would qualify as ECF.

National Hazardous Waste Constituent Survey

The NHWCS was designed and conducted by EPA's Office of Solid Waste to collect information about the physical characteristics of industrial hazardous waste streams. EPA administered the survey in 1996 to 221 of the largest hazardous waste generation and management facilities in the U.S. Although these facilities accounted for more than 90 percent of the waste quantity included in the 1993 BRS, the survey only requested information pertaining to *major* waste streams that these facilities reported to EPA for the 1993 BRS. The survey defined a major waste stream as any wastewater waste stream greater than 40,000 tons or non-wastewater waste stream of more than 400 tons.

The NHWCS data most relevant to the proposed ECF exclusion are as follows:

- **Waste Stream Heat Content:** The NHWCS database contains the heat content (i.e., Btu per pound) of each waste stream included in the database. We use this information to assess whether each waste stream in the database would meet the thermal content requirements of the proposed rule.

- **Constituent Concentrations:** The NHWCS asked surveyed respondents to indicate the concentration of each constituent included in a waste stream. We use this information to determine whether individual waste streams in the database would meet the constituent concentration limits outlined in the proposed ECF exclusion.

- **Waste Form:** The NHWCS database reports the waste form of each waste stream included in the database. Based on this information, we are able to identify which waste streams in the database are non-halogenated organic liquids.[10]

- **BRS Waste Code:** The NHWCS database reports the BRS waste codes associated with each waste stream. Each waste code represents the presence (but not concentration) of a specific substance. We use this information to determine which waste streams in the NHWCS database contain dioxins or furans.[11]

Percentage and Tonnage of Affected Waste Qualifying for the Proposed Exclusion

To estimate the total tonnage of waste likely to qualify for the proposed ECF exclusion, we use data from the NHWCS to estimate the percentage of potentially eligible waste that would qualify for the exclusion.[12] Although a single qualifying percentage could be estimated for all waste streams, we estimated separate qualifying percentages for four individual waste stream groups:

> ***Group 1:*** Waste streams managed through deepwell/underground injection (2003 BRS waste form code H134), discharge to sewer/POTW (2003 BRS waste form code H135), or biological treatment (form code H081) in the baseline.
>
> ***Group 2:*** Waste streams currently managed through energy recovery (form code H050) or fuel blending prior to energy recovery (form code H061).
>
> ***Group 3:*** Waste streams managed through incineration (form code H040) in the baseline.
>
> ***Group 4:*** All other waste streams.

We designed these groups to include similar waste streams. For example, all of the waste streams in Group 2 are likely to have a relatively high thermal value.

Based on the specifications of the proposed ECF exclusion and the above-referenced data included in the NHWCS database, we estimated the percentage of potentially affected waste (i.e., non-halogenated, non-dioxin organic liquids) in each group likely to qualify for the ECF exclusion. As indicated in Exhibit 4, the NHWCS data suggest that approximately 3 percent of

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[10] As indicated above, the wastes that could potentially qualify for the exclusion are non-halogenated, non-dioxin organic liquids. The waste form information in the NHWCS database helps us identify which waste streams in the database are consistent with this description.

[11] As indicated above, the wastes potentially affected by the rule are non-halogenated, non-dioxin organic liquids. Similar to the waste form data described above, the waste code information in the NHWCS database helps us identify waste streams in the database that fit this description.

[12] Appendix A provides a more detailed description of our approach for estimating the percentage of potentially eligible waste that is likely to qualify for the proposed ECF exclusion.

the potentially eligible waste in Group 2 would qualify for the exclusion under the Agency Selected Approach and Alternative Option B. EPA staff familiar with the waste streams in Group 2 have suggested that this 3 percent value in all likelihood underestimates the proportion of potentially affected H050 and H061 waste that would qualify for the proposed ECF exclusion, and have indicated that a 10 percent value would be more appropriate. Therefore, we used a 10 percent qualifying percentage for Group 2 to estimate the total tonnage of waste eligible for the exclusion. Based on this figure, we estimate that approximately 182,800 tons of waste will qualify for the exclusion under the Agency Selected Approach and Alternative Option B.

Exhibit 4

Summary of Waste Qualifying for the Emissions-Comparable Fuels Exclusion under the Agency Selected Approach and Alternative Option B

Group[1]	NHWCS-based qualifying percentage	Final Qualifying Percentage	Potentially Eligible Waste Tonnage	Waste Tonnage Qualifying for the Exclusion
Group 1	0 percent	0 percent	3,332,400	0
Group 2	3.0 percent	10.0 percent	1,233,300	123,300
Group 3	11.1 percent	11.1 percent	465,800	51,700
Group 4	1.5 percent	1.5 percent	520,000	7,800
TOTAL			5,551,500	182,800

Sources: Based on data from U.S. EPA, National Hazardous Waste Constituent Survey and U.S. EPA, 2003 BRS.
Notes:

1. Group 1 includes waste streams managed through deepwell/underground injection, discharge to a sewer/POTW, or biological treatment. Group 2 includes waste streams managed through energy recovery or fuel blending prior to energy recovery. Group 3 includes waste streams managed through incineration, and Group 4 includes all waste streams not included in Groups 1, 2, or 3.

Exhibit 5 presents the estimated qualifying percentages and waste tonnages for each group under Alternative Option A. As indicated in this exhibit, we expect that the tonnage of waste eligible for the exclusion under Alternative Option A would be nearly the same as the qualifying tonnage under the Agency Selected Approach and Alternative Option B. For waste streams in Group 1, Group 2, and Group 4, the eligible tonnage is exactly the same under all three options, but the qualifying tonnage for Group 3 waste (i.e., waste that is incinerated in the baseline) may be slightly higher under Alternative Option A than under the other two options. This reflects the potential for a constituent concentration limit waiver for PAHs and naphthalene under Alternative Option A.[13] Our analysis of the NHWCS data suggests that such a waiver would increase the percentage of Group 3 waste that qualifies for the exclusion from 11.1 percent to 11.5 percent. For the purposes of this analysis, EPA is interested in examining the impacts of Alternative Option A with and without the PAH/naphthalene waiver; therefore, we present analytic results for this option as a range to reflect both of these scenarios.

[13] As indicated in Exhibit 1, the emission-comparable fuel constituent concentration limits for PAHs and naphthalene are the same under the Agency Selected Approach and Alternative Option B as under the 1998 Comparable Fuels Exclusion Rule.

Exhibit 5

Summary of Waste Eligible for the Emissions-Comparable Fuels Exclusion under Alternative Option A

Group[1]	NHWCS-based qualifying percentage	Final Qualifying Percentage	Potentially Affected Waste Tonnage	Waste Tonnage Qualifying for the Exclusion
Group 1	0 percent	0 percent	3,332,400	0
Group 2	3.0 percent	10.0 percent	1,233,300	123,300
Group 3	11.1-11.5 percent	11.1-11.5 percent	465,800	51,700-53,600
Group 4	1.5 percent	1.5 percent	520,000	7,800
TOTAL			5,551,500	182,800-184,700

Sources: Based on data from U.S. EPA, National Hazardous Waste Constituent Survey and U.S. EPA, 2003 BRS.
Notes:

1. Group 1 includes waste streams managed through deepwell/underground injection, discharge to a sewer/POTW, or biological treatment. Group 2 includes waste streams managed through energy recovery or fuel blending prior to energy recovery. Group 3 includes waste streams managed through incineration, and Group 4 includes all waste streams not included in Groups 1, 2, or 3.

To estimate the quantity of qualifying ECF generated by each facility affected by the rule, we used waste quantity data from the 2003 BRS and the qualifying percentages in Exhibits 4 and 5. For example, if a facility reported 100 tons of potentially eligible Group 2 waste in the 2003 BRS and 50 tons of potentially eligible Group 3 waste, we assume that it had 15.55 tons of emission-comparable fuel (0.10 x 100 + 0.11 x 50= 15.55) under the Agency Selected Approach and Alternative Option B.

Impact Estimation Methodology

Under the proposed ECF rule, facilities may realize a number of benefits and costs if they use the exclusion. To estimate these impacts, we follow the process outlined below.

- First, we estimate the potential impacts that would be realized by each generator with eligible waste if it chose to use the exclusion.

- Second, for waste generated by facilities that would need to send their waste offsite to use the exclusion, we estimate the potential impacts that receiving facilities would realize if they accepted this waste.[14]

- Third, based on the impacts realized by generators and receiving facilities, we determine which generators would likely use the exclusion. In making this determination, we assume that generators with a boiler eligible to burn ECF will use the exclusion only if the benefits of doing so outweigh the costs. We assume that the

[14] As indicated in Exhibit 1, a facility must have a boiler that meets the requirements of 40 CFR 266.110 to burn emission-comparable fuel. Facilities that generate ECF but that do not have a boiler that meets the 266.110 specifications, or that could not be easily modified to meet these specifications, would need to send its emission-comparable fuel offsite to use the exclusion.

same condition applies to generators that do not have a boiler eligible to burn ECF, but we also assume that these facilities would use the exclusion only if receiving facilities would be willing to accept the ECF of these generators (i.e., if the ECF-related benefits realized by the receiving facilities exceed the corresponding costs).

- After identifying the generators that are likely to use the exclusion, we estimate the total social costs and benefits of the proposed rule, and also evaluate the key secondary impacts of the proposed exclusion for commercial incinerators and commercial kilns.

We describe our methodology in greater detail below.

Estimation of Potential Impacts

As indicated above, a key step in assessing the impacts of the proposed rule is estimating the potential benefits and costs realized by waste generators if they decide to use the exclusion and the impacts realized by facilities that receive ECF from generators that cannot burn their ECF onsite. Below we summarize these benefits and costs and outline our approach for estimating the value of these impacts.[15]

- **Fuel cost savings.** Under the proposed ECF exclusion, generating facilities with qualifying waste may decide to burn their ECF onsite for its fuel value. Based on the requirements of the proposed rule, we assume that only those facilities with non-stoking watertube boilers could engage in this practice.[16,17] These facilities could reduce their

[15] Appendix C presents the cost inputs used to estimate these impacts.

[16] Detailed data are not available to indicate whether each generating facility has a non-stoking watertube boiler onsite. According to a document published by the State and Territorial Air Pollution Program Administrators (STAPPA) and the Association of Local Air Pollution Control Officials (ALAPCO), however, "watertube boilers… commonly have a heat input of 10-250 MMBtu/hr" while "firetube boilers [have] typical heat inputs of 1-30 MMBtu/hr." In addition, Energy and Environmental Analysis, Inc. notes that "one reason that firetube designs are not desirable for high pressure (>200 psig) or high capacity (>10 MMBtu) applications is that the entire boiler would be under pressure and a failure of the pressure vessel would be more serious than a failure of a single tube in a watertube boiler." As a result, using data from EPA's National Emissions Inventory (NEI), we assume that a generating facility has a watertube boiler if it has at least one high capacity boiler capable of a heat input of greater than 10 MMBtu. We assume that each watertube boiler identified using the method above is a non-stoking watertube boiler unless the 2002 National Emissions Inventory indicates that it uses non-pulverized solids (e.g., coal) as its primary fuel. Because the NEI does not provide enough information to make a definitive determination of whether each boiler is a non-stoking watertube boiler, our analysis may not accurately reflect which boilers could burn emission-comparable fuels and which boilers could not. (Sources: Energy and Environmental Analysis, Inc., "Characterization of the U.S. Industrial/Commercial Boiler Population," May 2005, available at the Council of Industrial Boiler Owners' (CIBO) website, accessed on October 6, 2006 at <http://www.cibo.org/pubs/industrialboilerpopulationanalysis.pdf>; and STAPPA and ALAPCO, "Controlling Nitrogen Oxides Under the Clean Air Act: A Menu of Options," July 1994, available at <http://www.p2pays.org/ref/02/01245.htm >.

[17] Boilers burning ECF must also meet the other requirements of 40 CFR 266.110, but we assume that a non-stoking watertube boiler could be modified to meet these requirements. The cost of doing so is reflected in our estimates of the rule's costs.

consumption of fuel from other sources under the proposed rule and therefore experience a reduction in their fuel costs. For each facility with an eligible boiler (i.e., a non-stoking watertube boiler), we estimate these potential fuel cost savings based on the value of the fuel the ECF would displace and the tonnage of qualifying ECF generated by the facility that is not already burned by the facility for energy recovery in the baseline.[18,19]

If a generator does not have an eligible boiler onsite, we estimate the fuel cost savings that would be realized by a facility that purchased the waste. We develop this estimate based on the tonnage of ECF available from the generating facility, our estimate of the average thermal content of ECF (12,200 Btu per pound), and the average price per MMBtu of fuels that the ECF would displace at the receiving facility.[20]

- **Revenues.** Generating facilities that have qualifying ECF but do not have an eligible boiler (i.e., a non-stoking watertube boiler) onsite may choose to sell their ECF to other facilities. We estimate the revenues a generator would receive from off-site facilities based on the tonnage of ECF generated by the facility and our estimate of the market price of ECF.[21]

- **Management cost savings.** Facilities with waste streams that qualify for the exclusion could divert their waste from baseline management practices and experience a reduction

[18] For each generating facility with an eligible boiler onsite, we estimate the value of the fuel that the facility's ECF would displace based on the fuels used by the facility in the baseline, as indicated by the 2002 National Emissions Inventory (NEI). For each facility, the 2002 NEI indicates the number of boilers located onsite and the fuels used in each boiler. Based on this information and the value of each fuel used by each facility, we estimated the weighted average value of the fuels (per MMBtu) used by each facility in the baseline, using the number of boilers by fuel type as weights. For example, natural gas has an average price of $8.22 per MMBtu ($2005) and coal has an average price of $1.80 per MMBtu ($2005). If a facility had two natural gas boilers and one coal boiler, we assume that the average value of the facility's fuel is $6.08 per MMbtu (2/3 of $8.22 plus 1/3 of $1.80). (Sources: Natural gas price based on U.S. Energy Information Administration (EIA), "Natural Gas Prices," accessed on March 16, 2006 at: <http://tonto.eia.doe.gov/dnav/ng/ng_pri_sum_dcu_nus_a.htm>; coal price from U.S. EIA, *Annual Coal Report 2004*.)

[19] Based on the waste management method definitions used by EPA for the 2003 BRS, we assume that waste streams with management method codes H050 and H061 (i.e., energy recovery and fuel blending prior to energy recovery, respectively) are burned for energy recovery in the baseline. Although the 2003 BRS defines incineration as thermal destruction other than use as a fuel, some facilities may report waste as incinerated if the waste is burned in an incinerator to maintain temperatures high enough for efficient incineration of other wastes. As a result, some facilities' characterization of incineration may be inconsistent with the BRS definition of incineration. It is unclear how widespread this misreporting may be. To be consistent with the BRS definition of incineration, we assume that waste classified as incinerated in BRS is not used for energy recovery purposes.

[20] We estimate an average thermal content of ECF of 12,200 Btu per pound based on our assessment of waste streams in the 1996 NHWCS that could potentially qualify as ECF (i.e., non-halogenated, non-dioxin organic liquids). We assume that the average price for fuels that the ECF would displace at the receiving facility is $7.55 per MMBtu. We determined this price based on consumption-weighted sale prices of natural gas, distillate fuel, residual fuel, and coal using fuel prices and consumption data reported by the U.S. Energy Information Administration (EIA). See Appendix C for additional information.

[21] Appendix B presents our methodology for estimating the market price of ECF. Because of the costs associated with burning ECF, the market price of ECF will likely be less than the value of the fuel it would displace.

in their hazardous waste management costs under the proposed rule. We estimate these potential management cost savings based on the waste management data reported by each generating facility in the 2003 BRS and the average per ton costs of each management method.[22]

- **Hazardous waste transport cost savings.** As noted earlier, we assume that a facility will burn its ECF onsite if it has a non-stoking watertube boiler onsite. Therefore, under the exclusion, facilities may enjoy hazardous waste transport cost savings if waste managed onsite under the exclusion was transported offsite in the baseline. These avoided transport costs include costs associated with loading/unloading trucks, washing and decontaminating trucks, and mileage costs. We estimate these costs based on the tonnage of ECF generated by each facility that is sent offsite in the baseline and the average distance each facility sends this waste in the baseline.[23]

- **Emission-comparable fuel transport costs.** Facilities that generate ECF and have a non-stoking watertube boiler would experience transport cost savings because they would opt to burn their ECF onsite instead of transporting it offsite. However, those facilities that do not have an eligible boiler onsite would need to transport their ECF offsite to take advantage of the exclusion and would incur the transport costs listed above (e.g., loading/unloading fees, washing fees, decontamination fees, mileage costs).[24]

- **Tracking savings/costs.** The tracking requirements under the proposed exclusion are less stringent than under baseline conditions. For example, hazardous waste manifests would not be required for ECF under the proposed rule. Therefore, generators may realize tracking savings under the proposed rule. In addition, facilities that opt to use the exclusion by burning ECF onsite may send fewer shipments offsite, which would also lower their tracking costs. For waste generated by facilities without an eligible boiler onsite (i.e., facilities that would need to ship their ECF offsite to take advantage of the exclusion), these tracking cost savings could be offset by the tracking costs associated with shipments of ECF offsite. A portion of such costs would be incurred by the receiving facility.

- **Storage savings/costs associated with ECF generation.** Similar to tracking savings/costs, generators that use the exclusion may experience storage cost savings

[22] Appendix C presents our estimates of the average costs per ton for each management method.

[23] We estimate these distances based on the location of each generator and the location of the facilities where each generator sends its emission comparable fuel in the baseline, as reported in the 2003 BRS.

[24] A key variable in estimating these transportation costs is the distance between each generator and the facility where it would send its ECF. However, because we do not know where individual facilities would send their ECF, these distances are uncertain. Absent this information, we assume that a generator in a given state would send its ECF the average distance of waste sent offsite from facilities in that state in the baseline. For example, waste sent offsite from New York facilities in the baseline is, on average, shipped 355 miles, based on facility location data in the 2003 BRS. Therefore, we assume that any ECF sent offsite from a New York facility is transported 355 miles.

because the ECF storage requirements under the proposed rule are less stringent than the baseline RCRA Subtitle C storage requirements. However, facilities that burn ECF must retrofit their boilers with ECF burner tanks and ensure that these boilers meet the other storage requirements of the proposed rule. For generators that burn their ECF onsite, storage savings exceed these costs, but facilities that receive ECF incur storage costs but realize no storage savings.

- **Boiler costs.** Facilities that generate ECF and can burn their ECF onsite would likely need to modify their boilers to meet the requirements of the proposed ECF exclusion.[25] More specifically, they would need to purchase AWCFO (Automatic Waste Feed Cut-off) systems, CO continuous emissions monitoring systems (CEMS), and fire nozzles. They would also incur annual operating and maintenance (O&M) costs associated with these items. We estimate these costs for generating facilities that burn their ECF onsite, and for offsite facilities that would receive ECF from generators that cannot burn their ECF onsite (i.e., ECF generators without a non-stoking watertube boiler).

- **Raw materials replacement costs.** Under the proposed exclusion, a generating facility that recycles some of its hazardous waste in the baseline may decide to burn this waste for energy recovery or sell it if the waste qualifies as ECF. Consequently, this facility would have to purchase raw materials to replace the materials recovered from the waste in the baseline (e.g., solvents recovered from the facility's waste). We estimate these raw material replacement costs based on the tonnage of these waste streams and the value of the material recovered from these streams.[26]

- **Waste stream analytical costs.** We also measure the analytical costs that generating facilities would face if they opt to use the proposed ECF exclusion. Such costs include annual testing and recordkeeping costs.

Decision Simulation

As indicated above, an important step in estimating the social costs and benefits of the proposed rule is determining which affected facilities are likely to use the exclusion. We make this determination for each ECF generator based on the cost and benefit impacts above. For each generator, we estimate the potential impacts of the exclusion as follows:

(1) $Benefits_{\text{generator}} = M + F_{SG} + R + T_{SG} + TR_{SG} + S_{SG}$

[25] Lucky Benedict, EERGC, Personal communication, July 5, 2006.

[26] Although many materials may be recovered from ECF in the baseline, we use solvents as a proxy for all recovered material. In addition, we assume that 33.5 percent of the waste affected by the rule represents recoverable solvent and that the value of the recovered solvent is $3,580 per ton, based on data in Gustafson, David and Christopher Engelmann, DPRA Inc., "Recycling Break-Even Analysis for the Economic Analysis Support for OSW's RCRA 'Definition of Solid Waste' (DSW) Final Rule; EPA Contract No. 68-W-02-007, WA 4-35; Revision to WA 3-35 Subtask 3E Deliverable," May 16, 2006, Memorandum to Mark Eads, U.S. EPA Office of Solid Waste.)

Where, $Benefits_{\text{generator}}$ = Benefits realized by the ECF generator if it uses the exclusion

M = Management cost savings realized by the generator if it uses the exclusion

F_{SG} = Fuel cost savings realized by the generator if it uses the exclusion (based only on waste not burned onsite for energy recovery by the generator in the baseline)

R = Revenues earned by the generator if it uses the exclusion (for facilities that cannot burn their ECF onsite)[27]

T_{SG} = Tracking cost savings realized by the generator if it uses the exclusion

TR_{SG} = Transport cost savings realized by the generator if it uses the exclusion (related to ECF sent offsite in the baseline)

S_{SG} = Net storage cost savings realized by the generator if it uses the exclusion

(2) $Costs_{\text{generator}} = T_{CG} + TR_{CG} + RM + A + B_{CG}$

Where, $Costs_{generator}$ = Costs incurred by the ECF generator if it uses the exclusion

T_{CG} = Tracking costs incurred by the generator if it uses the exclusion

TR_{CG} = Transport costs incurred by the generator if it uses the exclusion (for facilities that cannot burn their ECF onsite)

RM = Raw material replacement costs incurred by the generator if it uses the exclusion (applies only to waste that is recycled in the baseline)

A = Analytical costs incurred by the generator if it uses the exclusion

B_{CG} = Boiler costs incurred by the generator if it uses the exclusion

If $Benefits_{\text{generator}}$ are greater than $Costs_{\text{generator}}$ for a given facility *and* if the facility has a boiler in which it can burn its ECF (i.e., a non-stoking watertube boiler), we assume that the facility will use the exclusion. If the ECF-related benefits for a generator would exceed the corresponding costs but the generator does not have a boiler that could burn ECF, we assume that the generator would use the exclusion only if the benefits to be realized by the facility receiving the ECF exceed the costs. Otherwise, we assume that the generator would be unable to sell its ECF. We estimate the impacts to receiving facilities as follows:

(3) $Benefits_{\text{receiver}} = F_{SR}$

Where, $Benefits_{\text{receiver}}$ = Benefits realized by the facility that receives the generator's ECF

F_{SR} = Fuel cost savings realized by the facility that receives the generator's ECF.

(4) $Costs_{\text{receiver}} = E + T_{CR} + S_{CR} + B_{CR}$

Where, $Costs_{\text{receiver}}$ = Costs incurred by the facility that receives the generator's ECF

E = Cost of obtaining ECF from the generator

T_{CR} = Tracking costs incurred by the facility that receives the generator's ECF

S_{CR} = Storage costs incurred by the facility that receives the generator's ECF

B_{CR} = Boiler costs incurred by the facility that receives the generator's ECF

[27] Revenues are net of losing waste used as fuel by the generator in the baseline, if any.

Exhibit 6 summarizes our decision rules for generators that have an eligible boiler onsite and generators that do not have an eligible boiler onsite.

Exhibit 6

Decision Rules for Facilities that Generate Emission-Comparable Fuels

Type of Facility	*Facility Decision Rule*
Generator *with* an onsite boiler eligible to burn emission-comparable fuels.	The generator will use the exclusion only if $Benefits_{\text{generator}} > Costs_{\text{generator}}$
Generator *without* an onsite boiler eligible to burn emission-comparable fuels.	The generator will use the exclusion only if $Benefits_{\text{generator}} > Costs_{\text{generator}}$ **and** $Benefits_{\text{receiver}} > Costs_{\text{receiver}}$

It is important to note that a key assumption of our analysis is that one facility would receive ECF for each generator that ships its ECF offsite. Following implementation of the rule, however, it is possible that a given receiving facility will purchase ECF from multiple generators (i.e., the number of receiving facilities could be less than the number of generators sending their ECF offsite). Therefore, because many of the costs incurred by receiving facilities are fixed and do not depend on the quantity of ECF received, our assumption of one receiving facility per ECF generator shipping its waste offsite may lead to overestimation of receiver costs.

Estimation of Social Costs and Benefits

As outlined above, we estimate the economic impacts of the ECF exclusion for individual facilities to determine whether it would be worthwhile for them to use the exclusion. These private costs and benefits do not necessarily represent the social costs and benefits of the proposed rule, as some of these facility-level impacts simply represent a transfer from one facility to another. For example, a facility that sends 100 tons of waste to a cement kiln in the baseline would realize significant energy cost savings if it burned the waste onsite as an emission-comparable fuel under the proposed rule. Although these fuel cost savings would affect the facility's decision to use or not use the exclusion, we do not include them in our estimates of the social benefits of the rule because the cement kiln that received the waste in the baseline would need to purchase additional fuel to replace the waste fuel it lost as a result of the proposed rule.

For any given facility that decides to use the exclusion, we estimate the total social benefits and costs associated with this decision as follows:

(5) $Benefits_{\text{social}} = T_{SG} + M + F_s + TR_{SG} + S_{SG}$

Where, T_{SG} = Tracking cost savings realized by the generator
M = Management cost savings realized by the generator

F_s = Fuel value of that portion of the generator's eligible waste not burned for energy recovery in the baseline[28]
TR_{SG} = Transport cost savings realized by the generator
S_{SG} = Storage savings realized by the generator

(6) $Costs_{\text{social}} = T_C + TR_{CG} + RM + A + S + B_C$

Where, T_C = Tracking costs incurred by the generator and the receiving facility if the ECF is sent offsite
TR_{CG} = Transport costs incurred by the generator if it sends its ECF offsite
RM = Raw material replacement costs incurred by the generator, if appropriate
A = Analytical costs incurred by the generator
S = Storage costs incurred by the generator and any other facilities where the generator sends its ECF
B_C = Boiler costs incurred by the facility that burns the generator's ECF

As indicated in Equation 5, we do not include revenues earned from the sale of ECF in our estimates of the rule's social benefits. This reflects the fact that these revenues represent the fuel value of ECF sold on the open market. Because the social benefit estimates in Equation 5 already include the fuel value of ECF not burned for energy recovery in the baseline, we would be double counting the fuel savings of the rule if we added gross revenues from the sale of ECF to the benefits represented in Equation 5.

For each generator expected to use the exclusion, we estimate the net social benefits of the rule as the difference between the social benefits and social costs as specified in Equations 5 and 6.[29] We then estimate the *total* net social benefits of the proposed rule by aggregating the net social impacts associated with each facility that we expect to use the exclusion, as shown in Equation 7.

[28] For the purposes of estimating the fuel cost savings associated with the rule, we assume that fuel savings for wastes managed through energy recovery or fuel blending (i.e., BRS management method codes H050 and H061, respectively) in the baseline would be zero. For excluded wastes managed through other methods in the baseline, we assume fuel savings of 12,200 Btu per pound. The value of this energy depends on the fuel that it would replace. For example, consider a facility that currently generates 100 tons of ECF, 20 tons of which it sends to a fuel blender, 10 tons of which it sends to a commercial kiln, and 70 tons of which it burns in an incinerator onsite. If the facility were to use the exclusion, we would estimate fuel cost savings only for the 70 tons of ECF not sent to a fuel blender or a commercial kiln in the baseline. Based on the thermal value of 12,200 Btu per pound, this tonnage has a fuel value of 1,708 MMBtu. If the ECF would replace natural gas, which has a fuel value of $8.22/MMBtu, the facility's decision to use the exclusion would result in fuel savings of approximately $14,000.

[29] Because emissions associated with the combustion of excluded waste are expected to be comparable to those associated with conventional fossil fuels, we assume that the proposed rule will lead to no changes in human health and environmental outcomes and that the human health and ecological impacts of the rule are zero. Therefore, net social benefits in this report represent the difference between the cost savings and cost impacts of the proposed exclusion.

(7) $$TNSB = \sum_{i=1}^{n} (Benefits_{social} - Costs_{social})$$

Where, $TNSB$ = Total net social benefits of the emission-comparable fuel exclusion;
$Benefits_{social}$ = The social benefits associated with an individual facility's decision to use the exclusion;
$Costs_{social}$ = The social costs associated with an individual facility's decision to use the exclusion, and
n = The number of facilities that use the exclusion.

Secondary Impacts: Commercial Incinerators and Commercial Kilns

In addition to estimating social costs and benefits, we also evaluate the indirect impacts of the ECF exclusion on commercial incinerators and commercial kilns. Under the proposed rule, generators that currently send qualifying waste to commercial incinerators or commercial kilns may divert their waste away from these facilities. Therefore, commercial incinerators and kilns may experience an indirect (i.e., secondary) loss as a result of the rule. These secondary effects include revenue losses for both groups and fuel replacement costs for commercial kilns.[30] We estimate these impacts as follows:

(8) $RL_{Incinerators} = Q_{Incinerators} \text{ x } P_{Incinerators}$

Where $RL_{Incinerators}$ = Revenue losses for commercial incinerators;
$Q_{Incinerators}$ = Tonnage of waste that generators no longer send to offsite incinerators as a result of the rule, and
$P_{Incinerators}$ = Average tipping fee charge by commercial incinerators.[31]

(9) $RL_{Kilns} = Q_{Kilns} \text{ x } P_{Kilns}$

Where RL_{Kilns} = Revenue losses for commercial kilns;
Q_{Kilns} = Tonnage of waste that generators no longer send to commercial kilns as a result of the rule, and
P_{Kilns} = Average tipping fee charged by commercial kilns.[32]

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[30] Our estimates of commercial kiln revenue losses reflect waste that the 2003 BRS indicates is either sent offsite for energy recovery in the baseline (BRS waste form code H050) or sent to fuel blenders prior to energy recovery (BRS waste form code H061). We include the latter in our estimate because waste sent to fuel blenders is frequently sent to kilns who receive a fee from blenders for accepting the blended waste.

[31] We assume a per ton incineration cost of $237, based on the per gallon tipping fee for bulk non-halogen liquids at commercial incinerators. Environmental Technology Council, http://www.etc.org/costsurvey8.cfm.

[32] Based on pricing data on the Environmental Technology Council's website, we assume that the tipping fee charged by commercial kilns is the same as that charged by incinerators for bulk non-halogen liquids ($237 per ton). Environmental Technology Council, http://www.etc.org/costsurvey8.cfm. For waste that goes to fuel blenders before commercial kilns, we may overestimate the fee earned by commercial kilns. A portion of this fee is likely earned by fuel blenders.

(10) $F_{Kilns} = Q_{Kilns} \text{ x } E_{Kilns} \text{ x } P_{Substitute}$

Where F_{Kilns} = Fuel replacement costs for commercial kilns;
Q_{Kilns} = Tonnage of waste that generators no longer send to commercial kilns as a result of the rule;
E_{Kilns} = The average energy content of waste diverted away from kilns as a result of the exclusion (12,200 Btu/pound), and
$P_{Substitute}$ = The cost of substitute fuel.[33]

It is important to note that the incinerator and kiln revenue losses represented by Equations 8 and 9 do not offset the management cost savings represented in Equation 5. Although these revenue losses represent a cost in accounting terms to the incinerators and kilns, they do not represent a real resource cost of the rule. Exhibit 7 illustrates this point. In this exhibit, a generator pays a commercial incinerator $1,000 in the baseline to incinerate its waste but then uses the waste as an emission-comparable fuel under the proposed rule. As indicated in the pre-rule panel of the exhibit, the $1,000 paid by the generator to the commercial incinerator funds the use of the resources necessary to incinerate the generator's waste (i.e., labor, materials, and physical capital). Although the generator does not use any of its own labor, materials, or capital to incinerate the waste, it pays the commercial incinerator to use its own resources for this purpose. Once the rule goes into effect, however, the generator's waste is no longer incinerated, freeing up the resources expended for incineration in the baseline for other activities.[34] The value of this resource savings is $1,000, the fee paid by the generator in the baseline. To suggest that the lost revenues to the commercial incinerator offset this $1,000 in resource savings would imply that the value of the labor, materials, and capital saved as a result of the exclusion is zero.[35]

Similar to these revenue losses, the fuel replacement costs for commercial kilns do not offset the social fuel cost savings included in Equation 5. As indicated above, our estimate of the rule's social fuel cost savings includes only those savings associated with waste that is *not* burned for energy recovery in the baseline. For waste currently burned by commercial kilns for energy

[33] We assume that a commercial kiln would use coal as its fuel source in lieu of the waste it had received in the baseline. For the per ton cost of coal, we use the average delivered price for coal for industrial plants as reported in the *Annual Coal Report 2004* published by the US Energy Information Administration (EIA). Converting the per ton price into 2005 dollars, we use a price of $1.80/MMbtu (adjusted to 2005 dollars).

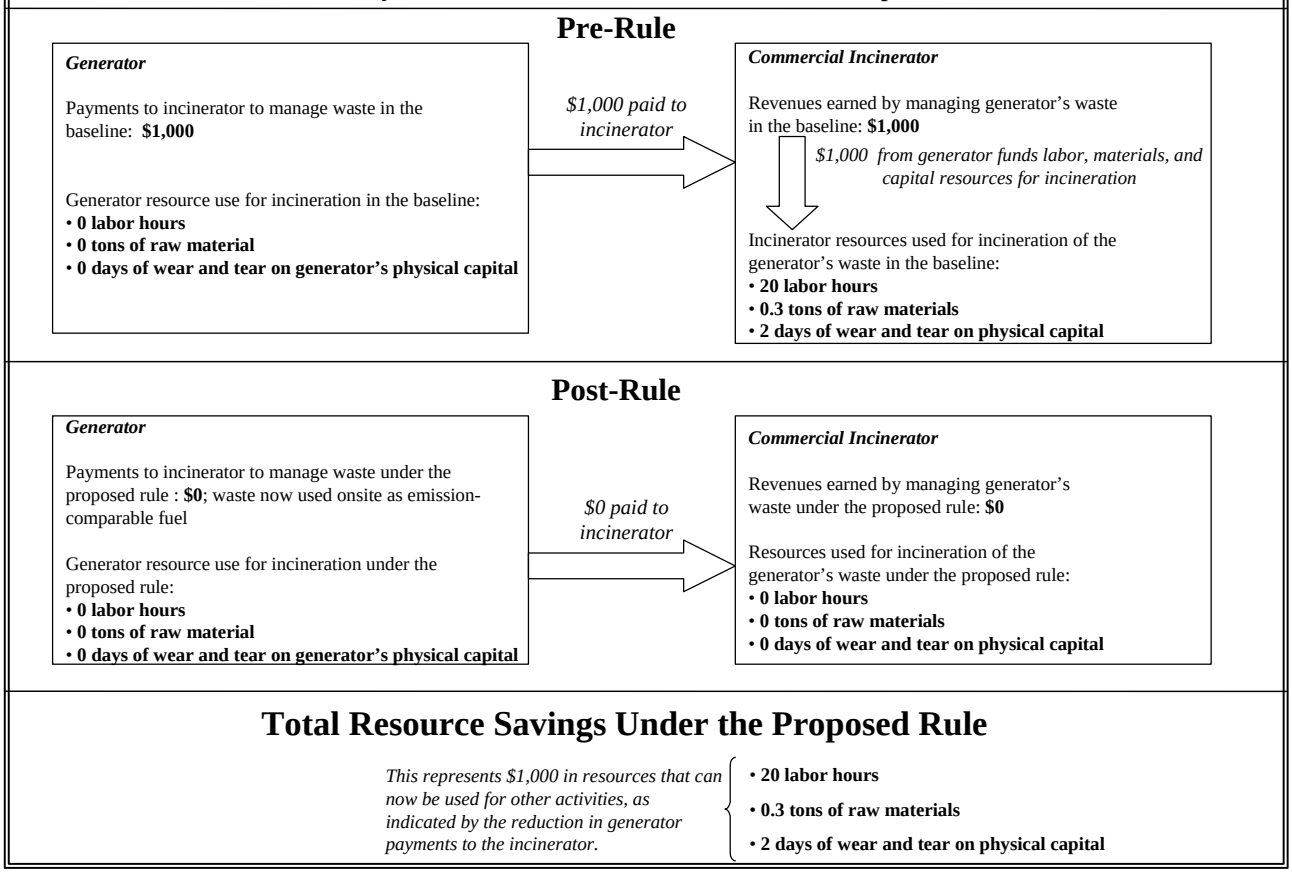
[34] In other words, the deregulatory nature of the ECF exclusion frees up resources that can be used more optimally elsewhere in the market, thereby improving overall economic efficiency.

[35] This argument can also be explained through another illustrative example. If a new regulation required facilities to install new pollution control systems, one of the impacts of the rule would be the cost of obtaining these new systems. The increase in revenues enjoyed by companies that manufacture pollution control systems, however, would not be considered an offset to the costs of the regulation because they simply represent the value of the resources used to produce the pollution control systems. While these manufacturers would experience revenue increases as a result of the regulation, the social cost of the regulation is the value of the resources that are diverted from other uses to the production of pollution controls.

recovery, we assume fuel savings of zero. Therefore, we do not need to offset the fuel savings reflected in Equation 5 with commercial kiln fuel replacement costs.

Exhibit 7

Illustration of Resource Savings Associated with Diverting A Generator's Waste Away from A Commercial Incinerator Under The Proposed Rule



Human Health and Ecological Impacts

Because the proposed rule was designed to ensure that emissions associated with the combustion of ECF are comparable to emissions associated with conventional fossil fuels, we assume that the proposed rule would yield no change in human health and environmental outcomes. Therefore, we did not conduct an in-depth analysis of the change in human health and ecological risk associated with the proposed rule.

Costs to Government

Under the proposed rule, the government will incur processing costs associated with certifying waste as ECF. Although we do not estimate these costs in this analysis, we do not expect these costs to be a significant burden as a result of the proposed ECF exclusion.

Methodological Limitations

Although the methods outlined above represent a reasonable approach for assessing the impacts of the proposed rule, it is important to highlight the key limitations of our analysis.

- **Qualifying percentages.** As indicated above, we estimate the tonnage of waste eligible for the exclusion based on the percentage of waste that we believe will qualify for the exclusion. We estimate these qualifying percentages based on constituent concentration and heating values reported in the 1996 National Hazardous Waste Constituent Survey (NHWCS). Since the composition of waste may have changed since 1996, the data from the NHWCS may not fully represent the constituent concentrations of today's waste streams. In the absence of more recent data, however, we believe the 1996 NHWCS database represents the best available information for this analysis.

  An additional limitation of the qualifying percentages estimated from the NHWCS is that they are aggregate rather than facility-specific figures. Although they may provide a reasonable approximation of the percentage of potentially eligible waste likely to qualify for the exclusion in aggregate, the qualifying percentages for individual facilities are likely to vary. Therefore, although our results are reasonable in aggregate, we may not fully represent impacts for individual facilities. For this reason, we present our impact estimates in aggregate only.

- **Eligible boilers at generating facilities.** As previously noted, we assume that a facility that generates ECF can burn it onsite only if the facility has an eligible boiler (i.e., a non-stoking watertube boiler). Based on data from the 2002 National Emissions Inventory (NEI), we assume that any boiler with a heat input greater than 10 MMBtu is a watertube boiler (see footnote 16). We further assume that each watertube boiler is a non-stoking boiler unless it burns non-pulverized coal. In the absence of data indicating which facilities have non-stoking watertube boilers, we believe that these assumptions provide a reasonable indication of which facilities can burn ECF onsite. For some boilers, however, our assumptions may not be valid.

- **Number of off-site facilities receiving ECF waste**. We assume that a generating facility without an eligible onsite boiler would send its qualifying ECF offsite if it chooses to use the exclusion. Because we do not know how many facilities would receive ECF from generators that cannot burn their ECF onsite, we assume that the number of facilities purchasing ECF is equal to the number of generating facilities expected to send their ECF offsite. In other words, we assume that each unique generator without an eligible boiler would send its ECF to a unique offsite facility. In practice, however, it is possible that multiple generators would send their ECF to the same receiving facility. Accordingly, we may overestimate total receiving facility costs because many of these costs are per-facility fixed costs that do not depend on the tonnage of ECF received. Similarly, it is also possible that a generator would send its ECF to multiple receiving facilities and that the number of receiving facilities could exceed the number of generators, in which case we may underestimate receiving facility costs.

- **Boiler retrofit costs.** We assume that all facilities that burn ECF will incur boiler retrofit costs associated with the installation of AWCFO (Automatic Waste Feed Cut-off) systems and CO CEMS (Continuous Emissions Monitoring Systems), as well as additional operating and maintenance costs. This assumption may result in overestimation of total boiler retrofit costs because some facilities may already have boilers with the requisite systems installed and will not incur these costs.

- **Location of off-site facilities receiving ECF waste**. Facilities that do not have an eligible boiler onsite will need to send their ECF offsite if they decide to use the exclusion. *Ex ante*, however, it is impossible to know where generators will send their waste or how far it will be transported. As described above, we assume that all facilities in a given state would send their waste the same distance.[36] It is unclear whether this assumption biases our estimates of the transport costs associated with the exclusion.

- **ECF pricing**. By creating the regulatory designation of emission-comparable fuel, the proposed rule, in effect, creates a new segment of the waste fuel market. As described above, we estimate the market price of ECF based on the value of fuels displaced by ECF and the costs incurred by facilities that receive ECF. While we believe our estimate of the market price of ECF is reasonable, we recognize that there remains a level of uncertainty regarding ECF pricing.[37]

- **ECF heating value**. Based on our assessment of waste streams in the 1996 National Hazardous Waste Constituent Survey (NHWCS), we assume that ECF has an average heating value of 12,200 Btu per pound.

- **Changes in commercial waste management prices**. To simplify our analysis, we do not account for potential reductions in prices charged by cement kilns and commercial incinerators in response to the rule.[38] Such changes could affect the decision of individual ECF generators to use or not use the exclusion. By not accounting for these potential price reductions, we may overestimate the quantity of waste excluded as a result of the rule.

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[36] See footnote 24.

[37] Appendix B outlines our approach for estimating the market price of emission-comparable fuel under each regulatory option.

[38] As part of our evaluation of Alternative Option B, however, we do reflect the possibility that commercial incinerators may reduce their tipping fees for ECF to retain the business of clients who generate waste newly classified as ECF under the proposed rule. Under this scenario, we assume that savings associated with waste incinerated offsite in the baseline are reduced to zero, with the exceptions of generator storage and tracking savings.

RESULTS

In this section, we summarize the results of our analysis based on the methodology outlined above. These results include the following:[39]

- Social benefits and costs of the exclusion;
- Tonnage of waste excluded from the regulatory definition of hazardous waste under each regulatory option; and
- Secondary impacts for commercial incinerators and kilns.

We present these impacts both at the national level and for the 16 states listed in Exhibit 8, all of which have enacted statutes that either: (a) prohibit them from promulgating standards that are more stringent than federal regulations; or (b) require them to undertake additional legislative action to enact standards more stringent than federal regulations. States not included in Exhibit 8 do not have similar restrictions and may not adopt the ECF exclusion. Therefore, the results associated with the 16 states listed in Exhibit 8 represent lower bound impact estimates of the impacts associated with each option.

Exhibit 8

16 States Unlikely to Exceed the Stringency of Federal Regulations*

Arkansas	New Mexico
Arizona	Oklahoma
Colorado	South Dakota
Idaho	Texas
Illinois	Utah
Louisiana	Virginia
Maryland	West Virginia
Montana	Wyoming

* These 16 states have enacted statutes that either prohibit them from adopting standards more stringent than federal regulations or require them to take legislative action to enact standards more stringent than federal regulations.

Social Costs and Benefits

Exhibit 9 presents our estimates of the annual social costs and benefits of the Agency Selected Approach and the two alternative options, assuming the exclusion is adopted by all 50 states. Under the Agency Selected Approach, we estimate annual net social benefits (i.e., net resource savings) of $23 million.[40,41,42] Approximately 67 percent of the benefits reflected in this

[39] As indicated above, we expect that the human health and ecological impacts of the proposed rule will be negligible because the rule was designed to ensure that emissions associated with the combustion of ECF are comparable to the emissions associated with burning conventional fossil fuels. Therefore, our discussion of results focuses on other types of impacts.

[40] As part of our analysis, we also evaluated what the impacts of the proposed rule would be if we assume that 3 percent of Group 2 waste (i.e., waste burned for energy recovery in the baseline) would qualify for the exclusion instead of 10 percent. This assumption is based on our analysis of the National Hazardous Waste Constituent survey data, as previously discussed. Under this assumption, we estimate that the proposed rule would

estimate represent management cost savings. Transportation, boiler retrofits, and analytical costs represent the majority of the costs associated with the rule.

Annual net social benefits under Alternative Option A (at the national level) are $603,000 to $1,396,000 greater than the net benefits of the Agency Selected Approach. The principal reason for this difference is that storage cost savings are more significant under Alternative Option A relative to the Agency Selected Approach. In addition, as mentioned above, our high-end estimate for Alternative Option A reflects a constituent concentration waiver for naphthalene and PAHs, which would increase the percentage of Group 3 waste (i.e., waste incinerated in the baseline) qualifying for the exclusion.

Under Alternative Option B, the annual net social benefits of the ECF exclusion range from $15 million to $20 million per year, significantly less than the benefits of the Agency Selected Approach. This largely reflects the RCRA Subtitle C storage and tracking requirements that are included in Alternative Option B but not in the Agency Selected Approach or Alternative Option A.

To generate the high-end estimate for Alternative Option B, we use the same approach as for the Agency Selected Approach and Alternative Option A. To develop the low-end estimate for Alternative Option B, however, we assume that generating facilities would not send their ECF offsite.[43] As shown in Exhibit 9, this assumption results in a significant reduction in annual fuel cost savings and avoided management costs relative to the savings under the Agency Selected Approach. In fact, under the low-end estimate of Alternative Option B, annual benefits are more than 40 percent less than those expected under the Agency Selected Approach.

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result in annual net social benefits of $14 million per year. The total amount of comparable fuel that would qualify for the ECF exclusion under this scenario is approximately 96,500 tons, 52,000 tons of which would likely be excluded under the Agency Selected Approach. We also conducted an additional sensitivity analysis in which we assumed that all waste that is incinerated in the baseline is burned as a fuel by incinerators to maintain heating values adequate for efficient incineration. Under this assumption, we estimate that the proposed rule would result in net annual savings of approximately $17 million per year and that approximately 104,000 tons of ECF would be excluded under the Agency Selected Approach.

[41] As indicated in Footnote 8, EPA also considered the adoption of SPCC storage controls on comparable fuel excluded from the regulatory definition of hazardous waste under current regulations. We estimate that such requirements would result in compliance costs of $23,000 to $1.8 million per year. The difference between these two values reflects uncertainty with respect to the number of facilities that use the current comparable fuels exclusion.

[42] In developing the proposed rule, EPA also considered a scenario under which the ECF requirements for spill prevention, control, and countermeasures and for tank air emissions would not apply to as many facilities. EPA's analysis of this scenario suggests that these changes would not affect the estimated cost impacts of the proposed rule.

[43] We applied this assumption to the analysis because the RCRA Subtitle C tracking requirements associated with Alternative Option B could deter facilities from sending ECF offsite.

Exhibit 9

Annual Social Benefits and Costs of the Emission-Comparable Fuels Exclusion – 50 States*
(thousands of dollars)

	Agency Selected Approach	Alternative Option A		Alternative Option B		
		Low	High	Low	Mid	High
Annual Emission-Comparable Fuel Benefits	$35,705	$36,360	$37,447	$20,429	$25,682	$30,770
Fuel Savings, net of baseline fuel recovery	$6,989	$7,058	$7,503	$5,859	$4,165	$6,048
Management Cost Savings	$23,804	$23,886	$24,432	$12,641	$18,635	$21,071
Net Storage Cost Savings	$259	$763	$780	$0	$0	$0
Hazardous Waste Transport Cost Savings	$4,574	$4,574	$4,653	$1,838	$2,874	$3,610
Net Tracking Cost Savings	$79	$79	$79	$91	$8	$41
Annual Emission-Comparable Fuel Costs	($12,321)	($12,374)	($12,667)	($5,725)	($9,597)	($10,330)
Burner Storage Costs	($1,491)	($1,413)	($1,434)	($1,595)	($2,103)	($2,399)
Boiler Retrofit Costs	($2,923)	($2,987)	($3,019)	($2,224)	($2,072)	($2,447)
Waste Stream Analytical Costs	($3,033)	($3,101)	($3,187)	($1,701)	($2,270)	($2,270)
Raw Materials Replacement Cost (for waste recycled in the baseline)	($364)	($364)	($368)	($205)	($215)	($215)
Emissions Comparable Fuel Transport Costs	($4,510)	($4,510)	($4,659)	$0	($2,938)	($3,001)
ANNUAL NET SOCIAL BENEFITS	**$23,384**	**$23,987**	**$24,780**	**$14,705**	**$16,085**	**$20,441**

Note: Estimates reported in year 2005 dollars.
* The figures shown here are national estimates of the annual social benefits and costs of the proposed exclusion assuming that it is adopted by all 50 states. As part of our analysis, we also estimated the annual social benefits and costs of the proposed exclusion in the 16 states with laws that either: (a) prohibit them from promulgating standards that are more stringent than federal regulations; or (b) require them to undertake additional legislative action to enact standards more stringent than federal regulations. Our results for these 16 states represent a lower bound estimate of the rule's impacts.

For the middle estimate associated with Alternative Option B, we assume that the waste excluded under the high-end estimate would still be excluded but that the impacts associated with waste incinerated offsite in the baseline would be reduced. This reflects the possibility that commercial incinerators may lower their tipping fees for ECF under this option to retain the business of clients who generate waste newly classified as ECF under the proposed rule.[44] Under this scenario, we assume that savings associated with waste incinerated offsite in the baseline are reduced to zero, with the exceptions of generator storage and tracking savings. Based on this assumption, we estimate that Alternative Option B would result in annual savings of approximately $16 million per year.

[44] Waste currently sent to affiliated facilities (i.e., facilities owned by the same company) for energy recovery in the baseline could continue to be sent to these facilities under Alternative Option B, even if they are excluded from the regulatory definition of hazardous waste under the proposed rule. Due to data limitations, however, we were not able to capture this scenario in our analysis.

As indicated above, we also estimated the impacts of the exclusion for the 16 states listed in Exhibit 8. States not listed in this exhibit could decide not to adopt the exclusion; therefore, our impact estimates for the 16 states in Exhibit 8 represent lower bound estimates of the rule's impacts. Restricting our analysis to these states, we estimate that the Agency Selected Approach would result in $13 million in annual net social benefits, as outlined in Exhibit 10. This represents slightly more than half of the savings associated with the rule if it is adopted by all 50 states. Under Alternative Option A, we estimate annual net social benefits ranging between $13 and $14 million for ECF generated in these states. Under Alternative Option B, net benefits specific to these states are $2 million to $4 million less than under the Agency Selected Approach.

Exhibit 10

Social Benefits and Costs of the Emissions-Comparable Fuels Exclusion – 16 States*
(thousands of dollars)

	Agency Selected Approach	**Alternative Option A**		**Alternative Option B**		
		Low	High	Low	Mid	High
Total Emission-Comparable Fuel Benefits	$18,611	$18,983	$19,826	$12,204	$14,164	$16,546
Fuel Savings, net of baseline fuel recovery	$3,773	$3,814	$4,153	$3,478	$2,864	$3,665
Management Cost Savings	$11,951	$12,001	$12,421	$7,476	$9,687	$10,847
Net Storage Cost Savings	$138	$419	$433	$0	$0	$0
Hazardous Waste Transport Cost Savings	$2,684	$2,684	$2,752	$1,193	$1,590	$1,995
Net Tracking Cost Savings	$65	$65	$66	$57	$23	$40
Total Emission-Comparable Fuel Costs	($6,020)	($6,058)	($6,296)	($3,117)	($5,065)	($5,465)
Burner Storage Costs	($797)	($753)	($773)	($886)	($1,179)	($1,333)
Boiler Retrofit Costs	($1,557)	($1,589)	($1,620)	($1,207)	($1,152)	($1,335)
Waste Stream Analytical Costs	($1,755)	($1,805)	($1,863)	($907)	($1,424)	($1,424)
Raw Materials Replacement Cost (for waste recycled in the baseline)	($118)	($118)	($118)	($116)	($118)	($118)
Emissions Comparable Fuel Transport Costs	($1,794)	($1,794)	($1,921)	$0	($1,193)	($1,256)
NET SOCIAL BENEFITS	**$12,591**	**$12,925**	**$13,530**	**$9,087**	**$9,098**	**$11,082**

Note: Estimates reported in year 2005 dollars.
* The figures shown here apply to the 16 states with laws that either: (a) prohibit them from promulgating standards that are more stringent than federal regulations; or (b) require them to undertake additional legislative action to enact standards more stringent than federal regulations. Our results for these 16 states represent our lower bound estimate of the rule's impacts.

Tonnage of ECF Excluded

As indicated above, we estimate that approximately 182,800 tons of waste would qualify for the exclusion each year under the Agency Selected Approach and Alternative Option B, and that between 182,800 and 184,700 tons would qualify under Alternative Option A. Based on our projections of the decisions of individual generating facilities to use or not use the exclusion at the national level, we estimate that approximately 106,500 tons, or 58 percent of the qualifying total, would actually be excluded annually, as indicated in Exhibit 11. Of this total, 53 percent would be burned onsite by generating facilities while the remainder would be sent to off-site facilities. Approximately 32 percent of the total amount of ECF excluded under the Agency Selected Approach represents waste that is newly burned for energy recovery (i.e., waste that was not burned for energy recovery in the baseline).

Exhibit 11

Waste Quantities Affected by the Emission-Comparable Fuels Exclusion - 50 States*

	Agency Selected Approach	**Alternative Option A**		**Alternative Option B**		
		Low	High	Low	Mid	High
Quantity of Waste Qualifying for ECF Exclusion (tons per year)	182,800	182,800	184,700	182,800	182,800	182,800
Total ECF Excluded (tons per year)	106,500	106,800	109,400	55,400	92,400	92,400
Excluded Waste Managed by Generating Facilities (tons per year)	56,500	56,900	57,900	55,400	45,300	55,400
Excluded Waste Sent Offsite by Generating Facilities (tons per year)	49,900	49,900	51,500	0	47,100	37,000
Portion of Excluded Total Not Burned for Energy Recovery in the Baseline and Burned for Energy Recovery under the Rule (tons per year)	34,200	34,500	37,000	28,900	29,700	29,700
Excluded Waste No Longer Sent Offsite for Incineration (tons per year)	12,500	12,500	13,500	11,000	0	11,800
Excluded Waste No Longer Sent Offsite for Energy Recovery (tons per year)	48,400	48,400	48,500	11,600	43,100	43,100

Note: Estimates reported in short tons.
* The figures shown here represent quantities affected by the proposed exclusion assuming that it is adopted by all 50 states. As part of our analysis, we also estimate waste quantities affected by the proposed exclusion in the 16 states with laws that either: (a) prohibit them from promulgating standards that are more stringent than federal regulations; or (b) require them to undertake additional legislative action to enact standards more stringent than federal regulations. Our results for these 16 states represent our lower bound estimate of the rule's impacts.

Under Alternative Option A, we estimate that between 106,800 and 109,400 tons of waste would be excluded annually by facilities with qualifying waste. The upper end of this range is approximately 3 percent higher than the excluded tonnage under the Agency Selected Approach. The total tonnage of waste that is newly burned for energy recovery under Alternative Option A (34,500 to 37,000 tons) is also higher than under the Agency Selected Approach.

Under Alternative Option B, the quantity of waste qualifying for the ECF exclusion is the same as under the Agency Selected Approach. However, because this alternative option is more stringent than the Agency Selected Approach, the estimated amount of ECF that facilities would choose to exclude ranges from only 55,400 to 92,400 tons, which is 13 to 48 percent lower than under the Agency Selected Approach.

As shown in Exhibit 12, we estimate that 83,600 tons of waste in the 16 states listed in Exhibit 8 would qualify as ECF each year under the Agency Selected Approach, which represents approximately 46 percent of the total waste that would qualify for the exclusion if it is adopted by all 50 states. Under the Agency Selected Approach, we estimate that approximately 66 percent of this eligible waste (55,300 tons per year) would actually be excluded by affected facilities. Under Alternative Option A, we estimate that the excluded total in these 16 states would be 200 to 2,200 tons higher than under the Agency Selected Approach. In contrast, for Alternative Option B, we estimate that the annual tonnage excluded would be 6,100 tons lower than under the Agency Selected Approach.

Secondary Impacts to Commercial Incinerators and Commercial Kilns

As part of our analysis, we considered the secondary impacts of the ECF exclusion on commercial incinerators and commercial kilns. As explained above, these facilities may experience indirect economic impacts under the proposed rule in the form of reduced waste management revenues and, in the case of commercial kilns, fuel replacement costs. We emphasize, however, that these secondary impacts should not be counted as an offset to the social benefits of the ECF exclusion.[45]

As shown in Exhibit 11, we estimate that approximately 12,500 tons of excluded ECF will no longer be sent offsite for incineration if the exclusion is adopted by all 50 states. We estimate that this would result in a decline of $3 million in annual commercial incinerator revenues (see Exhibit 13). This represents 1.1 percent of the total annual revenues generated by commercial incinerators, which we estimate to be $281 million.[46] Similarly, as indicated in Exhibit 11, we estimate that approximately 48,400 tons of the total ECF excluded under the Agency Selected Approach would no longer be sent off-site for energy recovery. We estimate that this diversion of waste represents an annual revenue loss of $11 million for commercial kilns

[45] The methodology section explains why commercial incinerator and kiln losses do not offset the social benefits of the proposed rule.

[46] This estimate is based on waste quantity data from the 2003 BRS and incinerator pricing information from the Environmental Technology Council (www.etc.org).

under the Agency Selected Approach (see Exhibit 13).[47] This is approximately 1.4 percent of annual waste management revenues earned by cement kilns and lightweight aggregate kilns (LWAKs), which we estimate to be $776 million.[48] Because this estimate of $776 million does not include revenues received from the sale of cement and/or clinker, we overstate the magnitude of kilns' revenue losses relative to their total baseline revenues.

Exhibit 12

Waste Quantities Affected by the Emissions-Comparable Fuels Exclusion - 16 States*

	Agency Selected Approach	**Alternative Option A**		**Alternative Option B**		
		Low	High	Low	Mid	High
Quantity of Waste Qualifying for ECF Exclusion (tons per year)	83,600	83,600	84,500	83,600	83,600	83,600
Total ECF Excluded (tons per year)	55,300	55,500	57,500	49,200	49,200	49,200
Excluded Waste Managed by Generating Facilities (tons per year)	34,400	34,600	35,200	49,200	29,300	33,900
Excluded Waste Sent Offsite by Generating Facilities (tons per year)	20,900	20,900	22,300	0	19,900	15,300
Portion of Excluded Total Not Burned for Energy Recovery in the Baseline and Burned for Energy Recovery under the Rule (tons per year)	18,600	18,800	20,700	17,200	18,000	18,000
Excluded Waste No Longer Sent Offsite for Incineration (tons per year)	7,500	7,500	8,200	6,200	0	7,000
Excluded Waste No Longer Sent Offsite for Energy Recovery (tons per year)	23,500	23,500	23,700	8,800	18,900	18,900

Note: Estimates reported in short tons.
* The figures shown here apply to the 16 states with laws that either: (a) prohibit them from promulgating standards that are more stringent than federal regulations; or (b) require them to undertake additional legislative action to enact standards more stringent than federal regulations. Our results for these 16 states represent our lower bound estimate of the rule's impacts.

[47] We assume an energy recovery cost of $237 per ton based on data from the Environmental Technology Council.

[48] Similar to baseline commercial incinerator revenues, we estimate the waste management revenues earned by commercial kilns in the baseline based on waste quantity data in the 2003 BRS and combustion pricing data from the Environmental Technology Council.

In addition to the revenue losses discussed above, commercial kilns would also lose a source of fuel if waste is diverted away from them as a result of the exclusion. Assuming that ECF has an average heating value of 12,200 Btu per pound, we estimate that the cost of replacing this waste fuel is approximately $2 million per year.[49]

Relative to the Agency Selected Approach, secondary impacts to commercial incinerator and kilns are lower under Alternative Option B and moderately higher under Alternative Option A, consistent with the quantity of ECF excluded under each of these options. As indicated in Exhibit 13, revenue losses to commercial incinerators and commercial kilns combined are 0 to 2 percent higher under Alternative Option A and 10 to 63 percent lower under Alternative Option B. Fuel replacement costs for commercial kilns are approximately the same for the Agency Selected Approach and Alternative Option A. Under Alternative Option B, however, fuel replacement costs are 11 to 76 percent lower than under the Agency Selected Approach.

Exhibit 13

Secondary Impacts of the Emission-Comparable Fuel Exclusion on Commercial Incinerators, Commercial Kilns, and Fuel Blenders – 50 States (thousands of dollars)*

	Agency Selected Approach	**Alternative Option A**		**Alternative Option B**		
		Low	High	Low	Mid	High
Annual Decline in Commercial Incinerator Revenues	$2,959	$2,959	$3,185	$2,611	Not Estimated	$2,781
Annual Decline in Commercial Kiln and Fuel Blender Revenues	$11,444	$11,444	$11,473	$2,750	$10,207	$10,207
Annual Fuel Replacement Costs for Commercial Kilns	$2,117	$2,117	$2,123	$509	$1,888	$1,888

Note: Estimates are presented in year 2005 dollars.
*The figures shown here are national estimates assuming that the exclusion is adopted by all 50 states. As part of our analysis, we also estimated the annual social benefits and costs of the proposed exclusion in the 16 states with laws that either: (a) prohibit them from promulgating standards that are more stringent than federal regulations; or (b) require them to undertake additional legislative action to enact standards more stringent than federal regulations. Our results for these 16 states represent a lower bound estimate of the rule's impacts.

As indicated in Exhibit 14, the losses described above are significantly lower if we restrict our analysis to the 16 states listed in Exhibit 8. Under the Agency Selected Approach, commercial incinerator revenue losses are 40 percent lower than under the national scenario and commercial kiln revenue losses are 51 percent lower. Similarly, fuel replacement costs associated with the Agency Selected Approach are 51 percent lower when we restrict our analysis to the 16 states in Exhibit 8.

[49] As indicated above, we assume that coal would serve as the primary replacement fuel for commercial kilns.

Exhibit 14 Secondary Impacts of the Emission-Comparable Fuel Exclusion on Commercial Incinerators, Commercial Kilns, and Fuel Blenders – 16 States (thousands of dollars)*						
	Agency Selected Approach	**Alternative Option A**		**Alternative Option B**		
		Low	High	Low	Mid	High
Decline in Commercial Incinerator Revenues	$1,768	$1,768	$1,950	$1,478	Not Estimated	$1,647
Decline in Commercial Kiln and Fuel Blender Revenues	$5,570	$5,570	$5,599	$2,073	$4,463	$4,463
Fuel Replacement Costs for Commercial Kilns	$1,031	$1,031	$1,036	$384	$826	$826

Note: Estimates are presented in year 2005 dollars.
* The figures shown here apply to the 16 states with laws that either: (a) prohibit them from promulgating standards that are more stringent than federal regulations; or (b) require them to undertake additional legislative action to enact standards more stringent than federal regulations. Our results for these 16 states represent our lower bound estimate of the rule's impacts.

EQUITY CONSIDERATIONS AND OTHER IMPACTS

As required by applicable statutes and executive orders, the following section summarizes our analysis of equity considerations and other regulatory concerns associated with the proposed ECF exclusion. This section assesses potential impacts with respect to the following issues:

- **Regulatory Planning and Review**: requires examination and quantification of costs and benefits of regulating with and without the proposed rule;

- **Regulatory Flexibility:** focuses on the potential effects of the proposed rulemaking on small entities;

- **Environmental Justice:** considers potential issues for minority and low-income populations;

- **Children's Health Protection:** examines the potential impact of the proposed rulemaking on the health of children;

- **Joint Impacts of Other EPA Policies and Rules:** discusses how other regulatory efforts together with the proposed rulemaking may affect the universe of facilities affected by the proposed rule;

- **Unfunded Mandates:** examines the implications of the proposed rulemaking with respect to unfunded mandates;

- **Tribal Governments:** extends the discussion of federal unfunded mandates to include impacts on Native American tribal governments and their communities;

- **Federalism:** considers potential issues related to state sovereignty;

- **Regulatory Takings:** discusses the potential for takings to occur under the proposed rulemaking;

- **Energy Impacts:** examines the impacts of the proposed rulemaking on energy use, supply, and distribution;

- **Civil Justice:** considers steps taken to minimize litigation, eliminate ambiguity, and reduce burden associated with the proposed rulemaking; and

- **Facilitation of Cooperative Conservation:** discusses implementation of the proposed rule in a manner that promotes "cooperative conservation" among the Departments of the Interior, Agriculture, Commerce, and Defense and the Environmental Protection Agency.

Regulatory Planning and Review

Under Executive Order 12866 [58 FR 51735 (October 4, 1993)], the Agency, in conjunction with the Office of Management and Budget's (OMB's) Office of Information and Regulatory Affairs (OIRA), must determine whether a regulatory action is "significant" and therefore subject to OMB review and the full requirements of the Executive Order. The Order defines "significant regulatory action" as one that is likely to result in a rule that may:

(1) Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;

(2) Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;

(3) Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or

(4) Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

Pursuant to the terms of Executive Order 12866, it has been determined that this rule is a "significant regulatory action" because it (4) raises novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order. As

such, this document was submitted to OMB for review. Changes made in response to OMB suggestions or recommendations are documented in the public record.

This rule, as proposed, is projected to result in benefits to society in the form of cost savings. The total net cost savings of the rule are estimated to be $23 million per year. This is significantly below the $100 million threshold established under point one above.[50] Thus, this proposal is not considered to be an economically significant action.

Regulatory Flexibility Act

The Regulatory Flexibility Act (RFA) as amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), 5 USC 601 et. seq., generally requires an agency to prepare a regulatory flexibility analysis of any rule subject to notice and comment rulemaking requirements under the Administrative Procedure Act, or any other statute. This analysis must be completed unless the agency is able to certify that the rule will not have a significant economic impact on a substantial number of small entities. Small entities include small businesses, small not-for-profit enterprises, and small governmental jurisdictions.

The RFA provides default definitions for each type of small entity. Small entities are defined as: (1) a small business as defined by the Small Business Administration's (SBA) regulations at 13 CFR 121.201; (2) a small governmental jurisdiction that is a government of a city, county, town, school district or special district with a population of less than 50,000; and (3) a small organization that is any not-for-profit enterprise which is independently owned and operated and is not dominant in its field.

This rule, as proposed, is projected to result in benefits in the form of cost savings to facilities that use the exclusion. As a result, the rule would not result in adverse impacts for any small businesses that generate emission-comparable fuels.

Because of the uncertainty of our results at the facility level, we do not present impact estimates specific to small ECF generators that may be affected by the proposed rule. As described in the methodological overview above, our impact estimates are based on the percentage of waste expected to qualify for the exclusion, as estimated from data collected through the 1996 National Hazardous Waste Constituent Survey (NHWCS). Although these qualifying percentages are valid in aggregate, they are more uncertain at the facility level. Therefore, we do not present facility specific impacts. Exhibit 15, however, presents average facility impacts by 4-digit NAICS code for those types of facilities that our analysis suggests will use the exclusion.

[50] This $100 million threshold applies to both costs and cost savings.

Exhibit 15 Average Cost Savings per Generator Using the Exclusion, by 4-digit NAICS Code		
4-digit NAICS	**Description**	**Average Cost Savings per Generator**
5622	Waste Treatment and Disposal	$56,629
5629	Remediation and Other Waste Management Services	$53,535
3251	Basic Chemical Manufacturing	$31,731
3254	Pharmaceutical and Medicine Manufacturing	$6,256
3259	Other Chemical Product and Preparation Manufacturing	$4,975
3253	Pesticide, Fertilizer, and Other Agricultural Chemical Manufacturing	$4,810
3399	Other Miscellaneous Manufacturing	$4,597
3252	Resin, Synthetic Rubber, and Synthetic Fibers and Filaments Manufacturing	$3,996
3334	Ventilation, Heating, Air-Conditioning, and Commercial Refrigeration Equipment Manufacturing	$1,384
4246	Chemical and Allied Products Merchant Wholesalers	$1,060
3255	Paint, Coating, and Adhesive Manufacturing	$823
3241	Petroleum and Coal Products Manufacturing	$655
3361	Motor Vehicle Manufacturing	$569
3344	Semiconductor and Other Electronic Component Manufacturing	$435
4931	Warehousing and Storage	$245
3362	Motor Vehicle Body and Trailer Manufacturing	$176
3256	Soap, Cleaning Compound, and Toilet Preparation Manufacturing	$141
3261	Plastics Product Manufacturing	$24

As indicated above, our analysis suggests that commercial kilns and commercial incinerators may experience revenue losses under the exclusion. In addition, kilns may experience additional fuel replacement costs. Based on our review of these facilities, we identified 2 commercial kilns that are currently owned by small businesses.[51] Because kilns' revenue losses plus fuel replacement costs under the exclusion represent approximately 2 percent of the total annual revenues earned by cement kilns and lightweight aggregate kilns (LWAKs), we believe that the proposed rule would not have a significant economic impact on these facilities.[52] In addition, because the 2 percent figure mentioned above does not reflect the revenues earned by kilns through the sale of cement and other products (i.e., their primary business), this value represents an overestimate of kiln impacts relative to their baseline revenues. Furthermore, these impacts are indirect and not a direct result of the proposed rule requirements. Analysis of these economic impacts is presented to help ensure a more complete understanding of potential impacts.

[51] The two commercial kilns identified are: (1) a cement kiln owned by Continental Cement Company (EPA ID: MOD054018288); and (2) a LWAK owned by Thermalkem (Norlite) (EPA ID: NYD080469935).

[52] We estimate baseline commercial kiln revenues from burning waste of $776 million. We developed this estimate based on waste quantity and waste form data in the 2003 BRS and tipping fee values from the Environmental Technology Council.

Environmental Justice Analysis

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" (February 11, 1994) requires us to complete an analysis of the proposed ECF exclusion rule with regard to equity considerations. The Order is designed to address the environmental and human health conditions of minority and low-income populations. Because the proposed rule was designed to ensure that emissions from ECF are comparable to emissions associated with the fuels they would displace, we do not expect the rule to result in any adverse or disproportional health or safety effects for minority or low-income populations.[53]

Children's Health Protection Analysis

Executive Order 13045: "Protection of Children from Environmental Health Risks and Safety Risks" (62 FR. 19885, April 23, 1997) applies to any rule that: (1) is determined to be "economically significant" as defined under E.O. 12866, and (2) concerns an environmental health or safety risk that EPA has reason to believe may have a disproportionate effect on children. If the regulatory action meets both criteria, the Agency must evaluate the environmental health or safety effects of the planned rule on children, and explain why the planned regulation is preferable to other potentially effective and reasonably feasible alternatives considered by the Agency. The proposed ECF exclusion is not subject to the Executive Order because it is not economically significant as defined under point one of the Order, and because we do not have reason to believe the environmental health or safety risks posed by emissions-comparable fuels present a disproportionate risk to children.

Joint Impacts of Rules

As indicated above, the proposed rule would exclude secondary materials from the regulatory definition of hazardous waste if they meet the specifications of emissions-comparable fuel and are burned for energy recovery. Boilers that burn ECF, however, would still be required to comply with other environmental regulations, such as maximum achievable control technology (MACT) emissions standards established under the Clean Air Act and National Pollutant Discharge Elimination System (NPDES) requirements established under the Clean Water Act. In addition, as outlined in the proposed rule, boilers that burn ECF would need to comply with the technical specifications described in 40 CFR 266.110. Facilities with boilers that already meet the requirements of 40 CFR 266.110 would not incur the additional boiler retrofit costs outlined above if they begin to burn ECF under the proposed rule.[54]

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[53] Furthermore, because this rule is projected to result in improved economic efficiency on a nationwide level, it is feasible that the impacts of the proposed rule may contribute to expected economic opportunities for all citizens.

[54] Some facilities' boilers may already be in compliance with 40 CFR 266.110 so that they can obtain a waiver for conducting a trial burn to test the destruction and removal efficiency of the boiler.

Unfunded Mandates Analysis

Signed into law on March 22, 1995, the Unfunded Mandates Reform Act (UMRA) calls on all federal agencies to provide a statement supporting the need to issue any regulation containing an unfunded federal mandate and describing prior consultation with representatives of affected state, local, and tribal governments.

The proposed ECF exclusion is not subject to the requirements of sections 202, 204 and 205 of UMRA. In general, a rule is subject to the requirements of these sections if it contains "Federal mandates" that may result in the expenditure by State, local, and tribal governments, in the aggregate, or by the private sector, of $100 million or more in any one year. The proposed rule does not result in $100 million or more in expenditures for any of these groups. As proposed, the ECF exclusion is expected to result in net cost savings for affected facilities.

Tribal Government Analysis

Executive Order 13175: Consultation and Coordination with Indian Tribal Governments (65 FR 67249, November 9, 2000), requires EPA to develop an accountable process to ensure "meaningful and timely input by tribal officials in the development of regulatory policies that have tribal implications." We have determined that the proposed rule does not have tribal implications, as specified in the Order. No Tribal governments are known to own or operate hazardous waste facilities that generate emissions-comparable fuels subject to the proposed rule. Thus, Executive Order 13175 does not apply to this rule.

Federalism Analysis

Executive Order 13132, entitled "Federalism" (64 FR 43255, August 10, 1999), requires EPA to develop an accountable process to ensure "meaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications." "Policies that have federalism implications" is defined in the Executive Order to include regulations that have "substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government."

Under Executive Order 13132, EPA may not issue a regulation that has federalism implications, that imposes substantial direct compliance costs, and that is not required by statute, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by State and local governments, or EPA consults with State and local officials early in the process of developing the regulation.

This proposal is not expected to have federalism implications. We do not anticipate that it will have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various

levels of government, as specified in the Order. The rule focuses on modified requirements for facilities generating emission-comparable fuels, without affecting the relationships between Federal and State governments. Thus, Executive Order 13132 does not apply to this rule. Nevertheless, EPA's Workgroup for the rule included several State representatives in the Agency workgroup who participated in the development of the rule.

Regulatory Takings Analysis

Executive Order 12630, "Government Actions and Interference with Constitutionally Protected Property Rights" (March 15, 1988), directs federal agencies to consider the private property takings implications of regulations. Under the Fifth Amendment of the U.S. Constitution, the government may not take private property for public use without compensating the owner.[55] A regulatory taking occurs when a government entity deprives a person of the use or rewards of his property by the application of regulations that have not changed the ownership of the property. Though the exact interpretation of this takings clause as applied to regulatory action is still subject to an ongoing debate, a framework for interpretation has been established by legal precedent through a series of prominent legal cases.[56]

Within the context of mainstream legal precedent, a regulatory taking of private property is generally deemed to result if the court determines that the government action satisfies any of the following criteria:

- Results in a physical invasion of property;
- Denies the owner all reasonable or economically viable use of property;[57]
- Interferes with reasonable investment-backed expectations for property; or
- Fails to establish a justifiable connection between the requirements imposed (e.g., permit conditions) and the underlying purposes of the regulation.

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[55] Public use was recently defined more broadly in *Kelo v. City of New London* 545 U.S. 469 (2005). In its decision, the U.S. Supreme Court ruled that the use of eminent domain to transfer private property for economic redevelopment qualified as a permissible "public use" under the Takings Clause of the Fifth Amendment.

[56] See, for instance, *Pennsylvania Coal Co. v. Mahon*, 260 U.S. 393 (1922), *Penn Central Transportation Co. v. City of New York* 438 U.S. 104 (1978), *Nollan v. California Coastal Commission* 483 U.S. 825 (1987), *Lucas v. South Carolina Coastal Council* 112 S. Ct. 2886 (1992), *Dolan v. City of Tigard* 114 S. Ct. 2309 (1994). Also see *Palazzolo v. Rhode Island* 533 U.S. 606 (2001) and *Kelo v. City of New London* 545 U.S. 469 (2005).

[57] No universally accepted formula exists for determining at what point direct economic impacts from regulatory action constitute a taking. Rather, courts must make this determination on a case-by-case basis. In the landmark *Lucas* decision, the U.S. Supreme Court proclaimed that a 100 percent deprivation in value most often, but not always, constitutes a taking. Recent case law includes many examples in which regulations deprived owners of as much as 50 percent or more of the value associated with the economic use of property, yet the court still ruled that the regulations did not deny the owner all reasonable economic value. For instance, see *Concrete Pipe and Products v. Construction Laborers Pension Trust for Southern California*, 113 S.Ct. 2264 (1993), as cited in U.S. EPA.

Even if a regulatory requirement meets any or all of the designated conditions for a regulatory taking, courts may still find it exempt from the takings clause if the regulatory action is meant to prevent a "nuisance" or to provide other benefits to the public. A nuisance is defined as an activity or condition that either interferes with public welfare or with the ability of another private citizen to enjoy his or her own property.[58]

Based on our review of relevant case law, the proposed rule is not likely to result in any regulatory takings. The proposed rule will not require that private property be invaded or taken for public use.

Energy Impact Analysis

Executive Order 13211, "Actions Concerning Regulations that Affect Energy Supply, Distribution, or Use" (May 18, 2001), addresses the need for regulators to more fully consider the potential energy impacts of regulatory action. Under Executive Order 13211, agencies are required to prepare a Statement of Energy Effects when a regulatory action may have significant adverse effects on energy supply, distribution, or use, including impacts on price and foreign supplies. Additionally, the requirements obligate agencies to consider reasonable alternatives to regulatory actions with adverse effects and the impacts that such alternatives might have on energy supply, distribution, or use.

The proposed ECF exclusion rule is not subject to Executive Order 13211, "Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use" (66 Fed. Reg. 28355 (May 22, 2001)). This rule, as proposed, will not seriously disrupt energy supply, distribution patterns, prices, imports or exports. Furthermore, this rule is not an economically significant action under Executive Order 12866.

As indicated in the Results section above, however, implementation of the proposed ECF exclusion rule will likely lead to an increase in the recovery of energy from hazardous secondary materials. Based on our analysis, 34,200 tons of waste not burned for energy recovery in the baseline would be burned for energy as ECF under the proposed exclusion. Assuming a heating value of 12,200 Btu per pound, this amount equals approximately 834,000 MMBtu per year, which is the energy equivalent of 144,000 barrels of crude oil per year (394 barrels per day).[59] By comparison, the U.S. consumed more than 20 million barrels of petroleum products per day in 2005.[60]

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[58] Numerous court decisions ranging from landmark preservation to the control of industrial pollution in residential areas have upheld regulations while at the same time acknowledging the takings claims associated with them on the basis of nuisance prevention and resource protection goals.

[59] According to the U.S. Energy Information Administration (EIA) *Annual Energy Outlook 2006*, Table A2, one barrel of crude oil produced has a heat content of 5.8 million Btu.

[60] U.S. EIA, Annual Energy Review 2005, Table 5.1.

Civil Justice Analysis

The proposed rule meets applicable standards in sections 3(a) and 3(b)(2) of Executive Order 12988, "Civil Justice Reform" (February 5, 1996), to minimize litigation, eliminate ambiguity, and reduce burden. EPA actions to meet the requirements of the Order include, but are not limited to, the following: unambiguous specification of the standards and a description of the effect of the standards on existing law.

Facilitation of Cooperative Conservation

Executive Order 13352, "Facilitation of Cooperative Conservation" (August 26, 2004), directs the Departments of the Interior, Agriculture, Commerce, and Defense and the Environmental Protection Agency to implement laws relating to the environment and natural resources in a manner that promotes "cooperative conservation." The Order defines "cooperative conservation" as "actions that relate to use, enhancement, and enjoyment of natural resources, protection of the environment, or both, and that involve collaborative activity among Federal, State, local, and tribal governments, private for-profit and nonprofit institutions, other nongovernmental entities and individuals."

This proposed rule is designed to promote cooperation between EPA, State, local governments, and other nongovernmental entities and individuals by implementing an approach to enhance the utility of the comparable fuel exclusion without imposing unnecessary regulatory costs on generators, primarily the manufacturing sector. In accordance with the Order, EPA will consider public comments on the proposed rule from State and local governments and private organizations during the development of the final rule.

Appendix A

Estimating the Percentage of Potentially Eligible Waste that Qualifies as Emission-Comparable Fuel

To estimate the percentage of potentially affected waste that would qualify for the ECF exclusion, we follow the three-step process outlined below:

1. **Remove Waste Qualifying for the Current Comparable Fuels Exclusion from the NHWCS:** As indicated in the main body of this document, we use the 2003 BRS to identify waste streams that could potentially be eligible for the proposed ECF exclusion and the 1996 National Hazardous Waste Constituent Survey to estimate the percentage of this waste likely to qualify for the exclusion. Under the reporting requirements of the 2003 BRS, RCRA facilities are not required to report information on waste streams excluded from the regulatory definition of hazardous waste under the 1998 Comparable Fuels Exclusion. Therefore, the 2003 BRS does not include data on these waste streams. In contrast, because the NHWCS was conducted before the 1998 Comparable Fuels Exclusion was established, it includes data on waste streams that would qualify for the 1998 exclusion. To address this inconsistency between the NHWCS and 2003 BRS data, we removed waste streams qualifying for the 1998 exclusion from the NHWCS dataset before estimating the percentage of NHWCS waste that would qualify for the ECF exclusion.[61] If these waste streams were not removed from the NHWCS, we would underestimate the percentage of waste that would qualify for the proposed ECF exclusion.[62]

2. **Estimate Qualifying Percentages for Non-Comparable Fuel Waste:** After removing waste qualifying for the 1998 Comparable Fuels Exclusion from the

[61] We assume that a waste stream in the NHWCS database would qualify for the 1998 Comparable Fuels Exclusion if it meets four criteria: (1) the waste is a liquid, in which case we assume it meets the viscosity requirements of the 1998 CFE rule; (2) the waste stream meets the thermal requirements included in the 1998 CFE rule (i.e., greater than or equal to 5,000 Btu/pound); (3) the waste stream is not halogenated and does not contain dioxins or furans; and (4) the waste stream's constituent concentrations are below the corresponding concentration limits specified in the 1998 CFE rule (*Federal Register*, Volume 64, Number 189. Pages 53,027-53,074, September 30, 1999).

[62] In other words, if we do not remove waste streams qualifying for the 1998 exclusion from the NHWCS, our estimate of the percentage of potentially eligible waste qualifying for the ECF exclusion would be calculated as follows:

$$\textit{ECF Qualifying Percentage} = \frac{\textit{Tonnage of waste in the NHWCS qualifying for the ECF exclusion}}{\textit{Tonnage of Comparable Fuel Waste in the NHWCS} + \textit{Tonnage of Potentially Affected Non-Comparable Fuel Waste in the NHWCS}}$$

This equation would estimate the ECF qualifying percentage based on a denominator that includes both Comparable Fuel waste and non-Comparable Fuel waste. Because the 2003 BRS does not include Comparable Fuel waste, we needed to exclude such waste from our estimation of the ECF qualifying percentage. Therefore, we removed this waste from the NHWCS dataset before estimating the ECF qualifying percentage in step 2.

NHWCS dataset, we estimated the percentage of potentially affected waste in the (modified) NHWCS dataset that would qualify for the proposed exclusion. As indicated in the main body of this document, we assume that non-halogenated, non-dioxin organic liquids are the only waste streams that could potentially be eligible for the proposed exclusion. Therefore, our denominator in estimating the ECF qualifying percentage is the tonnage of non-halogenated, non-dioxin organic liquids in the NHWCS, excluding waste streams that qualify for the 1998 Comparable Fuels Exclusion. The numerator for the ECF qualifying percentage is the tonnage of this waste that would qualify for the proposed ECF exclusion.[63] Equation A-1 summarizes our estimation of the qualifying percentage with waste qualifying for the 1998 Comparable Fuels Exclusion removed from the NHWCS.

(A-1)

$$\textit{ECF Qualifying Percentage} = \frac{\textit{Tonnage of waste in the NHWCS that qualifies for the proposed ECF exclusion}}{\textit{Tonnage of Non-halogenated, Non-dioxin Organic Liquid Waste in the NHWCS, excluding waste that qualifies for the 1998 Comparable Fuels Exclusion}}$$

3. **Adjust Qualifying Percentages to Account for Qualifying Comparable Fuel Waste That is not Excluded:** As indicated in Step 1, we remove waste that would qualify for the 1998 Comparable Fuels Exclusion from the NHWCS dataset to make it more consistent with the 2003 BRS, which is our data source for identifying waste streams potentially eligible for the proposed exclusion. Therefore, the denominator of the qualifying percentage estimated in Step 2 includes no waste that would qualify for the 1998 Comparable Fuels Exclusion. The 2003 BRS, however, may include some waste that qualifies for the 1998 exclusion because some facilities with qualifying waste choose not to use the exclusion. Therefore, we adjust the qualifying percentages estimated in Step 2 to account for this possibility.

   To help EPA address this issue, the American Chemistry Council (ACC) provided the Agency with waste generation and management data collected through a voluntary survey of ACC members. Based on the results of this survey, ACC estimates that respondents exclude approximately 56 percent of the waste that qualifies as comparable fuel under the 1998 exclusion. It is unclear, however, whether this estimate would apply universally across the entire chemical industry or to other industries. We suspect that 56 percent may be an underestimate because of the voluntary nature of the ACC survey; facilities that currently exclude most of their qualifying waste would not be highly motivated to submit data to inform the development of changes to current regulation because such facilities likely experience significant benefits under the current exclusion. Therefore, we assume that 78

[63] We assume that a waste stream would qualify for the proposed ECF exclusion if it meets the following criteria: (1) the waste is a liquid, in which case we assume it meets the viscosity specifications outlined in the proposed rule; (2) the waste has a heating value greater than or equal to 8,000 Btu/pound; (3) the waste is non-halogenated and does not contain dioxins or furans; and (4) the waste does not exceed any of the constituent concentration limits included in the proposed rule.

percent (the average of 56 percent and 100 percent) of the waste that qualifies for the 1998 Comparable Fuels Exclusion is actually excluded by RCRA facilities. Based on this estimate, we add 22 percent (100 percent -78 percent) of the waste qualifying for the comparable fuel exclusion to the denominator of the right-hand side of Equation A-1. Equation A-2 illustrates this adjustment.

$$\textbf{(A-2)}\ \text{Adjusted } \textit{ECF Qualifying Percentage} = \frac{\textit{Tonnage of waste in the NHWCS that qualifies for the proposed ECF exclusion}}{\textit{22 percent of the waste in the NHWCS that qualifies for the 1998 Comparable Fuels Exclusion} + \textit{Tonnage of non-halogenated, non-dioxin organic liquid waste in the NHWCS, excluding waste that qualifies for the 1998 Comparable Fuels Exclusion}}$$

As indicated in the main body of this document, we estimated the ECF qualifying percentages associated with four individual waste stream groups as outlined below:

Group 1: Waste streams managed through deepwell/underground injection (2003 BRS waste form code H134), discharge to sewer/POTW (2003 BRS waste form code H135), or biological treatment (form code H081).

Group 2: Waste streams managed through energy recovery (form code H050) or fuel blending prior to energy recovery (form code H061),

Group 3: Waste streams managed through incineration (form code H040), and

Group 4: All other waste streams.

Applying the three-step approach outlined above to each group, we estimated the ECF qualifying percentages presented in Exhibits 4 and 5 in the main body of this document. As indicated in both of these Exhibits, we estimate a qualifying percentage of 3 percent for waste streams managed through energy recovery or fuel blending in the baseline (under the Agency Selected Approach and the two alternative options). EPA staff familiar with these wastes suggested that this 3 percent value may underestimate the proportion of potentially affected H050 and H061 waste that would qualify for the proposed ECF exclusion and indicated that a 10 percent value would be more appropriate. Therefore, we used a qualifying percentage of 10 percent for these waste streams to generate the primary impact estimates presented in the main body of this document.

Appendix B

Procedure for Estimating the Market Price of Emission-Comparable Fuel

As indicated in the main body of this document, we estimate the revenues that generators would earn by selling their emission-comparable fuel (ECF) based on the total amount of ECF sold by these facilities and the per-unit market price of ECF. To estimate the fuel value of ECF, we assume that the per MMBtu value of ECF is consistent with the sales-weighted average price of other fuels that ECF could displace (i.e., the sales-weighted average price of natural gas, distillate fuel, residual fuel, and coal per MMBtu, using the industrial sector's consumption of each fuel as weights). Therefore, based on DOE pricing and consumption data for 2005, we estimate that ECF sold on the open market would displace fuel that costs approximately $7.55 per MMBtu on average. Because facilities would incur costs to burn ECF that they would not incur when using conventional fossil fuels, the price of ECF must be lower than $7.55 per MMBtu to make ECF an attractive alternative to conventional fuels. For each regulatory option, we adjust the $7.55 per MMBtu value based on the costs that receiving facilities would incur if they used ECF. We develop this adjustment factor based on the following five-step process:

1. First, we identify those generators who we believe would need to send their ECF offsite to use the exclusion (i.e., those generators that do not have a non-stoking watertube boiler);

2. Second, we estimate the total fuel value of the ECF generated by the facilities identified in Step 1 based on a unit ECF fuel value of $7.55 per MMBtu;

3. Third, we estimate the incremental costs that receiving facilities would incur if they were to burn the ECF generated by the facilities identified in Step 1 instead of conventional fuels;

4. Among the generators identified in Step 1, we identify those for which the fuel value estimated in Step 2 exceeds the costs estimated in Step 3. This gives us a list of generators (a) who would need to send their ECF offsite to use the exclusion and (b) who generate ECF with a fuel value that exceeds the cost (incurred by the receiving facility) of burning it.

5. Although a receiving facility could burn the ECF identified in Step 4 at a cost that is lower than the potential fuel value of this ECF, it would still be less expensive for a receiver to burn conventional fuels if the ECF price were $7.55 per MMBtu (i.e., the unit value of the fuel that the ECF would displace).[64] Therefore, for ECF to be an attractive fuel option, its price must be less than $7.55 per MMBtu. To estimate the ECF price at which receiving facilities would be indifferent between burning the ECF identified in Step 4 and conventional fuels sold at a price of $7.55 per MMBtu, we developed the ECF price adjustment factor shown in Equation B-1.

[64] If a receiver burned ECF instead of conventional fuels, it would incur the costs estimated in Step 3, but it would not incur these costs if it burned conventional fuels. Therefore, if the price of the ECF and conventional fuels were the same, conventional fuels would be a more attractive option.

(B-1) $$A_{ECF} = \frac{F - C}{F}$$

where, A_{ECF} = ECF price adjustment factor;
F = The fuel value of ECF generated by those facilities identified in Step 4 above, at a price of $7.55 per MMBtu, and
C = The cost of burning the ECF generated by those facilities identified in Step 4.

For each option we then estimate the market price of ECF as follows:

(B-2) $P_{ECF} = A_{ECF}$ x *$7.55 per MMBtu*

where, P_{ECF} = The estimated market price of emission-comparable fuels;
A_{ECF} = ECF price adjustment factor, and
$7.55 per MMBtu = The sales-weighted average price per MMBtu of the fuels ECF could displace.

Exhibit B-1 provides a hypothetical illustration of how we applied the approach outlined above. For purposes of illustration, the example in Exhibit B-1 assumes that just eight facilities generate waste that is potentially eligible for the exclusion.

Exhibit B-1

Illustration of ECF Price Estimation Methodology

A EPA ID	B Does the facility have an eligible boiler onsite?	C MMBtu of waste that would need to be sent offsite to be excluded (0 if the facility has an eligible boiler)	D Fuel value of waste that would need to be sent offsite to be excluded (Column C x $7.55 per MMBtu)	E Costs incurred by facilities receiving waste from the facility in column A (0 if the facility has an eligible boiler)	F Does the fuel value in Column D exceed the costs in Column E?
XXX123	Yes	0	0	$0	No
XXX456	No	50,000	$377,475	$127,440	Yes
XXX789	No	45,690	$344,935	$126,823	Yes
YYY123	No	3,521	$26,585	$126,823	No
YYY456	Yes	0	$0	$0	No
ZZZ487	No	98,255	$741,775	$126,823	Yes
ZZZ987	No	20	$149	$127,308	No
AAA285	No	10	$75	$127,567	No
Total Value of Fuel Valuable Enough for Receivers to Accept (estimated as the sum of column D where column F equals "Yes":				$1,464,186	
Total Cost of Burning ECF that is valuable enough for receivers to accept (estimated as the sum of Column E where column F equals "Yes"):				$381,086	
Price Adjustment Factor (estimated as ($1.46 million-$0.38 million)/$1.46 million):				0.74	
Estimated ECF Market Price (estimated as $7.55 per MMBtu x 0.74):				$5.58 per MMBtu	

Appendix C

Cost Inputs

This appendix presents the unit cost inputs used to support our analysis.

Exhibit C-1

Fuel Price Information

[A] Fuel Type[a]	[B] Price	[C] Price Source	[D] Btu Conversion	[E] Btu Conversion Source	[F] = [B] / [D] * 10^6 $/MMBtu ($ 2005)[b]
Natural Gas (Industrial)	$8.47 per 1,000 ft^3 ($2005)	EIA1	1,031 Btu per SCF (standard ft^3)	EIA2	**$8.22**
No. 2 Distillate (Industrial)	$1.808 per gallon ($2005)	EIA3	138,690 Btu per gallon	EIA4	**$13.04**
Residual Fuel Oil Average (End Users)	$0.725 per gallon ($2004)	EIA5	149,690 Btu per gallon	EIA4	**$4.98**
Liquefied Petroleum Gas (LPG)	$14.24 per million Btu ($2004)	EIA6			**$14.64**
Petroleum Coke	$1.20 per million Btu ($2005)	EIA7			**$1.20**
Coal – Average Delivered Price (Other Industrial Plants)	$39.30 per short ton ($2004)	EIA8	22,473,000 Btu per short ton	EIA9	**$1.80**
Gasoline – All Grades, Bulk	$1.585 per gallon ($2005)	EIA10	125,071 Btu per Gallon	EIA4	**$12.67**

Sources:
EIA1: U.S. Energy Information Administration (EIA), "Natural Gas Prices," accessed on March 24, 2006 at: <http://tonto.eia.doe.gov/dnav/ng/ng_pri_sum_dcu_nus_a.htm>.
EIA2: U.S. EIA, *Annual Energy Review 2004*, Table A4.
EIA3: U.S. EIA, "No. 2 Distillate Prices by Sales Type," accessed on March 24, 2006 at: <http://tonto.eia.doe.gov/dnav/pet/pet_pri_dist_dcu_nus_a.htm>.
EIA4: U.S. EIA, *Annual Energy Review 2004*, Appendix A.
EIA5: U.S. EIA, "Residual Fuel Oil Prices by Sales Type," accessed on March 24, 2006 at: <http://tonto.eia.doe.gov/dnav/pet/pet_pri_resid_dcu_nus_a.htm>.
EIA6: U.S. EIA, *Annual Energy Outlook 2006*, Table A3.
EIA7: U.S. EIA, *Electric Power Monthly June 2006*, Table 4.5.
EIA8: U.S. EIA, *Annual Coal Report 2004*, Table ES1.
EIA9: U.S. EIA, *Annual Energy Review 2004*, Table A5.
EIA10: U.S. EIA, "Petroleum Marketing Monthly," March 2006, bulk price for all grades, Table 6.
Notes:
a. To estimate the average value of fuel used by CO boilers, we use the average of Natural Gas (Industrial), No.2 Distillate (Industrial), and Residual Fuel Oil Average (End Users) as the fuel price ($8.74).
b. 2004 prices adjusted to 2005 using GDP deflator.

Exhibit C-2

Estimation of the Value of Fuel Replaced by ECF Sent Offsite

[A] Fuel Type	[B] Annual Consumption (2004)[1]	[C] Btu Conversion[2] (trillion Btu)	[D] Btu Weight	[E] $/MMBtu[4] ($ 2005)	[F] = [D] x [E] Sales-Weighted $/MMBtu
Natural Gas – Industrial Consumption	8,665 trillion Btu	8,665	71.6%	$8.22	$5.88
Distillate Fuel – U. S. Industrial Consumption	556,000 barrels per day (or 8.5 billion gallons per year)	1,182	9.8%	$13.04	$1.27
Residual Fuel – U. S. Industrial Consumption	103,000 barrels per day (or 1.6 billion gallons per year)	236	2.0%	$4.98	$0.10
Coal Consumption – Other Industrial Plants	2,025 trillion Btu	2,025	16.7%	$1.80	$0.30
	Total: [3]	12,108	100%		**Estimated fuel value of waste displaced by ECF sent offsite: $7.55**

Notes:
1. Annual consumption for natural gas and residual fuel from U.S. EIA, *Annual Energy Review 2004*, Table 2.1d. Annual consumption for distillate fuel and coal consumption from U.S. EIA, *Annual Energy Outlook 2004*, Table 5.13b. One barrel = 42 gallons.
2. Sources listed in Column C for respective fuel types in Exhibit C-1.
3. Total may not sum due to rounding.
4. From Column F for respective fuel types in Exhibit C-1.

Exhibit C-3 Transport Cost Inputs		
[A] **Type of Cost**	**[B]** **Price[1]** **($1999)**	**[C]** **Price[2]** **($2005)**
Tanker Trailer Mileage Cost		
Number of miles to transport:		
200-299	$2.48 per mile	$2.84 per mile
300-399	$2.45 per mile	$2.81 per mile
400-499	$2.40 per mile	$2.75 per mile
500-599	$2.35 per mile	$2.69 per mile
600-699	$2.33 per mile	$2.67 per mile
700-799	$2.29 per mile	$2.62 per mile
800-899	$2.27 per mile	$2.60 per mile
900-999	$2.26 per mile	$2.59 per mile
1000+	$2.24 per mile	$2.57 per mile
Tank Truck Loading	$290.44 per 5,000 gallons	$332.81 per 5,000 gallons
Tank Truck Unloading	$290.44 per 5,000 gallons	$332.81 per 5,000 gallons
Truck Washout/Decontamination	$150 per cleanout	$171.88 per cleanout
Notes: 1. 1999 prices from DPRA Inc., *Unit Cost Compendium*, Section I. 2. 1999 prices adjusted to 2005 using GDP deflator.		

Exhibit C-4

Cost Inputs for Boiler Costs, Analytical Costs, Tracking Costs, and Storage Costs

Component	Annualized Cost	Scaling Factor[a]
Boiler Costs		
AWFCO system	$541 per facility	None
CO CEMS	$826 per facility	None
Firing nozzle	$25 per facility	Scales with ECF flowrate; 0.6 scaling factor; Base flowrate for scaling: 3.3 gallons per minute
O&M labor	$30,400 per facility	None
Analytical Costs		
Annual testing costs	$12,150 per waste stream	None
Recordkeeping	$1,800 per waste stream	None
Tracking Costs[b]		
Shipping paper	$25 per shipment	None
Manifest	$50 per shipment	None
One-time notice indicating intent to use exclusion	$15 per facility	None
Obtain EPA ID	$44 per offsite burner	None
One-time certification of compliance with burner controls	$25 per facility	None
Recordkeeping	$30 per shipment	None
Generator Storage Costs[b]		
Secondary containment (Dikes, berms)	$145 per tank (1 tank per waste stream)	Scales with tank capacity; 0.6 scaling factor; Base tank capacity of 1,000 gallons per tank
Secondary containment (Engineered materials)	$3,371 per tank (1 tank per waste stream)	Scales with tank capacity; 0.6 scaling factor; Base tank capacity of 20,000 gallons per tank
Notification of leaks	$360 per facility	None
Detailed report of leak	$2,730 per facility	None
Develop/renew SPCC plan	$186 per facility	None
Approval of SPCC plan by licensed professional engineer	$71 per facility	None
Submit response plan to EPA Regional Administrator	$22 per facility	None
Air emissions controls – for Alternative Option A	$1,103 per tank (1 tank per waste stream)	Scales with tank capacity; 0.6 scaling factor; Base tank capacity of 20,000 gallons per tank
Air emissions controls – for Agency Selected Approach and Alternative Option B	$1,655 per tank (1 tank per waste stream)	Scales with tank capacity; 0.6 scaling factor; Base tank capacity of 20,000 gallons per tank
Burner Storage Costs[b]		
Burn Tank	$7,576 per facility	Scales with tank capacity; 0.6 scaling factor; Base tank capacity of 20,000 gallons per tank
Secondary containment (Dikes, berms)	$145 per facility	Scales with tank capacity;

Exhibit C-4

Cost Inputs for Boiler Costs, Analytical Costs, Tracking Costs, and Storage Costs

Component	Annualized Cost	Scaling Factor[a]
		0.6 scaling factor; Base tank capacity of 1,000 gallons per tank
Secondary containment (Engineered materials)	$3,371 per facility	Scales with tank capacity; 0.6 scaling factor; Base tank capacity of 20,000 gallons per tank
Piping from burn tank to burner	$58 per facility	None
Visual inspections of tanks	$2,920 per facility	None
Inspections of equipment (e.g., pumps, valves)	$884 per facility	None
Monitoring for VOC leaks	$1,800 per facility	None
Cessation and containment of leaks as hazardous waste	$4,710 per facility	None
Notification of leaks	$360 per facility	None
Detailed report of leak	$2,730 per facility	None
Professional engineer certification for major repairs	$98 per facility	None
Develop/renew SPCC plan	$186 per facility	None
Approval of SPCC plan by licensed professional engineer	$71 per facility	None
Submit response plan to EPA Regional Administrator	$22 per facility	None
Air emissions controls – for Alternative Option A	$1,103 per tank	Scales with tank capacity; 0.6 scaling factor; Base tank capacity of 20,000 gallons per tank
Air emissions controls – for Agency Selected Approach and Alternative Option B	$1,655 per tank	Scales with tank capacity; 0.6 scaling factor; Base tank capacity of 20,000 gallons per tank
Air emissions recordkeeping and reporting	$1,400 per facility	None
Operator training	$3,600 per facility	None
Closure cost	$8,684 per facility	Scales with tank capacity; 0.6 scaling factor; Base tank capacity of 10,000 gallons per tank
Financial assurance recordkeeping for closure costs	$1,800 per facility	None
Groundwater monitoring (offsite burner only)	$56,001 per offsite burner	None
Permitting (offsite burner only)	$18,300 per offsite burner	None

Source:
All estimates provided by EERGC, September 13, 2006.
Notes:
a. The scaling factors are used to estimate costs that are dependent on the quantity of qualifying ECF at each facility. For example, to estimate secondary containment costs for engineered materials, we use a scaling factor of 0.6 and apply that to a base value of 20,000 gallons per tank. If we assume the facility generates enough ECF to warrant a 3,000 gallon tank, under this approach, we use the following equation to estimate the facility's secondary containment costs for engineered materials: $[(3{,}000)/20{,}000]^{0.6}$ x $3,371 (annualized cost) = $1,080.
b. This exhibit only includes those tracking and storage costs that would change under the proposed rule or one of the alternative options considered by EPA. We do not present those tracking and storage costs that would remain unchanged from the baseline.

Exhibit C-5A

Management Method Cost Inputs

Management Method	Price	Price Source	Price $/ton ($2005)[f]
Solvent Distillation (H020)	Annual O&M ($/ton) = $6,260 * (Recovered Waste Quantity)$^{0.45}$ + $7,636	DPRA1	**$497.45**[a]
Acid Regeneration (H039)	Annual O&M ($/ton) = $32.97 * (Recovered Waste Quantity) + $1,498	DPRA1	**$39.94**[b]
Incineration (H040)[c]	$0.96 per gallon ($2004)	ETC	**$236.56**
Energy recovery (H050)[d]	$1 per gallon ($2004)	ETC	**$236.56**
Fuel Blending (H061)	$99.17 per Mton ($1994)	DPRA2	**$135.78**
Land treatment or application, including prior treatment and/or stabilization (H131)[e]	$133 per ton ($2004)	ETC	**$136.71**
Landfill or surface impoundment, including prior treatment and/or stabilization (H132)[e]	$133 per ton ($2004)	ETC	**$136.71**
Deepwell Injection (H134)	$175 per ton ($1997)	DPRA2	**$205.69**
Hazardous POTW/TSD Discharge/Disposal (H135)	$1.75 per gallon ($1998)	DPRA2	**$609.58**

Sources:
DPRA1: DPRA Inc., 3/14/06 Memorandum on Recycling Break-even Analysis (Subtask 3E Deliverable).
DRPA2: DPRA Inc., *Unit Cost Compendium*, Section I.
ETC: Environmental Technology Council, accessed on March 28, 2006 at: <http://www.etc.org/costsurvey8.cfm>.
Notes:
a. Average per ton cost for solvent distillation calculated by dividing the total annual operating and maintenance costs of potentially eligible waste by the total tonnage of affected waste across facilities.
b. Average per ton cost for acid regeneration calculated by dividing the total annual operating and maintenance costs of potentially eligible waste by the total tonnage of affected waste across facilities.
c. Commercial incinerator price for bulk non-halogen liquid waste.
d. We use the commercial incinerator price for bulk non-halogen liquid waste as a proxy.
e. Commercial landfill price for bulk waste with treatment.
f. Prices adjusted to 2005 dollars using GDP deflator.

For all management methods not included in Exhibit C-5A and for affected waste with no management method reported in the 2003 BRS, we use the weighted average cost per ton of the management methods in Exhibit C-5A. Exhibit C-5B outlines how we calculated this weighted average.

Exhibit C-5B Weighted Average Cost per Ton of Management Methods Listed in Exhibit C-5A				
[A] Management Method	**[B] Potentially Eligible Waste (tons)**	**[C] Tonnage Weight**	**[D] Price $/ton ($2005)[b]**	**[E] = [C] x [D] Tonnage-Weighted $/ton**
Solvent Distillation (H020)	110,696	6%	$497.45	$31.25
Acid Regeneration (H039)	49,403	3%	$39.94	$1.12
Incineration (H040)	312,890	18%	$236.56	$42.00
Energy recovery (H050)	444,359	25%	$236.56	$59.65
Fuel Blending (H061)	299,366	17%	$135.78	$23.07
Land treatment or application, including prior treatment and/or stabilization (H131)	361	0.02%	$136.71	$0.03
Landfill or surface impoundment, including prior treatment and/or stabilization (H132)	1,300	0.07%	$136.71	$0.10
Deepwell Injection (H134)	23,474	1%	$205.69	$2.74
Hazardous POTW/TSD Discharge/Disposal (H135)	520,427	30%	$609.58	$144.01
Total:[a]	1,762,276	100%		**$303.96**

Notes:
a. Total may not sum due to rounding.
b. See Exhibit C-5A for price information.