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RCRA Hazardous Waste Delisting: The First 20 Years

Program Evaluation

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EXECUTIVE SUMMARY

PURPOSE

This report documents an evaluation of the outcomes and impacts of the hazardous waste delisting program, conducted by the United States Environmental Protection Agency under the Resources Conservation and Recovery Act (RCRA). The report describes the rationale for conducting a program evaluation, the results and outcomes of the delisting program, and other findings and issues raised in this evaluation.

This evaluation was undertaken as part of EPA's implementation of the Government Performance and Results Act (GPRA) of 1993. That statute requires federal agencies to include program evaluations in the strategic planning process.

THE HAZARDOUS WASTE DELISTING PROGRAM

The Resource Conservation and Recovery Act, which guides EPA's hazardous waste management programs, provides for a process to remove, or "*delist*", a waste generated at a facility from the list of hazardous wastes. This delisting process is initiated by the generator (person who creates the waste), who prepares a petition for delisting the waste. The petition provides information about the waste, including its chemical composition, to demonstrate the rationale for delisting the waste. The petition is reviewed by the appropriate regulatory agency (either EPA or a state hazardous waste regulatory agency which has been authorized to grant delisting petitions) to determine whether the waste should continue to be listed as hazardous.¹

EPA's Office of Solid Waste decided that the delisting program would be a good candidate for evaluation. After consultation with staff and management in both headquarters and the regional offices, OSW decided that this evaluation would be most useful if focused on the *outcomes* and *impacts* of the federal delisting program, rather than focus on the mechanisms for conducting delistings. Therefore, this study examines how the program has functioned, and what has been gained by the operation of the delisting program. This "big picture" focus also results in findings that provide useful information for assessing the future direction and management of the delisting program. This report looks at three different categories of outcomes of the delisting program:

- ▶ Cost savings and aggregate economic impacts
- ▶ Impacts of delisting on the environment
- ▶ Impacts of delisting on the RCRA hazardous waste management program

¹ See Section 1.3 for more detail on the full process of the regulatory determination.

METHODOLOGY OF THE EVALUATION

EPA assembled a database listing all the delisting applications granted by the EPA (not including those granted by state governments) between calendar years 1980 and 1999. Some of the information had been kept by the delisting program, either in paper files or in the Delisting Petition Data Management System. This database had been discontinued in 1995. Other data was taken from the *Federal Register* notices announcing each proposed and final delisting granted.

Data elements in the current database include:

- ▶ Name and address of petitioning facility
- ▶ Date petition submitted and final decision reached
- ▶ Date delisting became effective
- ▶ Waste volume, matrix, form, quantity, and source
- ▶ Chemical test results for wastes
- ▶ RCRA waste codes
- ▶ Management of wastes before and after delisting

Using the database, we calculated total volumes of waste delisted. We also estimated the cost of administering the program, and cost savings that have been realized through delisting.

DESCRIPTIVE STATISTICS

Over the 20-year period from 1980 through 1999, delistings were granted to a total of 136 separate waste streams, generated at 115 separate facilities. By far the most common waste code for which delistings were granted is F006, an electroplating waste, found in 51 delisted waste streams. Over this period, **a cumulative total of 45 million tons of waste has been excluded from subtitle C requirements**; over 80% of that volume is wastewater.

ECONOMIC IMPACTS OF THE DELISTING PROGRAM

The reduced social costs associated with the delisting program are derived through calculating the administrative costs of operating the delisting program, and the offset of lowered costs of waste treatment and disposal.

The total administrative costs associated with this twenty year period of the delisting program ranges from \$107 million to \$226 million. The costs to petitioners is between 70-85% of that total. The costs of running the program, while large, are far outweighed by the cost savings achieved, however. From the inception of the delisting program through the year 2000, ***cumulative net cost savings attributable to the delisting program range between \$1.2 billion and \$2.4 billion***. Even if no further delistings are ever granted, the delisting program will save over \$105 million each year, from wastes that have already been removed from Subtitle C regulation.

ENVIRONMENTAL IMPACTS OF THE DELISTING PROGRAM

An complete investigation into previously delisted wastes was outside the scope of this program evaluation. However, given a strict risk assessment process (which has been made progressively more accurate), the Agency has little reason to believe that these streams are causing environmental problems. The Agency has also taken steps to limit the possibilities for harmful environmental releases in the future, and to facilitate review of the consequences of disposal of delisted waste streams.

Another issue of concern is the impact of delisting on recycling. It seems logical that delisting might inhibit recycling in some cases, and promote it in others. We found anecdotal evidence of both impacts, but were unable to identify clear trends in either direction.

CONCLUSIONS

The findings of this evaluation distinctly demonstrate the significant **economic** impacts of the delisting program: reductions in deadweight loss to the economy totaling over \$100 million each year. Continued efficiencies and refinements in the delisting petition review process should only improve those results. The **environmental** impacts are not as clear, although EPA does not have reason to suspect that delisted wastes are causing environmental problems.

As one of the first program evaluations undertaken by the RCRA program in response to GPRA, there is also clear value to this evaluation study itself. Not only has it helped the RCRA program understand the process of program evaluation, it has also helped us understand the nature of the value of a program. The analysis demonstrates that benefits can take many forms, not just risk reduction. A program like delisting demonstrates its value in terms of reduction in economic losses, and concomitant improvement in human welfare.

CHAPTER ONE: EVALUATION OF THE DELISTING PROGRAM

1.1 PURPOSE

This report documents an evaluation of the outcomes and impacts of the hazardous waste delisting program, conducted by the United States Environmental Protection Agency under the Resources Conservation and Recovery Act (RCRA). The report describes the rationale for conducting a program evaluation, the results and outcomes of the delisting program, and other findings and issues raised in this evaluation.

1.2 PROGRAM EVALUATION AND GPRA

This evaluation was undertaken as part of EPA's implementation of the Government Performance and Results Act (GPRA) of 1993. Under that statute, *program evaluation* has been defined as "an objective and formal assessment of the results, impact, or effects of a program or policy."² Program evaluations also may examine the implementation, operations, and/or processes of programs.³ A program evaluation will draw conclusions about the effectiveness of the design, implementation, and/or impacts of a program. The term *program* here includes the usual connotation of a set of staff activities with a defined goal or purpose; the term may also include a policy initiative, an investment project, or even a change in procedures.

Why conduct a program evaluation? Evaluation is clearly a good practice for effective management, whether public, private, or non-profit. Among the advantages of conducting evaluations are

- ▶ Assessing the impact of programs and policies
- ▶ Documenting that functions have been carried out and outcomes reached
- ▶ Documenting a lasting record of the program
- ▶ Assisting with decisions about program continuation, expansion, and future funding.

Although the GPRA statute does not require a specific schedule of program evaluations, the law clearly presumes they will be conducted. The committee report accompanying the legislation, as well as the legislation itself, speaks specifically of the role of program evaluations in the annual cycle of performance planning and reporting. Guidance from the Office of Management and

² *Government Performance and Results Act of 1993: Report of the Committee on Governmental Affairs, United States Senate, to Provide for the Establishment, Testing, and Evaluation of Strategic Planning and Performance Measurement in the Federal Government, and for Other Purposes*, p. 32.

³ See, for example, U.S. Office of Management and Budget, Circular A-11, §210.11: "Program Evaluations and Strategic Plans," 1998.

Budget⁴ directs agencies to prepare a planned schedule of program evaluations. According to the GPRA, the 5-year strategic plan should contain a “description of the program evaluations used in establishing or revising general goals and objectives.” The legislation also guides the agency to include a schedule for future program evaluations to be conducted. An October, 1998 memo from Sallyanne Harper, then Chief Financial Officer of the EPA, documents the Agency’s expectation that programs will conduct program evaluations as part of GPRA implementation, and provides basic guidelines for conducting such evaluations.

1.3 THE HAZARDOUS WASTE DELISTING PROGRAM

EPA uses a formal assessment process to determine whether certain industrial wastes should be placed on a list of “hazardous wastes.” These determinations include wastes from specific industrial processes or particular chemical formulations. Any waste that meets the listing description (regardless of its specific chemical composition) is a *listed* hazardous waste, and is regulated under RCRA Subtitle C. Those regulations include requirements for specific waste handling procedures, from generation through storage, treatment, and disposal.

Congress and EPA recognized, however, that listing wastes incurs the possibility of regulating wastes which do not truly pose a threat to human health or the environment. A facility may have a process or raw material that produces a waste with different attributes than others in the listed group. In other cases, waste treatment techniques may remove or destroy hazardous constituents. For example, a facility in Indiana was granted a petition to delist wastewater treatment sludges from an electroplating process, after demonstrating that concentrations of specific constituents in the the sludges were not large enough to present significant risk from disposal.

The RCRA statute⁵ and regulations, therefore, also provides for a process to remove, or “*delist*”, a waste generated at a facility from the list of hazardous wastes. This delisting process is initiated by the person generating the waste, who prepares a petition for delisting the waste. The petition provides information about the waste, including its chemical composition, to demonstrate the rationale for delisting the waste. The petition is reviewed by the appropriate regulatory agency (either EPA or a state hazardous waste regulatory agency which has been authorized to grant delisting petitions) to determine whether the waste should continue to be listed as hazardous.⁶ This determination is subject to notice and comment before a final decision is made.

⁴ U.S. Office of Management and Budget, Circular A-11, §210.11: “Preparation and Submission of Strategic Plans,” 1998.

⁵ §3001(f).

⁶The process is explained in regulations at 40 CFR 260.20 and 260.22, and in *Petitions to Delist Hazardous Wastes: A Guidance Manual*, Office of Solid Waste, 1993.

To gain a better understanding of the operations of the delisting program, this study employed a tool called a *program logic model*. A program logic model is a kind of input/output model of a program's operations. Figure 1 presents a simplified logic model of the waste delisting program. The steps in the delisting process are shown down the center of the diagram. These steps represent

- ▶ *inputs*,
- ▶ *outputs* (work processes and results), and
- ▶ *outcomes* (final results of the outputs)

of the delisting processes. In addition to these steps, the model also shows:

- ▶ *objectives*: desirable attributes of the process, outputs, or outcomes.
- ▶ *contextual variables*: factors exogenous to the Agency's performance of outputs that can affect the degree to which process objectives are successfully met.

The following is a description of the delisting program, using these terms of program logic.

INPUT: Hazardous waste generators prepare petitions and send them to the EPA.

Process objective: Ensure that generators are aware that a waste can be delisted if they can demonstrate that it should not be regulated as a hazardous waste.

OUTPUT 1 Agency staff review the applications for completeness, according to criteria in the delisting manual⁷.

Process objectives: The review should be speedy; petitioners should not be left waiting too long for a decision.

Contextual Variables: The speed of the review and decision process is dependent on a number of variables, including the complexity of the applications submitted, time needed for the petitioner to submit additional materials, and the budget and FTE time available for the task. Other factors outside of EPA control, which can affect the degree of achievement of the objectives, include the nature and extent of public comments on proposed delisting decisions, and any legal challenges that might ensue.

OUTPUT 2 The next output is a decision to either reject or accept the delisting petition; that is, the decision is to either retain the hazardous status of the waste, or give it a new non-hazardous status. This initial decision is subject to notice and comment, and then a final decision is reached and published.

⁷USEPA Office of Solid Waste, "Petitions to Delist Hazardous Wastes: A Guidance Manual", March 1993.

Delisting Program Logic Model

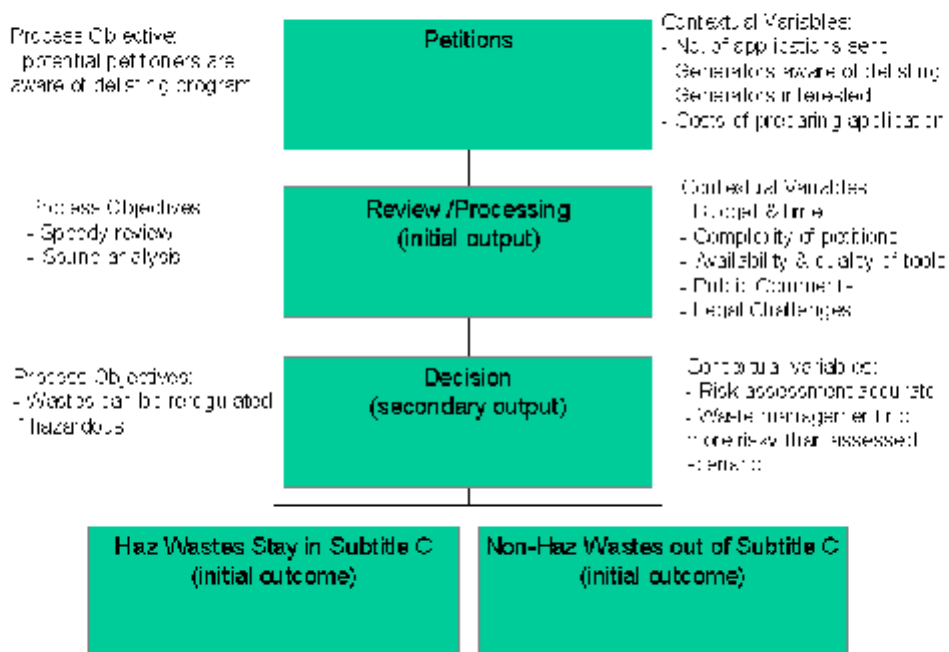


Figure 1

Process objectives: The decision should be supported by sound analysis, well-reasoned and well-documented.

OUTCOME 1 From that decision follows the first *outcome* in the process: The waste is either retained in Subtitle C regulation, or allowed to exit Subtitle C regulation.

Process objective: Wastes that are allowed to exit Subtitle C regulation do not pose significant risk to human health or the environment.

Contextual Variables: The risk assessment is sufficiently conservative to cover actual post-delisting waste management. Management of delisted wastes should be no more risky than the management scenarios assessed.

OUTCOME 2 If the waste is allowed to exit Subtitle C regulation, a secondary *outcome* follows: resources previously devoted to managing that waste as hazardous can be freed up for other uses.

1.4 EVALUATION OF THE DELISTING PROGRAM

1.4.1 Why Evaluate the Delisting Program?

The delisting program has faced changes recently, which makes it a good candidate for program evaluation. Among these changes:

- ▶ Responsibility for review of petitions and issuing decisions on delistings was delegated to EPA's regional offices in October, 1995. Until that point, these functions had resided in the Office of Solid Waste (at EPA headquarters) since the beginning of the program. This change suggests that a process evaluation might be appropriate, comparing the implementation of delisting by headquarters and regional offices.
- ▶ In 2000, responsibility for national coordination of the delisting program was also delegated from OSW, this time to the Region 6 delisting staff. This change in program operations also tends to recommend a process evaluation.
- ▶ In 1999, EPA proposed revisions to the "mixture" and "derived-from" rules, which provide another way to remove low-risk wastes from Subtitle C regulation. EPA is also working on a Hazardous Waste Identification Rule (HWIR), with regulatory standards identifying wastes that are low-risk. This regulation, once fully implemented, will provide an alternative means for industry to have these wastes removed from Subtitle C regulation.⁸ In light of this initiative, it seems reasonable to conclude that EPA should gain a better understanding of the delisting program, in order to better understand how it might work with HWIR. Will delisting be redundant? What roles will delisting and HWIR play, and how can EPA use the tools together to get more effective environmental regulation?

⁸See <http://www.epa.gov/epaoswer/hazwaste/id/hwirwste/index.htm> for more information on HWIR and the mixture and derived-from rules.

What might be the best type of evaluation for the delisting program?

There are three basic types of program evaluations:

- 1) *Formative* evaluations are conducted in the early stages of development (or implementation) of a program. They are intended to get an early indication of any problems with the program, and the likelihood of success.
- 2) *Process* evaluations focus on the operations and implementation of a program.
- 3) *Outcome* evaluations focus on the results, consequences, or products of a program.

The type of evaluation performed depends on the situation of the program, and the type of information that will prove useful to program managers.

The delisting program, having been carried out for 20 years, is probably not a candidate for a formative evaluation. The delegations of responsibility to Regional staff advanced the possibility of a process evaluation, looking at changes in delisting functions and operations. A process evaluation would also seem to be of limited usefulness, since EPA's Inspector General has recently completed a study of the process and operations of the delisting program⁹.

After extensive consultation with managers and staff in both OSW and regional offices, OSW decided that this evaluation would be most useful if it focused on the *outcomes* and *impacts* of the federal delisting program.¹⁰ Rather than focus on the mechanisms for conducting delistings, therefore, this study examines how the program has functioned, and what has been gained by the operation of the delisting program. This "big picture" focus also results in findings that provide useful information for assessing the future direction and management of the delisting program.

There is a great deal to be learned through this evaluation. By examining the outcomes of the program, EPA gains an understanding of what impacts the program has on industry, on waste management, and on the economy overall. The evaluation also provides RCRA managers with information to make decisions about the delisting program itself, and about interactions with other deregulatory initiatives (e.g., HWIR). This information should be useful as EPA continues working to tailor regulatory requirements to meet the risks addressed.

⁹USEPA, Office of Inspector General, RCRA Hazardous Waste: RCRA Delisting of Hazardous Waste, Report # E1DSB7-11-002108700001, June 1998.

¹⁰Although some states are authorized to delist wastes, this evaluation focuses on EPA's program.

1.4.2 What are the Outcomes and Impacts of the Delisting Program?

The principal outcomes of the delisting program are the cost savings and economic impacts that result from shifting wastes from Subtitle C management to less stringent Subtitle D management standards. This report looks at three different categories of outcomes of the delisting program:

- ▶ Cost savings and aggregate economic impacts
- ▶ Impacts of delisting on the environment
- ▶ Impacts of delisting on the RCRA hazardous waste management program

The report also examines the distribution of these impacts, on different industries, geographic areas, and types of businesses.

1.4.3 Is the Delisting Program Fulfilling Its Goals?

In many cases, an important part of an outcome evaluation is an assessment of the performance of a program against some kind of standard. Is the program making good progress toward strategic goals and objectives? Are there any deficiencies in performance because of program implementation?

For the delisting program, this is not an easy question. The delisting program doesn't have *strategic* goals, in terms of what it hopes to accomplish in outcomes; EPA does not set targets, for example, of numbers of wastes to be delisted each year. Goals are operational and process-oriented (as in the process objectives noted in section 1.3), but driven by the receipt of applications, not by strategic goals. It is difficult to set goals for an essentially reactive program, which aims at processing applications as they are received.

An overall goal for federal regulatory operations, however, is to maximize regulatory efficiency. To do that, EPA attempts to make sure that the burden placed on the regulated entities is no heavier than necessary to achieve regulatory goals of protection of human health and the environment.¹¹ To the extent that the delisting program is promoting efficient regulation and efficient use of resources, it is meeting that overall goal of federal regulation. Section 2.2 measures how well EPA is meeting that goal.

1.5 METHODOLOGY OF THE EVALUATION

The **evaluation question** asks: *What are the economic, environmental, and programmatic impacts of delistings?* The **evaluation design** uses a simple “before-and-after” framework to assess what changes have come about as a result of the delisting program. The evaluation design rests on the assumption that without the delisting, the waste would continue to be generated and managed under RCRA Subtitle C.

¹¹See “Regulatory Planning and Review”, Executive Order 12866, September 30, 1993.

1.5.1 Creating the Database

EPA assembled a database listing all the delisting applications granted by the EPA (not including those granted by state governments) between calendar years 1980 and 1999. Some of the information had been kept by the delisting program, either in paper files or in the Delisting Petition Data Management System. This database had been discontinued in 1995. Other data were taken from the *Federal Register* notices announcing each proposed and final delisting granted.

Data elements in the current database include:

- ▶ Name and address of petitioning facility
- ▶ Date petition submitted and final decision reached
- ▶ Date delisting became effective
- ▶ Waste volume, matrix, form, quantity, and source
- ▶ Chemical test results for wastes
- ▶ RCRA waste codes
- ▶ Management of wastes before and after delisting

1.5.2 Assessing the Data

Using the database, we calculated total volumes of waste delisted. These volumes were calculated using the following assumptions:

- We assumed that savings from delisting begin to accrue in the year after the exclusion takes effect. This likely results in understatement of savings, since there could be some savings in the same year as the exemption is granted.
- We assumed that waste generation in the absence of the delisting would have continued indefinitely at the same quantities.¹² This may lead to overstatement of savings, since companies may have ceased generating these wastes or may have implemented pollution prevention measures to reduce the quantity of waste generated. Conversely, it could lead to understatement, since increased production might have led to increased quantities of the wastes being generated¹³.

¹²This assumption was not made for wastes which were given "one-time" standard exclusions. These delistings are granted to a quantity of waste generated in the past, and are not applicable to any subsequent wastes generated. We did not assume that these wastes were generated or delisted in any other year.

¹³This assumption is especially tricky with one of the wastes, granted to Conversion Systems, Inc. for K061. There may be much larger amounts of K061 that have been delisted since the original amount, since the delisting was predicated on a particular treatment regimen.

- We assumed that after delisting, generators manage their wastes as if they were Subtitle D industrial wastes. However, there may be state requirements for management of these wastes, even in the absence of being listed as hazardous waste. To the extent that such requirements exist, the costs savings from delisting are overestimated.

Using data on unit costs of waste management under Subtitle C and Subtitle D, we also calculated the total cost savings attributable to delistings, on an annual basis and cumulatively. Results of the analysis are presented in Chapter Two.

CHAPTER TWO: RESULTS OF THE EVALUATION

This chapter presents the results of the data analysis, and conclusions from the data. It includes basic statistics on delistings, the economic and environmental impacts of delistings, and some data on the distribution of those impacts.

All of these statistics refer only to the federal delisting program. Incorporating the results of state delistings would lead to different results for most of these categories.

2.1 DESCRIPTIVE STATISTICS

Over the 20-year period from 1980 through 1999, delistings were granted to a total of 136 separate waste streams, generated at 115 separate facilities¹⁴. Table 1 below gives an overview of the individual waste streams delisted.

As-generated process wastes make up fewer than 15% of the waste streams; the majority were treatment residuals and wastewaters. Wastewater treatment sludges alone account for more than half the waste streams. Although only 4% of the waste streams were wastewaters, they are large volume wastes. 36 of the streams (26%) of the waste streams were not part of an on-going process, but only generated one time.

Table 2 shows the most frequent waste codes present in delisted wastes¹⁵. By far the most common code is F006, found in 51 waste streams. F019, F003, K071, and F005 were also quite common.

Delisted K061 waste streams were quite large, averaging 81,600 tons each. K071 wastes, on the other hand, averaged only 1,800 tons per year.

¹⁴ One delisting was granted and then later revoked, so there were actually 137 wastes delisted.

¹⁵The numbers of waste streams appear higher than in Table 1 because many wastes carry multiple codes.

**Table 1
OVERVIEW OF DELISTED WASTE STREAMS**

Type of Waste	Total	Wastewater s	Process Wastes	WWT Sludges	Other Treatmen t Residuals	Contaminate d Media
F001-F005 Solvent Wastes	21 (15%)	3	6	6	6	-
F006,F009,F019 Electroplating Wastes	69 (51%)	-	3	60	5	1
F020-F028 Dioxin Wastes	9 (7%)	2	-	-	7	-
K048,K051 Petroleum	3 (2%)	-	-	1	1	1
K060,K062 Steel	10 (7%)	-	2	2	6	-
K071,K106 Chlor-Alkali	12 (9%)	-	8	1	3	-
Miscell	12 (9%)	1	-	4	6	1
TOTAL	136 (100 %)	6	19	74	34	3
% of Waste Streams	100%	4%	14%	54%	25%	2%

**Table 2
MOST FREQUENT WASTE CODES PRESENT IN DELISTED WASTES**

Waste Code	No. of Streams	Average Size of Stream (tons)
F006	51	4,500
F019	34	5,400
F003	16	14,000
K071	13	1,800
F005	12	13,800*
K062	8	19,200
F020	7	1,500
F002	7	19,700*
K061	6	81,600
K002-K008	5	25,400

*Figures for F005 and F002 exclude the single outlier wastestream described below in section 2.1.1.

2.1.1 Total Quantities of Waste Delisted

The waste quantities discussed in the previous section only show generation in a single year. In the absence of the delisting program, however, these wastes would have continued to have been managed under Subtitle C management. For example, in 1985, a waste stream of sluiced bottom ash sludges was delisted; this waste is generated at an annual rate of 19,100 tons. Using the assumption of continuous generation (discussed in section 1.5.2), this analysis estimates that an aggregate total of 286,500 tons of this particular waste stream had been taken out of subtitle C management through 1999.

Cumulatively, **a total of 45 million tons of waste has been excluded from subtitle C requirements.** Over 80% of that volume is wastewater, with 32 million tons attributed to one waste stream at one facility.¹⁶

¹⁶This stream, the single largest volume waste delisted, consisted of scrubber effluent wastewaters.

2.2 ECONOMIC IMPACTS OF THE DELISTING PROGRAM

The reduced social costs associated with the delisting program are derived through calculating the administrative costs of operating the delisting program, and the offset of lowered costs of waste treatment and disposal.

2.2.1 Administrative Costs

A total of 906 delisting petitions have been submitted to EPA between 1980 and 1999. Table 3 provides a breakdown of the disposition of those petitions — those which were granted, those which were denied, and those which never completed the full review process.

Each delisting petition submitted to EPA incurs a cost to the petitioner (to gather the necessary data and prepare the petition) and to the government (for review of the petition and analysis of the data). For petitions that are incomplete, or that never complete the review process, these costs are lower.

STATUS	NUMBER OF PETITIONS	PERCENT OF TOTAL
WITHDRAWN	503	56%
DENIED	108	12%
REFERRED TO STATE	32	4%
INCOMPLETE / IN PROCESS	122	13%
RULE-MAKING PETITION/ DISMISSED*	26	3%
GRANTED	115	13%
TOTAL	906	100%

**These petitions were all listed as "dismissed," indicating that the Agency staff decided that the petition did not warrant further review .*

EPA has previously estimated the recordkeeping burden for a petitioner as well as the burden to the government for review of a delisting petition.¹⁷ This report estimated that the cost to the EPA for reviewing a petition is approximately \$28,000. The report estimated the cost to a petitioner at approximately \$82,000.¹⁸ Because an earlier report to EPA¹⁹ suggested that petitions sometimes cost as much as \$100,000 or more, we

¹⁷Supporting Statement for EPA Information Collection Request Number 1189.05, Identification, Listing, and Rulemaking Petitions, 16 January, 1998.

¹⁸We assumed that a petitioner incurs all the costs of preparing a petition, even for those petitions which were withdrawn or mooted.

¹⁹Industrial Economics, Inc. "Final Analysis of Delisting Program Policies and Procedures", 17 February 1992.

conducted a sensitivity analysis and estimated petitioners' costs using that per-petition cost estimate, as well.

Finally, we calculated the net present value of the aggregate administrative costs by applying a discount rate. Discounting reflects the time value of money, in that the value of a dollar lost in future years is greater than a dollar, since the capacity to invest and earn extra income is also lost. The discount rate represents the displaced investments and consumption that could have been made in the absence of spending these funds on preparing and reviewing delisting petitions.

Table 4 presents the administrative costs of conducting the delisting program²⁰. The total administrative costs associated with this twenty year period of the delisting program ranges from \$107 million to \$226 million. The costs to petitioners ranges is estimated to be 70-85% of that total.

	Government Costs	Petitioner Costs	Total	7% discount rate ²¹	2% discount rate ²¹
Low-End	22.14	74.01	96.15	112.93	107.15
High-End	22.14	148.02	170.15	225.86	189.55

2.2.2 Costs of Treatment and Disposal

The most obvious and significant impact of the delisting program is the reduction in the costs of waste management. Waste management costs under RCRA Subtitle C (hazardous waste standards) are usually significantly more expensive than waste management under RCRA Subtitle D (non-hazardous waste standards). Where these wastes were being managed more stringently than necessary, these additional costs of waste management represent an unnecessary cost to the economy. In economic terms, this is referred to as a deadweight loss to the economy. By reducing these unnecessary costs, the delisting program is restoring value to the economy. These resources can now be devoted to producing valued goods and services.

²⁰ Discount rates are used to adjust the raw costs for the time value of money; the present value of cost savings is higher than the nominal value of those savings in prior years. Two different discount rates are used in the table to render the costs comparable over the twenty-year period of the study. There is not a clear consensus on the appropriate discount rate to use in a study like this; EPA guidance suggest using a lower rate of 2-3%, representing the social rate of return on investments, and a sensitivity analysis using a higher rate of around 7%, which tends to reflect returns to the private entities concerned (in this case, the firms paying waste management costs). See USEPA, *Guidelines for Preparing Economic Analyses*, 2000, Chapter 6.

Cost savings in treatment and disposal are determined by assessing the costs of treatment and disposal for each waste stream for each year after the delisting became effective, under subtitle C and under subtitle D. The analysis develops two scenarios: waste management in the baseline scenario (with a delisting granted), and in a “without-delisting” scenario. Without delisting, these wastes would have incurred the higher Subtitle C costs of treatment and disposal. The difference between the costs in these two scenarios represent the cost savings in treatment and disposal costs attributable to the delisting.

Waste Management Techniques

This requires first associating waste management techniques (treatment and disposal) under both Subtitle D and Subtitle C. In many cases, these techniques were already specified in the delisting petition or other records. In other cases (where not specified) customary practices under Subtitle D were assumed for the waste streams. Unless other information was available, we assumed the same disposal practice (e.g., surface impoundment, landfill, incineration) would be used pre- and post-delisting.

Where not otherwise specified, required treatments under Subtitle C were assumed for pre-delisting management. Land Disposal Restrictions (LDRs) typically required additional treatment of wastes prior to land disposal, or encouraged a switch to an alternative technology. The analysis takes the LDRs into account by assuming that treatment would be required prior to land disposal once the relevant LDR took effect. If wastes were delisted prior to the effective date of the relevant LDRs, we assumed (in the “without-delisting scenario”) continuation of the existing treatment up until that year, and then LDR requirements after that year. We identified the year in which LDRs took effect based on the waste codes reported for each delisted waste stream. The earliest effective date was selected for wastes with multiple waste codes. For example, a waste that included F005 in its list of waste codes was assigned an LDR effective date of 1986, even if other waste codes reported for that waste stream had later LDR effective dates. In the absence of a delisting, management under LDR standards was assumed to begin the year after the effective date of the relevant LDR (e.g., the savings of avoided LDR management for a waste delisted in 1986 that includes F005 as a waste code were assumed to begin in 1987.)²¹

Unit costs

Each type of waste treatment is likely to either increase the quantity of waste (e.g., waste stabilization), decrease the quantity of waste (e.g., incineration), or have no appreciable effect

²¹The analysis assumes that cost savings begin the year after a delisting takes effect. For one-time delistings, cost savings occur only in the year after the delisting takes effect. Because the delistings actually took effect earlier than the following year, this assumption tends to understate the cost savings.

(e.g., neutralization). The residual factors shown in Table 1 indicate the residual quantity that remains to be disposed of after treatment.²²

Estimates of the unit costs of different treatment and disposal technologies are taken mostly from EPA's recent analysis of the proposed HWIR rule, and are reproduced in Table 5.²³

**Table 5:
Quantity-Based Industrial Hazardous Waste Treatment and Disposal Unit Costs**

Item	Waste Treatment or Disposal Method	Residual Factor	≤ 470 tons/year	≤ 4,700 tons/year	≤ 47,000 tons/year	≤ 470,000 tons/year
1	Deactivation	0.01	\$820	\$820	\$200	\$200
2	Liquid Incineration	0.25	\$301	\$301	\$301	\$301
3	Neutralization	1.01	\$270	\$34	\$4.48	\$0.73
4	HTMR	0.0	\$191	\$191	\$191	\$191
5	Mercury Retort	1.0	\$856	\$856	\$446	\$194
6	Stabilization	1.5	\$200	\$150	\$50	\$23
7	Vitrification	1.5	\$230	\$230	\$230	\$230
8	Underground Injection		\$0	\$0	\$0	\$0
9	Acid Regeneration/ Recycling		\$0	\$0	\$0	\$0
10	Subtitle C Disposal		\$130	\$130	\$130	\$57
11	Subtitle D Disposal		\$50	\$50	\$50	\$50

(1999\$ average cost per ton, depending on annual quantity treated by facility)

Source: U.S. EPA Office of Solid Waste, Economics, Methods, & Risk Assessment Division, Economic Assessment of the USEPA's 1999 Proposed Hazardous Waste Identification Rule (HWIR), 29 October 1999 Exhibit IV-14.

²²For example, stabilization results in an increase in the waste quantity to be disposed by a factor of 1.5.

²³U.S. EPA Office of Solid Waste, Economics, Methods, & Risk Assessment Division, *Economic Assessment of the USEPA's 1999 Proposed Hazardous Waste Identification Rule (HWIR)*, 29 October 1999.

Other unit cost figures include:

*Incineration*²⁴:

Liquids (comparable fuels) \$70/ton
 Liquids (highly contaminated) \$301/ton
 Sludges (less contaminated) \$320/ton
 Sludges (highly contaminated) \$630/ton
 Solids (less contaminated) \$683/ton
 Solids (highly contaminated) \$1281/ton

*Upgrading from surface impoundments (Subtitle D) to Subtitle C storage tanks*²⁵: \$0.40 /ton

These unit costs largely derive from 1999 estimates. Although the unit costs are adjusted for inflation for each year in which they are applied, this formula does assume that unit costs remain approximately the same over the twenty-year period of the study. Anecdotal evidence suggests that costs of hazardous waste management techniques have actually fallen at a more rapid pace than inflation. Waste management costs from the 1980's were actually higher than current prices, even in real terms. These inflation-adjusted cost savings are therefore probably an underestimate.

Assessment of Total Cost Savings

Using the aforementioned data and assumptions, each waste stream is assigned a cost of management post-delisting under Subtitle D (as actually required) and under Subtitle C (as would have been required in the absence of the delisting). Cost savings (the difference between the actual scenario and the hypothetical without-delisting scenario) were then calculated for each post-delisting year through 2000 (the first delistings took effect in 1985).²⁶

²⁴Unit costs for incineration taken from from Exhibit 3-1of *Assessment of the Potential Costs, Benefits, & Other Impacts of the Hazardous Waste Combustion MACT Standards*, USEPA, Office of Solid Waste, July 1999.

²⁵ Unit cost for storage tanks based on estimate of costs (capital costs plus annual operation and maintenance) for high volumes of waste, assuming 30-day storage period. Source: *Regulatory Impact Analysis: Application of Phase IV Land Disposal Restrictions to Newly Identified Mineral Processing Wastes*; USEPA, Office of Solid Waste, April 30, 1998. Exhibit F-14.

²⁶It is generally the practice to convert all prices to 1999 dollars, to account for lower prices in earlier years. This practice works with the general assumption that prices of the particular commodity follow general trends of inflation. However, our data suggests that prices of hazardous waste treatment do not follow the general trend of inflation; in fact, prices are lower (even in nominal terms) than they were in earlier years. Therefore, we have assumed 1999 prices for all years of the evaluation. In practice, this probably means that we are understating the cost savings.

Table 6 presents cost savings for each year, as well as aggregate cost savings. **The cost savings that accrue in 2000 – \$105.4 million — will continue to accrue every year — even if no further wastes are ever delisted²⁷.** Additional delistings will increase the total cost savings. From the inception of the delisting program through the year 2000, ***cumulative gross cost savings attributable to the delisting program range between \$1.36 billion and \$2.49 billion.***²⁸

These cost savings are probably underestimated, because of cost savings not included. Besides savings in treatment and disposal costs, there are other costs which may also be saved. Specifically, we have not accounted for

- ▶ Potential savings in transportation costs. This omission tends to underestimate the cost savings. Not only is transportation of non-hazardous wastes less expensive per mile, but it is likely that these wastes would be transported shorter distances, inasmuch as industrial waste disposal facilities are more widespread than permitted Subtitle C disposal facilities.

Table 6
Cost Savings per Year
(individual years, not cumulative)

Year	Cost Savings
1985	\$749,040
1986	\$5,096,626
1987	\$19,492,938
1988	\$22,126,162
1989	\$42,180,857
1990	\$51,866,658
1991	\$69,882,661
1992	\$73,683,088
1993	\$78,043,510
1994	\$78,592,062
1995	\$78,817,442
1996	\$96,974,128
1997	\$164,566,547
1998	\$98,126,193
1999	\$98,126,193
2000	\$105,400,863
Cumulative Net Present Value at 7% discount rate	\$2,490,052,373

²⁷Based on the assumptions of continuous generation of equal volume of the waste.

²⁸All cumulative costs in this analysis are presented in real terms, using year 2000 dollars.

- ▶ Potential savings in administrative costs, such as compliance with manifest requirements. For some facilities, delisting may have reduced or eliminated the burden of Subtitle C permitting requirements; the cost savings in those cases are significant. We did not collect data which would enable us to quantify these savings.

2.2.3 Net Cost Impacts

Section 2.2.1 discussed the costs of administering the program, while section 2.2.2 discussed the cost savings resulting from the program. The cost impacts of the delisting program are presented in Table 7. The cost savings in treatment and disposal costs overwhelm the administrative costs of conducting the program by an order of magnitude. In summary, over the twenty-year period examined, **the delisting program has resulted in a net cost savings to society in the range of \$1.17 billion to \$2.38 billion.**

Discount Rate	Admin. Costs, Low-End	Admin. Costs, High-End	Treatment & Disposal Cost Savings	Net Cost Savings, Low-End	Net Cost Savings, High-End
7%	\$112.93	\$225.86	\$2,490.05	\$2,264.19	\$2,377.12
2%	\$107.05	\$189.56	\$1,357.57	\$1,168.01	\$1,250.52

2.3 ENVIRONMENTAL IMPACTS OF THE DELISTING PROGRAM

A program evaluation should provide information that is useful to help manage the program; even a retrospective evaluation (such as this one) can help guide the program into the future. EPA staff who work on delisting were consistently interested in exploring the *environmental* consequences of the delisting program.

A basic premise of the delisting program (see the process objectives in the program logic model) is that delisted wastes do not pose any significant threat to human health or the environment, even when not managed under the strict guidelines of RCRA Subtitle C. This goal is accomplished through chemical analysis and fate and transport modeling of wastes, prior to granting a delisting. In order to be delisted, this analysis must demonstrate that the waste:

- ▶ Does not meet the criteria for which it was originally listed.
- ▶ Does not exhibit any of the hazardous waste characteristics.

- ▶ Does not exhibit any *other* factors (including additional constituents) which might cause the waste to be hazardous.

A delisting determination is based on reasonable worst-case scenarios, to ensure that there is no reason that the waste should remain under RCRA Subtitle C regulation.

Are there delisted wastes that nevertheless might pose environmental problems? Unfortunately, an environmental assessment of previously delisted wastes was beyond the scope of this program evaluation. We are able, however, to provide some qualitative assessment of the environmental impacts of the delisting program.

2.3.1 Environmental Releases

In 1997, a delisting had to be revoked when EPA discovered that our risk assessment assumptions did not fully capture the risk possibilities of a waste stream.²⁹ The waste which had its delisting revoked posed a greater threat of release of constituents than EPA originally estimated. This re-assessment occurred because the waste was managed in a more alkaline environment than the landfill transport models anticipated, resulting in a different release profile. EPA has already reviewed previously delistings to determine if this alkaline environment could be a similar problem with other waste streams, and concluded that this was a problem unique to the chemical characteristics of this waste stream.

What is the likelihood that other delisted wastes are producing environmental releases of concern? The fate and transport models that have been used in the program use very protective assumptions in projecting exposure to constituents. It would seem that the opportunities for damage are probably limited to

- ▶ Significant changes in the waste characterization (volume, constituents, constituent concentrations) from that reported in the original petition. Waste generators are supposed to notify EPA if such changes occur; EPA efforts to check up on previously delisted wastes have been minimal, but have not discovered such changes.
- ▶ Situations, like the revoked delisting, where there is some undiscovered flaw in the waste and risk assessment methodology.

The Agency is taking steps to limit the possibilities for harmful environmental releases in the future, and to facilitate review of the consequences of disposal of delisted waste streams. In July, 1998, EPA established a *conditional delisting* policy, to ensure that delisted wastes are managed in a manner consistent with the risk evaluation that supports the delisting decision. At the same time, the Agency established a *delisting reopener* mechanism, for immediate response to new

²⁹The exclusion for this waste stream, number ARD006354161, was repealed on December 1, 1997. For information on the action, see the Federal Register notice at 62FR Number 147, July 31, 1997.

information or data indicating conditions exist that may alter the Agency's position on the approval of a delisting.

Although improving environmental quality is not the primary rationale for the delisting program, it may provide some improvement in environmental quality, as well. There is anecdotal evidence that some facilities have engaged in extra treatment of their wastes (beyond what is legally required) in order to reduce the toxicity of their wastes in order to become eligible for delisting. This additional treatment would provide some additional protection against release of constituents to the environment.

Delisting may provide other environmental benefits, as well. In their review of the delisting process, EPA's Inspector General noted that some companies function with an "environmental programs budget." When the costs of waste management decline, these companies have redirected these funds into other environmental projects.

In summary, EPA does not have evidence of releases or lack of releases from delisted waste streams. However, given a strict risk assessment process (which has been made progressively more accurate), the Agency has little reason to believe that these streams are causing environmental problems. The Agency has also put additional measures in place to reduce the likelihood of releases.

2.3.2 Recycling

Delisting wastes may have an impact on recycling quantities. Although such impacts are not relevant to the delisting decision itself – which is exclusively risk-based – it is worthwhile examining how delisting has affected recycling.

To some extent, the high cost of hazardous waste treatment and disposal under Subtitle C has provided an incentive for firms to recycle wastes and to recover resources from wastes. Intuitively, therefore, it would seem that delisting – which reduces the cost of treatment and disposal – might have a negative impact on hazardous waste recycling. One particular delisting may have been very significant in inhibiting recycling. That delisting, granted in 1995, exempted 306,000 tons of chemically-stabilized electric arc furnace (EAF) dust. According to an industry study³⁰, over 85% of the EAF dust generated in the US had been recycled, primarily for zinc recovery. Such recovery accounted for approximately 30% of domestic zinc production, before the delisting action. This study suggested that the delisting would divert those wastes from resource recovery into chemical stabilization followed by disposal in Subtitle D landfills. As of yet, EPA has not formally assessed the impact of this delisting on zinc recovery from EAF dust wastes. Although the current database contains information on pre-delisting and (planned) post-delisting waste management, there is no clear indication of other wastes that have been diverted from recycling to waste disposal.

³⁰Arthur D. Little, Inc., "Electric Arc Furnace Dust – 1993 Overview" (Cambridge, July 1993).

On the other hand, many waste generators have told EPA that the “stigma” associated with hazardous wastes impedes recycling, since treaters and recyclers are often unwilling to acquire the liabilities associated with handling hazardous waste. Delisting wastes, therefore, may *increase* quantities recycled. We have information on one case where delisting apparently promoted waste recycling. The delisting allowed the facility to convert a 12,000 ton waste stream of lagoon sludges to be used as fertilizer. Prior to the delisting, the wastes were being incinerated.

2.3.3 Opportunity Costs to EPA

Another way of looking at the cost of the delisting program is through the concept of “opportunity cost”, i.e., alternative uses for the resources consumed in running the delisting program. In this sense, the cost of staff time spent on delisting is to view it as “other regulatory work” that is forgone in order to work on delistings. If EPA could have used those resources for an environmental protection program, what additional protection could they buy?

Administrative costs of the program over 20 years range between 107-226 million dollars. EPA’s expenditures probably represent no more than 15-30% of that total, or 16 to 68 million dollars. If spent on other hazardous waste programs, that could have represented a certain number of facility investigations, enforcement actions, permits, or other regulatory actions. Assuming those actions would have led to some degree of improvement in environmental quality, EPA has forgone such improvements. Those improvements, of course, could only come at the expense of the billions of dollars in social costs that delisting has saved, but it is worthwhile to be aware of the budgetary tradeoffs made.

2.4 DISTRIBUTION OF IMPACTS

In addition to looking at the aggregate cost savings attributable to the delisting program, we can also examine the distribution of those impacts. What are the economic impacts on specific industries or areas of the country?

2.4.1 Geography

Geographically, the most federal delistings have been granted in in the southeast and midwest (28 delistings granted in each of EPA Regions 4 and 5). The states most affected are

- ▶ Ohio (10)
- ▶ New York (9)
- ▶ Tennessee (9)
- ▶ Indiana (8)
- ▶ Pennsylvania (8)
- ▶ Alabama (7)
- ▶ Arkansas (7)

This represents only the distribution of EPA-granted delistings; 18 states have been authorized to grant delistings on their own.³¹

2.4.2 Small Businesses

It has been suggested that smaller business are prevented from obtaining delistings because of the high cost of preparing a petition.³² This report has shown, however, that the savings in waste management costs readily make up for the administrative costs of preparing a petition. At least 10% (12 of the 115) of the generators who have received delistings are Small Quantity Generators (or less). Although this is not a perfect proxy for business size, larger firms tend to be larger quantity generators.

2.4.3 Industries Affected

We also reviewed the extent to which different industries have been impacted by the delisting program. The following industries are of particular interest:

Plating and Metal Polishing/Coating: This industry has been a major beneficiary of delisting, as F006 and F019 waste codes are the most common wastes to be delisted.

Chloralkali: This is a small industry, which only numbered about 20 firms overall in the late 1980's. 12 wastestreams associated with this industry were delisted, related to 8 firms.

Blast Furnaces and Steel Mills: There were 12 delistings associated with this industry. At least 1.5 million tons of K061 have been delisted, deriving from steel production at mills using electric arc furnaces.

Pharmaceutical: Of the 45 million tons of waste delisted, 32 million tons are attributable to one waste stream at a single pharmaceutical facility in the midwest. This waste, consisting of scrubber effluents, is generated at a rate of nearly 3million tons per year.

Aluminum plating is another industry which received several delistings.

In general, the larger volume generators of hazardous wastes (e.g., chemical industry, metals) are well represented in the set of delistings. One exception to this correlation, however, is the petroleum industry; although a large generator of wastes, only 3 refineries got delistings. It is not

³¹ The list of states fully or partially authorized to delist wastes is: New Jersey, Delaware, Kentucky, North Carolina, Mississippi, Alabama, Georgia, Michigan, Illinois, Louisiana, Nebraska, North Dakota, South Dakota, Wyoming, Utah, Colorado, Oregon, and Idaho.

³²See USEPA, Office of Inspector General, *RCRA Hazardous Waste: RCRA Delisting of Hazardous Waste*, Report # E1DSB7-11-002108700001, June 1998.

clear if there is a specific reason why this industry has not made more use of delistings. One possibility is that there is either less variation among wastes in refineries, or the listing description more precisely captures the hazardous nature of their wastes.

CHAPTER THREE: RECOMMENDATIONS AND CONCLUSIONS

3.1 RECOMMENDATIONS

3.1.1 Regulatory Impacts Analysis

In reviewing Federal Register notices for delistings, we did not find any RIAs associated with these regulatory actions. Often, these notices indicate that since the rules don't meet the criteria of Executive Order 12866 (or predecessor applicable Executive Orders) as "significant regulatory action", then "no assessment of costs and benefits is necessary."

Although such an assessment is not *required* by the Executive Order, it is often a good idea to undertake such an assessment. It is always a good practice in making public policy to be aware of the impacts of a regulatory action, whether required by Executive Order, or statute, or not at all. This evaluation has demonstrated that such an analysis is particularly helpful for delistings, to help understand the value of the program overall. As RCRA program management continues to "fine tune" hazardous waste management requirements, assessing the impacts of delistings can be valuable in the Agency's overall effort to better match risks with regulatory requirements.

3.1.2 Evaluation of the Listing Program

Delisting exists because our listing methodology captures a large category of wastes, and some wastes are caught in the net which are not necessarily risky. The earliest EPA listings involved risk assessment methodology which tended to be far more cautious than methodologies used today. Therefore, it would seem, these early listings were more likely to have captured low-risk wastes than the later listings, which used more precise and refined risk assessment methodology. (Later risk assessments may be more conservative in some respects, especially in evaluating indirect effects and ecological risks.) The methodology and results of this evaluation could be very helpful in undertaking an evaluation of the hazardous waste listing program.

3.2 CONCLUSIONS

The findings of this evaluation distinctly demonstrate the significant economic impacts of the delisting program: reductions in deadweight loss to the economy totaling over \$100 million each year. Continued efficiencies and refinements in the delisting petition review process should only improve those results.

The environmental impacts are not as clear, although EPA does not have reason to suspect that delisted wastes are causing environmental problems.

As one of the first program evaluations undertaken by the RCRA program in response to GPRA, there is also clear value to this evaluation study itself. Not only has it helped the RCRA program understand the process of program evaluation, it has also helped us understand the nature of the “value” of a program. This evaluation have demonstrated that benefits can take many forms, not just risk reduction. A program like delisting demonstrates its value in terms of reduction in economic losses, and concomitant improvement in human welfare.

The delisting program has also helped refine standards for the RCRA hazardous waste management program itself, by providing information and feedback on our listing descriptions. Information received in delisting petitions has helped the Agency refine the “listing description”, that is, the characterization of the hazardous nature of a class of industrial wastes.