ECONOMICS BACKGROUND DOCUMENT

ECONOMIC ASSESSMENT OF THE USEPA'S 1999 PROPOSED HAZARDOUS WASTE IDENTIFICATION RULE (HWIR)

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PREFACE

This document presents both completed economic analytical work (i.e. an estimate of potential economic impacts of one specific HWIR exemption), as well as economic analysis work still in progress (i.e. a framework of an economic impact model under development for other potential HWIR exemptions).

With one exception, this document does not contain discussion of Federal regulatory economic analysis requirements (e.g. as contained in 1993 Executive Order 12866, RFA/SBREFA, or the 1995 UMRA); the preamble in the Federal Register notice describes and explains compliance with these requirements, as well as provides any supporting data and information necessary to the explanations.

The public is encouraged to provide comments and feedback to the USEPA – during the designated public review period indicted in the Federal Register notice – on the design and contents of this document, including submitting any supplementary information that may improve the accuracy, representativeness, or comprehensiveness of the information and data presented. Public reviewers may submit comments in writing directly to the RCRA Docket during the designated review period, which may be contacted for instructions by phone at 800-424-9346, or via the Internet at http://www.epa.gov/epaoswer/osw/infoserv.htm#info .

OVERVIEW OF THIS ECONOMIC ASSESSMENT

The US Environmental Protection Agency (USEPA) prepared this Economic Assessment, to accompany the Agency's proposed revisions to the "mixture-and-derived-from" rules (MDFRs) for identifying industrial hazardous wastes, under Subtitle C of the 1976 Resource Conservation and Recovery Act (RCRA). The USEPA first proposed the Hazardous Waste Identification Rule (HWIR) in 1992 (withdrawn), and again in 1995; the 1999 Federal Register notice is a supplement to the 1995 HWIR proposal. The specific substantive requirements and deadlines for the 1999 HWIR are set forth in an April 1997 US District Court consent decree. The 1999 HWIR proposes to retain the RCRA "mixture-and-derived-from rules" (40 CFR 261.3(a)(2)(iii),(iv) & (c)(2)(i)), and presents an additional regulatory proposal to revise the MDRFs for waste listed for a RCRA hazardous "characteristic":

- **Decharacterized waste exemption**: Revision to the current exemption (40 CFR 261.3(a)(2)(iii)) from RCRA Subtitle C industrial waste management requirements, for hazardous wastes listed solely for ignitability, corrosive, and/or reactivity characteristics.

The 1999 HWIR Federal Register notice also discusses two additional regulatory features:

- **Risk-based "exemption level" framework**: Description of a future implementation framework for establishing risk-based "exemption levels" for chemical constituents in hazardous waste, to exempt low-risk industrial process wastes from RCRA Subtitle C hazardous waste management requirements.
- **"Minimize threat" LDRs**: Replace the current technology-based land disposal restrictions (LDRs), with the new risk-based HWIR "exemption levels".

USEPA is currently in the process of refining a computer-based, human health and ecological risk analysis model, which may be applied in the future, for establishing HWIR "exemption levels" for certain industrial process hazardous waste constituents. Consequently, the 1999 HWIR notice does not contain exemption levels, nor identify LDRs for replacement with exemption levels. Accordingly, this document only provides an estimate of the economic impacts associated with the decharacterized waste exemption. This report also provides descriptive information on:

SECTION I	**HWIR Regulatory Background:** Discusses the 1999 HWIR notice and its regulatory options. The potential economic impacts of the mixed waste exemption as required in the consent decree, are assessed in a separate economic report identified in a separate USEPA regulatory notice in the Federal Register.
SECTION II	**Decharacterized Waste Exemption**: Estimates the potential national, industry-wide waste disposal cost savings associated with this provision of HWIR.
SECTION III	**Waste Constituent Database**: Description of USEPA's database on identity and concentration of constituents in industrial hazardous wastes.
SECTION IV	**HWIR Economic Model**: Describes the data and model under development to assess the economic impacts of HWIR "exemption levels" and associated changes to LDRs, when they become available in the future. **HWIR Implementation Costs:** Estimates per-facility costs for reporting, recordkeeping and waste analysis requirements to gain an HWIR exemption. **HWIR Potential Benefits**: Describes the potential economic benefits of the two prospective HWIR provisions (i.e. exemption levels & minimize threat).

SUMMARY OF ECONOMIC ANALYSIS FINDINGS

Compared to the 1995 HWIR proposal, the 1999 supplementary notice does not contain waste constituent exemption levels. Consequently, this economic impact report does not contain estimates of the potential HWIR-eligible waste quantities, and industry cost saving expected, with a particular set of HWIR exemption levels, or of replacing LDRs. However, this report presents results for the decharacterized waste exemption proposed under the 1999 HWIR. Under this provision, wastes that are listed solely due to a characteristic may be exempt from RCRA Subtitle C waste handling and tracking requirements, if the wastes comply with RCRA LDR standards. The estimated eligible waste quantities and annual cost savings for reduction in waste disposal costs and waste shipment manifesting burden under this provision of the 1999 HWIR notice include:

• Expected Annual Industry Waste Disposal Cost Savings:	$5.0 million ($4.3 to $6.5 million range)
• Industrial Process Waste Annual Quantity Exempt:	3.6 million tons
• Total Number of Eligible Industrial Wastestreams:	236 (120 waste generator facilities)
• Number of Economic Sectors Affected (SIC code count):	17 (18 if waste trucking included)

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SECTION I: REGULATORY BACKGROUND TO HWIR

I.A. INTRODUCTION AND REGULATORY FEATURES

The US Environmental Protection Agency (USEPA) historically designed the "Hazardous Waste Identification Rule" (HWIR) to address the over-regulation of wastes that pose small risks to human health and the environment, yet are currently subject to stringent regulatory requirements. It will allow generators and managers of low hazard wastes to avoid certain hazardous waste management requirements promulgated under Subtitle C of the Resource Conservation and Recovery Act (RCRA).

The 1999 HWIR notice is USEPA's third public notice for this rule; each contains different features and potentially affects different types of industrial wastes. The USEPA withdrew its initial 1992 HWIR proposal after receiving extensive public comment, and followed it by a second proposal in December 1995; the 1999 HWIR notice is a supplement to the 1995 proposal. The scope and regulatory features of the 1999 HWIR notice are determined according to conditions contained in an April 1997 US District Court Consent Decree.

The Consent Decree calls for USEPA "to seek comment on, but not necessarily endorse or recommend a particular result", with regard to 11 items related to "possible exemptions from hazardous waste regulation". The Consent Decree addresses possible exemption for two different types (i.e. sources) of RCRA wastes -- industrial process hazardous wastes, and low-level radioactive hazardous mixed wastes – however, the USEPA created two separate notices in 1999 associated with each type of waste. This "Economics Background Document" deals only with the industrial process waste HWIR regulatory notice. Refer to the 1999 Federal Register HWIR notice for information about the separate 1999 HWIR radioactive mixed waste notice.[1]

The 1999 HWIR industrial process waste notice contains the following four main features:

- "Mixture-and-Derived From" Rules: Retains the mixture and derived-from rules governing hazardous wastes, which are currently in effect on an emergency basis.

- Decharacterized waste exemption: Second, it expands an existing exemption within RCRA pertaining to mixtures of wastes listed only due to the presence of a hazardous characteristic (i.e. ignitability, corrosivity, reactivity), associated with 29 RCRA hazardous wastecodes listed solely for a characteristic.

- RCRA "exemption level" framework: Third, it describes an *implementation framework* for reducing unnecessary industrial process waste management (i.e. RCRA Subtitle C treatment and disposal), whereby wastes defined as hazardous through USEPA's listing procedure (i.e. "listed" wastes), would gain this exemption if they contain concentrations of contaminants below risk-based exemption levels.

- Modification to LDRs: Finally, the 1999 HWIR notice identifies the possibility for further reducing unnecessary treatment for hazardous wastes, by substituting the HWIR "exemption levels" as risk-based floors, for the existing technology-based LDRs (i.e. RCRA land disposal restrictions).

In its consideration of eliminating the over regulation of low hazard wastes, while continuing to protect human health and the environment, the features of the 1999 HWIR collectively represent a shift toward a risk-based system of hazardous waste regulation, potentially eliminating the over-regulation of low hazard wastes without deleterious effects on human health or the environment.

This document first presents USEPA's estimates of the economic impacts (i.e. potential industry cost savings) associated with the decharacterized waste exemption revision to the mixture-and-derived-from rules. The secondary purpose to this document is to

[1] In a related Federal Register notice, USEPA is also proposing an exemption from hazardous waste regulations, for mixtures and treatment residuals of hazardous wastes combined with low-level radioactive wastes (i.e. "mixed wastes"). Such wastes may become exempt from RCRA Subtitle C waste management requirements when they are disposed at a low-level radioactive waste disposal facility (LLRWDF). Mixed wastes will be considered hazardous until they are shipped to LLRWDFs for disposal.

present an analytical framework for estimating the economic impacts of the two prospective features of the 1999 HWIR notice -- the future establishment of hazardous waste "exemption levels" and the potential substitution of existing LDR levels with the exemption levels -- including estimating the quantities of industrial process waste likely to be affected under each regulatory provision, and the cost savings which may be expected to accrue to generators and managers of affected industrial wastestreams.

Organization of This Document

This introductory SECTION I provides regulatory background to the 1999 HWIR, by describing current Federal industrial process "hazardous" waste regulations and the need for HWIR. It also compares the 1992 and 1995 HWIR proposals to the 1999 HWIR notice. The remainder of this report is organized according to the following sections:

SECTION II Presents the USEPA's estimate of potential industry cost savings for the proposed HWIR decharacterized waste exemption.

SECTION III Summarizes the USEPA's database on chemical constituents in hazardous industrial wastes (i.e. hybrid database of 1986 and 1996 USEPA industry surveys).

SECTION IV
- Describes the methodology and an economic model under development by USEPA-OSW, to assess the potential economic impacts of the two future HWIR exemptions identified in the 1999 Federal Register notice:
  - Industrial hazardous waste "exemption levels".
  - LDR replacement levels.
- Estimates the per-facility implementation costs for establishing and maintaining industrial process waste eligibility under the HWIR exemption levels framework.
- Describes potential economic benefits of the two prospective HWIR exemptions.

I.B. CURRENT INDUSTRIAL HAZARDOUS WASTE REGULATIONS

In 1976, Congress passed the Resource Conservation and Recovery Act (RCRA) to address nationwide problems associated with the large quantities of municipal and industrial waste generated each year nationwide.[2] This Act, which was significantly amended by the Hazardous and Solid Waste Amendments of 1984 (HSWA), resulted in the establishment of four programs which regulate underground storage, and solid, medical, and hazardous wastes. The regulations under study in this document primarily relate to Subtitles C and D of RCRA:

Subtitle C Addresses hazardous wastes and was developed to protect human health and the environment from the risks posed by these wastes. RCRA Subtitle C requires "cradle-to-grave" management of hazardous waste, by regulating three categories of waste managers: generators, transporters, and operators of waste management facilities. Subtitle C regulations include treatment standards established under the Land Disposal Restrictions (LDRs) as well as requirements related to hazardous waste storage, transport, recycling, and disposal.

Subtitle D Focuses on non-hazardous wastes, and differs from RCRA Subtitle C in two important ways. First, while Subtitle C regulations are developed and promulgated by the USEPA, the development and implementation of RCRA Subtitle D requirements is the responsibility of the states. In addition, non-hazardous wastes regulated under Subtitle D are subject to standards that are generally less stringent and less costly than those under Subtitle C.

[2] Additional descriptive information on RCRA waste is available from: (1) USEPA's Office of Solid Waste Internet website (http://www.epa.gov/osw ; (2) USEPA's May 1998 *RCRA Orientation Manual*, report nr. EPA-530-4-98-004, which is available from the National Service Center for Environmental Publications at 800-490-9198 or via the Internet website http://www.epa.gov/epaoswer/general/orientat/index.htm ; and (3) the RCRA Public Hotline at 800-424-9346 or via the Internet at http://www.epa.gov/epaoswer/hotline .

The regulatory options described in the 1999 HWIR notice would amend the regulations for defining hazardous wastes, providing a means for low hazard wastes to become exempt from the Subtitle C system and instead be managed under less stringent Subtitle D requirements. The rule also describes potential modification of the technology-based treatment standards required under the RCRA Land Disposal Restriction (LDR) program, moving the LDR program towards a risk-based system. For purpose of providing regulatory background and context, current USEPA criteria for hazardous industrial waste identification, treatment, and exemption from RCRA Subtitle C, are discussed in this Section below.

RCRA Subtitle C Entry Criteria

Under Subtitle C of RCRA, wastes are identified as "**hazardous**" if they are placed on "**lists**" developed through a series of regulatory actions (40 CFR 261 Subpart D (261.30-261.33)), or if they exhibit certain hazardous waste "**characteristics**" (40 CFR 261 Subpart B (261.10) & Subpart C (261.20-261.24)). USEPA designates wastes as "hazardous" through a RCRA listing procedure (40 CFR 261 Subpart B (261.11)).[3] The Agency has studied wastes generated from a wide array of industrial sectors and identified those wastes that should be inherently defined as hazardous, and therefore "listed". A waste may be listed if it exhibits one of the characteristics of a hazardous waste, is acutely toxic or hazardous, meets other criteria established in the RCRA regulations, or meets the statutory definition of a hazardous waste. USEPA has identified listed wastes in the following three categories:

- **Nonspecific source wastes** (Fxxx coded wastes): This category includes generic wastes produced by manufacturing and industrial processes, such as halogenated solvents used in degreasing (40 CFR 261.31).
- **Specific source wastes** (Kxxx coded wastes): This category identifies waste from specific industries, such as wood preserving and organic chemical manufacturing (40 CFR 261.32).
- **Discarded commercial chemical products** (Uxxx & Pxxx coded wastes): This category includes discarded commercial chemical products, off-specification species, container residues, and spill residues (40 CFR 261.33).

USEPA may also classify a waste as hazardous if it has properties or characteristics that would present a potential hazard if the waste is managed improperly. The Agency has identified various physical characteristics which, if exhibited, lead to a hazardous classification (40 CFR 261 Subpart C (261.20-261.24)). These characteristics are ignitability, corrosivity, reactivity, and toxicity. Wastes exhibiting any of these characteristics defined by USEPA are subject to Subtitle C regulations.

RCRA "Mixture and Derived-from" Rules

USEPA promulgated the RCRA "***mixture and derived-from rules***" to ensure that listed wastes continue to be managed as hazardous waste as they undergo various types of treatment:

- RCRA ***mixture rule***: A mixture of any amount of nonhazardous solid waste with any amount of RCRA-listed "hazardous" waste, is also a "hazardous" waste (40 CFR 261.3(a)(2)(iii) & (iv)).
- RCRA ***derived-from rule***: Hazardous waste treatment, storage, and disposal processes and facilities often generate residues that may contain high concentrations of hazardous consituents. Any material (residues) derived from a listed hazardous waste is also a hazardous waste (40 CFR 261.3(c)(2)(i)).

[3] CFR= Code of Federal Regulations. The CFR is published by the Office of the Federal Register, National Archives and Records Administration (NARA). The CFR is a codification of the general and permanent rules published in the Federal Register (FR) by the Executive departments and agencies of the Federal Government. It is divided into 50 titles which represent broad areas subject to Federal regulation; Title 40 of the CFR is "Protection of Environment", and contains USEPA's regulations. The CFR is kept up to date by the individual daily issues of the Federal Register, and each volume of the CFR is updated annually. Full texts of the CFR and the Federal Register are available in electronic format at NARA's Internet website: http://www.nara.gov/fedreg or at the US Government Printing Office's website http://www.access.gpo.gov/nara .

USEPA developed the "mixture and derived-from rules" to close loopholes in the Subtitle C management system. Without a "mixture rule", generators of hazardous waste could potentially evade regulatory requirements by mixing listed hazardous waste with other wastes. Such a mixture would result in a waste that may continue to pose a serious hazard but is not designated as hazardous, since it no longer meets the original listing description and may not exhibit a hazardous characteristic. Likewise, without a "derived-from rule", owners and operators of hazardous waste management facilities could potentially evade regulation by minimally treating or otherwise altering a listed hazardous waste and claiming that the resulting residue is no longer the listed waste, despite the potential hazard which the residue may pose to human health and the natural environment.

RCRA Land Disposal Restrictions

The Hazardous and Solid Waste Amendments of 1984 required USEPA to establish conditions that must be met by all RCRA listed and characteristic wastes prior to land disposal. HSWA states that USEPA must:

> "...promulgate regulations specifying those levels or methods of treatment, if any, which substantially diminish the toxicity of the waste or substantially reduce the likelihood of migration of hazardous constituents from the wastes so that short-term and long-term threats to human health and the environment are minimized." (RCRA 3004(m))

The passage reproduced above is generally referred to as the "***minimize threat***" provision of HSWA. To comply with this congressional mandate, USEPA developed both requirements for the treatment of hazardous wastes prior to disposal and standards for determining whether disposal units meet the "no migration" test. Under the Land Disposal Restrictions (40 CFR 268), USEPA developed treatment standards by reviewing the performance of the best demonstrated and available technology (BDAT) for each type of waste. For most wastes, the standards are expressed as allowable concentrations of specific constituents (e.g. 10 mg/kg of benzene). However, in some cases USEPA mandates the use of a particular type of treatment (e.g. combustion).

The concentration standards for land disposal originally differed by type of waste; i.e. the allowable concentration of a particular constituent such as benzene could vary from waste to waste. In 1994, USEPA established Universal Treatment Standards (UTS) for most listed and characteristic wastes.[4] Under this approach, the acceptable concentration limit for each constituent is consistent across most wastes. However, only a subset of the constituents must be addressed for each waste prior to land disposal; these regulated constituents differ across wastes.

RCRA Hazardous Exemption Criteria

There are two methods by which a hazardous waste currently may gain exemption from Subtitle C requirements. The exemption process is relatively straightforward for characteristic wastes; once the characteristic is removed and any applicable land disposal requirements are met, the waste is no longer subject to most Subtitle C requirements. In contrast, listed wastes generally must remain in the Subtitle C system regardless of the hazards they pose. The only exemption mechanism that currently exists for listed waste is the delisting program.

The RCRA delisting program (40 CFR 260.22) is a formal application process in accordance with the requirements of the Administrative Procedures Act. As part of this process, USEPA or an authorized state agency reviews exemption petitions for individual wastestreams at individual facilities. Prior to approval, a generator or waste manager must demonstrate that the concentrations of the constituents for which the waste was listed do not pose significant risk to human health or the environment, and that no additional constituents are present which might cause the waste to be hazardous. The Agency publishes the results of its review in the Federal Register for public comment, and develops proposed and final regulations to establish the exemption. This process can be lengthy, difficult, and expensive for both USEPA and waste generators and managers.

Combustion MACT Standards

Under the Clean Air Act, USEPA is promulgating new standards regulating air emissions from the combustion of hazardous waste. The Maximum Achievable Control Technology (MACT) standards being developed under this effort will place more stringent limits on emissions

[4] The Phase IV Land Disposal Restrictions (LDRs) have since updated the Universal Treatment Standards for RCRA hazardous waste constituents (63 FR 28556, May 26, 1998).

of certain air pollutants (e.g. mercury, dioxin) from facilities that combust hazardous waste. These facilities include commercial and on-site incinerators, cement kilns, and lightweight aggregate kilns.

Because a substantial proportion of hazardous wastes are currently managed in on-site incinerators and cement kilns, the MACT standards may influence how generators choose to manage their wastes. Compliance with the more stringent standards may require generators and managers of hazardous waste to invest in additional pollution control technology and increase the costs of hazardous waste combustion. As a result, some generators and managers may seek alternatives to combustion for their wastes. By providing a mechanism for exempting low-risk wastes from Subtitle C management requirements, HWIR may allow some generators and managers to avoid the increased costs of combustion imposed by the MACT standards.

I.C. NEED FOR THE PROPOSED HWIR

Under the current RCRA system, listed hazardous wastes are regulated independent of the risk that they pose to human health and the environment. That is, wastes are identified as hazardous without consideration of the concentrations of their constituents, or the availability of those constituents to contaminate the environment. Similarly, under the RCRA Land Disposal Restrictions program, treatment standards for both listed and characteristic hazardous wastes are technology-based and do not consider whether the resulting concentrations in treated waste residuals (e.g. ash residue produced from waste incineration), are below the levels at which wastes pose significant hazards to human health or the environment. An overview of the need for a risk-based system for both hazardous waste identification and requirements for land disposal is provided in the following sections.

Providing an Exemption Mechanism for Listed Wastes

By requiring Subtitle C management of low-risk wastes, the current RCRA regulatory system may not allocate resources efficiently. From a societal perspective, too many resources may be devoted to managing low-risk wastes, reducing the resources available for other investments, including managing higher risk wastes. The RCRA "delisting program" (40 CFR 260.20, 260.22) provides an existing mechanism for removing (i.e. excluding) low-risk wastes from RCRA Subtitle C requirements, but it may not necessarily provide an efficient regulatory mechanism. The average annual number of RCRA delisting petitions submitted to USEPA during 1996 and 1997 is 15. Furthermore, data collected by USEPA indicates that preparation and review of a delisting petition is a time- and resource-intensive process:[5]

- USEPA estimates the regulatory burden to an industrial waste generator to prepare a single delisting petition for a waste generated at a particular facility, involves 425 labor hours, at an average cost to the company of $20,800.
- Requires an average of 807 Agency review hours, at an average cost of $27,500 per petition.
- Total societal resource burden (i.e. industry + Agency) per delisting petition is 1,232 labor hours (i.e. 425+807), at a cost of $48,300 (i.e. 420,800+$27,500).
- Based on the mid-1990s (i.e. 1996 & 1997) average annual delisting petition rate of 15 submissions per year for Agency review/approval, the average annual societal cost of the RCRA delisting program, may be estimated at 18,480 burden hours per year (i.e. 1,232 hours x 15), costing $724,500 per year (i.e. $48300 x 15).
- Require an average of one to three years from time of submission to approval/denial.

The Agency developed the HWIR proposal because it believes that a simpler exemption process is possible to reduce potential over-regulation of low hazard wastes and to decrease the administrative burden associated with the delisting program. To meet these requirements, USEPA is proposing a framework for establishing risk-based exemption levels for hazardous constituents in listed hazardous wastes, their treatment residuals, and mixtures with solid wastes. Wastes achieving these exemption levels would avoid most Subtitle C requirements, as long as the generator or waste manager complies with related testing, recordkeeping, and reporting requirements. This exemption process would be self-implementing, requiring less time and effort than the delisting program, while ensuring that risks

[5] Source for RCRA "delisting petition" preparation and review resource requirements: USEPA "Supporting Statement for EPA Information Collection Request Number 1189.05: Identification, Listing and Rulemaking Petitions", 16 Jan 1998, 43 pp. Labor burden hour estimates in this ICR, consist of the following four labor categories and national average hourly, overhead-loaded wage rates: legal ($99.80/hour), managerial ($75.91/hour), technical ($49.69/hour), and clerical ($25.99/hour).

to human health and the environment are minimized.

However, the delisting procedure will remain available to waste generators and managers seeking Subtitle C exemptions for low-risk wastes not captured by HWIR. While HWIR offers a generic exemption mechanism for wastes that are clearly low-risk, delisting represents a more "tailored" option for individual wastes that could be considered low-risk without meeting the HWIR exemption levels. USEPA will continue to review delisting petitions on a case-by-case basis according to established criteria for approval.

Eliminating Excessive Waste Treatment Requirements

The existing requirements for land disposal of hazardous wastes are based on the performance of available technologies. In developing the initial requirements in 1986, USEPA considered establishing risk-based screening levels below which treatment would not be required. These screening levels were back-calculated from exposure concentrations deemed protective of human health, taking into consideration contaminant transport through air, groundwater, and surface water. However, USEPA ultimately chose not to promulgate this risk-based approach because of the uncertainty inherent in the scientific assessment of risk.[6]

Since 1986, progress has been made in assessing the risks associated with hazardous constituents. The risk analysis framework described for establishing HWIR exemption levels takes into account data on human health and ecological effects that are now available, and considers a wide range of potential exposure pathways. Therefore, USEPA also discusses the use of this analysis to establish risk-based floors (i.e. "minimize threat" levels) for the Land Disposal Restrictions so that hazardous wastes no longer need to be treated below levels at which they pose no risk to human health or the environment. In other words, in cases where the technology-based standard for land disposal is more stringent than the risk-based HWIR exemption level, the exemption level would replace the existing treatment standard.[7] This change would eliminate the need for unnecessary treatment, allowing generators and waste managers to reduce unwarranted expenditures.

The 1992 Proposed HWIR

USEPA published an initial HWIR proposal in 1992 (57 FR 21450). This proposal established two sets of Subtitle C exemption criteria - one applying to low-risk process wastes, and another focusing on soil and ground media contaminated with certain listed wastes.[8] Exemption criteria were established for 201 hazardous constituents. USEPA estimated that these exemption options would result in between $60 million and $1.7 billion in annual waste management cost savings to industry.[9] In addition, the proposal included an option that would expand the toxicity characteristic to include all hazardous constituents for which human health-based standards exist. The economic effects on industry of an expansion of the toxicity characteristic, were not assessed.

In late 1992, USEPA withdrew this proposal (57 FR 49280). The Agency had received many comments criticizing the short schedule imposed on the regulatory development process and the risk assessment used to support the proposed exemption criteria. Some commentors also feared that the proposal would result in a "patchwork" of differing state hazardous waste programs because some states would refuse to incorporate the proposal into their programs. Moreover, USEPA wished to work through the individual elements of the proposal more carefully and publish a revised proposal at a later date.

The 1995 Proposed HWIR

In December 1995, USEPA promulgated a second HWIR proposal, which established risk-based exemption levels for 376 constituents (i.e. 200 risk-modeled levels, and 176 extrapolated levels) prevalent in hazardous waste (60 FR 6634). Under the proposal, listed wastes containing constituent concentrations at or below these levels would be designated as non-hazardous if the generator or waste manager

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[6] USEPA, "Hazardous Waste Management System; Land Disposal Restrictions; Final Rule," 51 FR 40572, November 7, 1986.

[7] The 1999 HWIR notice describes a framework for establishing HWIR "exemption levels" based on results of the risk analysis of industrial hazardous waste constituents. One provision of the 1999 notice is future replacement of RCRA land disposal restriction standards for those constituents addressed by the HWIR risk analysis.

[8] These 1992 HWIR criteria were termed "concentration-based exemption criteria" (CBEC). The consideration of contaminated media has since been addressed by USEPA in a separate final rulemaking (63 FR 65873, 30 Nov 1998).

[9] USEPA, "*Preliminary Economic Assessment of Proposed Hazardous Waste Identification Rule*," prepared by ICF Inc, for the Office of Solid Waste, April 30, 1992, 236pp.

complies with related implementation requirements. Furthermore, the proposal established risk-based floors (i.e. "minimize threat" levels) for the Land Disposal Restrictions to eliminate unnecessary waste treatment requirements. As context for the current proposal, the following sections describe the risk analysis used to establish the 1995 HWIR exemption levels, implementation requirements imposed by the proposal, the estimated impacts of the proposal on hazardous waste generators and managers, and public comments on the proposal.

1995 Multipathway Analysis

In 1995, USEPA prepared an extensive analysis of waste management and exposure pathways to ensure that wastes gaining exemption under HWIR would not pose threats to human health or the environment. This *Multipathway Analysis* evaluated risks to both human and ecological receptors. USEPA used the *Multipathway Analysis* to establish exemption level concentrations that would achieve target levels of risk to human health and the environment.

The *Multipathway Analysis* simulated contaminant transport from waste disposal sites to human and ecological receptors. USEPA chose five possible source types, representing likely management practices for exempt wastes (i.e. management in RCRA Subtitle D waste units). These included ash monofills, land application units, and waste piles for nonwastewaters, and surface impoundments and tanks for wastewaters. These source types were then evaluated for the various pathways by which humans or ecological receptors could be exposed to hazardous constituents. The pathways included various combinations of contaminant transport through groundwater, surface water, soil, air, and sediments, and exposure through inhalation, direct ingestion, ingestion of plants and animals, and dermal absorption. The analysis then calculated, for each constituent, the maximum allowable concentration (individually across each pathway), that would achieve USEPA's target levels of risk for each combination of source type, pathway, and receptor. This concentration was used as the HWIR exemption level for the constituent in the proposed rule.

Industry Implementation Requirements in the 1995 HWIR Proposal

The 1995 proposal required waste generators and managers to comply with a number of requirements to gain exemption from Subtitle C regulations. For example, the generator would have been required to test the waste to ensure that it meets the exemption level for each constituent; this analysis would have been performed both before the waste gains exemption and periodically after the exemption takes effect. Also, a notification and certification package would have to be prepared and submitted to the USEPA or authorized state agency, as well as published in a local newspaper. In addition, related documentation would be maintained on-site and be available for review. USEPA's preliminary estimate of the per-wastestream cost of complying with the 1995 HWIR implementation requirements, ranged from an average annualized cost of $21,000 to $169,000 (with an average cost of $35,000), depending on the size and constituent complexity of the wastestream. This cost range includes initial (i.e. first) year implementation "fixed costs", and annually and periodically recurring "fixed" and "variable" costs, discounted over a ten-year period using the OMB-prescribed 7% discount rate for Federal regulatory economic analyses.[10]

Benefits and Costs of the 1995 HWIR Proposal

USEPA conducted an economic assessment of the 1995 HWIR proposal to determine the likely economic benefits and costs to generators and managers of hazardous industrial process wastes.[11] This assessment was based on industrial process waste data contained in

[10] The range described in this estimate was based on the same assumption applied in the economic analysis of the 1995 HWIR proposal; that industry implementation costs for any given HWIR-eligible wastestream, fell between the costs of implementation for a simple wastestream (represented by a less complex wastestream classified as the RCRA hazardous solvent wastecodes F001 through F005, which are the most prevalent types of wastestreams in the industrial hazardous waste database), and that for a complex hazardous wastestream (represented by the RCRA F039 multi-source leachate wastecode). Chapter 4 of this report describes an alternative approach that estimates industry implementation costs, based on evaluation of individual eligible wastestream characteristics contained in a USEPA database.

[11] USEPA, "Assessment of the Potential Costs and Benefits of the Hazardous Waste Identification Rule for Industrial Process Wastes", (Vols. 1 & 2), prepared by Industrial Economics, Inc, for the Office of Solid Waste, 25 May 1995, 879pp:
Volume 1 (Chapters 1-10, 182 pp.; includes a 13 Nov 1995 Addendum with analysis of additional regulatory options, 11pp.)
Volume 2 (Appendices A-F, 697 pp.):
Appendix A: Process Waste Model: Methodology, 28 pp.
Appendix B: Process Waste Model: Constituent Concentration Data for Individual Wastestreams, 38 pp.

USEPA's 1986 *National Survey of Hazardous Waste Generators*, as well as on about 220 chemical constituents assigned with HWIR risk-based "exit levels". Using these data and exit levels, the assessment calculated the national quantity of listed hazardous waste potentially eligible for HWIR exemption, as well as the expected industry waste management annual cost savings, associated with exemption of these wastes.

As displayed in Exhibit I-1, the economic assessment concluded that under the 1995 proposed rule, approximately 61 million tons of RCRA-listed industrial process waste generated and handled by 5,300 facilities, would be eligible for exemption, or 20 percent of the total subpopulation of RCRA-listed industrial process wastes (i.e. 9,100 of the 25,300 HWIR-applicable industrial wastestream subpopulation). The May 1995 Economic Assessment report for the 1995 HWIR proposal estimated that the risk-based "exit level" exemptions for these wastes would result in **$44 to $60 million** in annual cost savings to generators and managers of exempt industrial wastes. In addition to reducing cost savings for HWIR-exempt wastes, implementation costs could be expected to prevent some generators from seeking exemptions for low-risk wastes.

Exhibit I-1
ESTIMATED NATIONAL BENEFITS OF 1995 HWIR PROPOSED RULE

Wastestream reference	Quantity of Wastewaters		Quantity of Non-wastewaters	Number of Waste Streams	Annual Cost Savings (1993 dollars)[3]
	Liquid[1]	Sludge[2]			
Listed Waste Universe	300.0 million tons	0.9 million tons	2.8 million tons	25,300	N/A
Wastes Eligible for HWIR Exemption	60.9 million tons	0.1 million tons	0.1 million tons	9,100	$44 to $60 million[4]
% of applicable universe	20%	11%	< 4%	36%	

Explanatory Notes:

1. The liquids category includes the liquid effluent portion of all wastes initially reported as wastewaters (approximately 99.7 percent of influent quantity).
2. The sludge category includes sludge residuals resulting from treatment of wastes initially reported as wastewaters (approximately 0.3 percent of influent quantity).
3. Cost savings are associated only with non-wastewaters and sludge residuals of wastewater treatment that are eligible for HWIR exemption. Because the liquid portion of wastewaters are generally handled and discharged under the Clean Water Act, they are generally managed in units exempt from Subtitle C requirements. Therefore, they are assumed to accrue no savings under HWIR.
4. * 1995 estimated industry cost savings range represents netting-out HWIR industry implementation costs. The May 1995 HWIR economic assessment report (p.3-2) actually presented a relatively broad range of $51.8 to $235.9 million in annual waste treatment and disposal cost savings (without netting-out industry implementation costs, i.e. gross savings), associated with three regulatory options representing different groundwater modeling (a) dilution-attenuation factors, and (b) cancer risk level assumptions (i.e. "DAF-1", "DAF-10", and "DAF-100" options). The $44 to $60 million range cited in the text above, represents USEPA's preferred 1995 option, corresponding to the middle "DAF-10" option with an associated $67 million annual industry costs savings (i.e. gross savings). The 1995 HWIR economic assessment report (p.3-3) estimated that netting-out industry implementation costs reduced industry cost savings by 10% to 34%; applied to the $67 million for the 1995-preferred option, produces the modified (i.e. net) cost savings estimate range of $44 to $60 million.
5. Source: USEPA Office of Solid Waste report "Assessment of the Potential Costs and Benefits of the Hazardous Waste Identification Rule for Industrial Process Wastes", prepared by Industrial Economics, Inc., 25 May 1995, (Vols I & II), 879pp.

Public Comments on the *Economic Assessment* of the 1995 Proposed HWIR

The 1995 HWIR proposal was available for public comment from December 21, 1995 through April 22, 1996. During this period, USEPA received hundreds of comments from a variety of stakeholders, including industry, government agencies, non-governmental organizations, and the public. The majority of these comments focused on various aspects of the multipathway risk analysis used to develop the 1995

Appendix C: Process Waste Model: Data and Assumptions for Individual Wastestreams, 330 pp.
Appendix D: Process Waste Model: Eligibility and Cost Savings Results for Individual Wastestreams, 287 pp.
Appendix E: HWIR Exit Levels for 218 Chemical Constituents, 8 pp.
Appendix F: Waste Minimization Analysis, 17 pp.

HWIR exemption levels. In particular, commentors took issue with methodologies used and with the conservative nature of the resulting exemption levels. Other key comments addressed HWIR implementation requirements, including sampling and testing requirements, and assumptions used in the 1995 economic analysis about the costs to generators of implementing the 1995 proposed HWIR. As summarized in Exhibit I-2, 48 different entities from nine different institutional categories, submitted 62 public comments to the USEPA, related to the economic analysis of the 1995 proposed HWIR. The identity of these commentors is provided in Appendix A to this report; Appendix B provides the excerpted comments related to the 1995 economics.

Exhibit I-2
Overview of 1996 Public Comments Directed at USEPA's May 1995 HWIR Economic Analysis

Institutional Type of Public Commentor*	Nr. of Commentors	Nr. of Comments*	Percent of Comments
1. Industry (specific companies)	15	16	26%
2. Industry associations	11	11	18%
3. Federal Government agencies	3	10	16%
4. Waste management companies	6	9	14%
5. State government agencies	6	6	10%
6. Utility companies/associations	3	4	6%
7. Waste management associations	2	3	5%
8. Consultant companies	1	2	3%
9. Independent citizens	1	1	2%
Column totals=	48	62	100%

* Note: Number of comments pertaining to the 1995 HWIR economic analysis, as extracted by OSW-HWID-ISPB from USEPA's 1995 HWIR proposal public comment database. Most comments contain multiple topics/issues; See Appendix A to this report for identities of public commentors, and Appendix B for the actual comment excerpts. (Column percentages above rounded to nearest whole numbers).

As displayed in Exhibit I-3, 62 of the public comments received by the USEPA in 1996, in part or whole, contained 22 topics/issues directed at various elements of the USEPA's 1995 HWIR Economic Assessment report, and/or pertaining to economic issues related to regulatory components of the 1995 proposed HWIR. On the basis of these and other comments, a collective conclusion was reached that the rule should not be promulgated at that time.[12]

Exhibit I-3
Summary of 22 Economic Analysis Topics Contained in 62 Public Comments
Provided by 48 Commentors in 1996, on the USEPA's 1995 HWIR Economic Analysis

Item	Topic of Public Comment	Nr. of comments	%
1	Excessive waste testing, recordkeeping, and other implementation costs to industry	45	73%
2	Provides minimal/no regulatory relief for small quantity hazardous waste generators	27	44%
3	Will potentially only benefit a relatively few number of industry sectors and facilities	23	37%

[12] As part of a consent decree amended in U.S. District Court on 11 April 1997, USEPA agreed to a revised schedule for revisions to the RCRA "mixture-and-derived-from rules", which directed USEPA to propose a rule by 31 October 1999, and to finalize the rule by 30 April 2001.

4	The 1995 HWIR economics report did not net-out implementation costs from savings	14	23%
5	Need to modify/revise the waste testing, treatment, and disposal unit costs applied	10	16%
6	Did not consider costs to complex batch processes, episodic generators, and drums	6	10%
7	Industry implementation costs may adversely impact markets/industries/prices	5	8%
8	Some waste generators will continue Subtitle C disposal to avoid CERCLA liabilities	4	6%
9	May potentially reduce the public's "stigma" associated with industrial waste	3	5%
10	The 1995 HWIR economics report was only preliminary in its scope and design	3	5%
11	There are other potential regulatory mechanisms to effect industry cost savings	3	5%
12	The 1995 HWIR economics report omits other potential social and industry costs	2	3%
13	Need to modify/revise exemption review and enforcement burden assumptions	2	3%
14	Waste transportation costs are not adequately considered	2	3%
15	The asserted possibility of small quantity hazardous waste aggregation is not feasible	2	3%
16	Need to include potential impacts of HWIR on state and local gov't. tax/fee revenues	2	3%
17	Small quantity generators not subject to all Subtitle C requirements should be excluded	1	< 2%
18	Need to clarify whether implementation costs include initial testing for exit claim	1	< 2%
19	Only waste generators with expensive Subtitle C management will take advantage	1	< 2%
20	The 1995 HWIR economic report output tables appendices are cumbersome	1	< 2%
21	The 1995 HWIR economics report excludes potential industry fixed cost savings	1	< 2%
22	HWIR may beneficially impact some industrial markets/sectors/prices	1	< 2%
Total public comments related to 1995 HWIR economics (non-duplicative count) =		62	100%
Note: This public comment summary table represents only the limited subset of 62 comments received by USEPA in 1996 which contain HWIR economics-related topics; other HWIR topics also contained in this subset of comments are not summarized above. Refer to the RCRA Docket on the 1995 HWIR proposal, and some selected discussion of such comments in the 1999 HWIR Federal Register notice.			

I.D. POTENTIAL BENEFITS OF THE 1999 HWIR NOTICE

In general, the 1999 HWIR notice describes a risk-based framework for exempting low-hazard listed wastes from certain Subtitle C requirements, and for determining the amount of treatment required for hazardous wastes. USEPA expects that certain implementation costs will accrue to generators who gain HWIR exemption for their low-risk wastes, however, the overall net economic impact of the HWIR exemption framework – as a *deregulatory* notice – is that USEPA expects that many industry sectors will accrue net cost savings after implementation. This section provides an overview of the universe of hazardous wastes potentially affected by the RCRA regulatory exemption features of the 1999 HWIR notice, and of the major categories of expected economic impacts.

Potential Benefits of the "Decharacterized Waste" Exemption Proposal

This HWIR 1999 proposed exemption applies to 29 RCRA industrial hazardous wastecodes (as of mid-1999), which are generated by an estimated 236 industrial facilities in the US. The estimated annual generation of these industrial hazardous wastes is 3.62 million tons annually. This quantity corresponds to "as generated" wastes (i.e. waste quantities at the point of generation). After treatment (mostly via incineration), the waste residual annual quantity which may have been decharacterized, is estimated at 57,400 tons (which represents an overall reduction to 1.6% of initial waste volume.

One feature of the 1999 HWIR notice, is an exemption for industrial hazardous wastes listed solely for the presence of a hazardous "characteristic" (i.e. ignitability, corrosivity, and/or reactivity). USEPA believes that wastes containing one or more of 29 listed wastecodes (but no other listed wastecodes) indicating the presence of a hazardous characteristic, are no longer hazardous if they are de-characterized and meet the appropriate LDR standards for any underlying hazardous constituents. Under this proposed exemption, industrial wastes that have been treated for the RCRA "characteristic", may then be disposed in non-hazardous Subtitle D disposal facilities, thus avoiding the relatively higher costs for disposal in waste management units meeting RCRA Subtitle C design and operating requirements. Section II of this document provides an estimate of the economic benefits of the exemption for "characteristically listed" wastes, and the economic impacts of the exemption on specific industry sectors.

Potential Benefits of the HWIR "Exemption Level" Framework

The universe of waste potentially eligible for RCRA regulatory relief under the 1999 HWIR "exemption level" framework, includes all RCRA "listed" *industrial hazardous wastes* (i.e. wastes that result from certain regulated industrial sources), totaling approximately 97 million tons annually.[13] This quantity includes listed wastes, as well as wastes that carry a listing and also exhibit a hazardous waste characteristic (i.e. ignitability, toxicity, reactivity, and/or leachability; note that the last characteristic is referred to in the CFR as "toxicity"). The next section of this document contains a more detailed description of the universe of affected hazardous wastes.

Despite the costs of implementing an HWIR exemption[14], USEPA expects that HWIR will result in net benefits to generators and managers of eligible industrial hazardous wastes. Categories of potential benefits include the following:

- Industrial Waste Management Cost Savings:
  - Treatment Cost Savings: A primary goal of HWIR is to reduce unnecessary treatment requirements under the Land Disposal Restrictions, allowing generators and managers of low hazard wastes to avoid or reduce the cost of treatment. HWIR may produce treatment cost savings in two ways. First, wastes gaining HWIR exemption at the point of generation do not need to comply with hazardous waste treatment requirements under the Land Disposal Restrictions. Thus, generators and managers of these "eligible as-generated" wastes may avoid the cost of treatment. Second, generators and managers may realize treatment cost saving for wastes that are not exempt as-generated under HWIR. These wastes must be treated to comply with the Land Disposal Restrictions; however, in certain cases, the HWIR exemption levels may cap the LDR treatment standards (referred in this document as the LDR "minimize threat" provision), allowing some wastes to be treated to a lesser extent than currently required. This may reduce the cost of treating these wastes.
  - Disposal Cost Savings: Generators and managers of wastes exempted under HWIR may also realize savings from the disposal of these wastes. Because HWIR exempt wastes are not classified as hazardous, they may be disposed in Subtitle D facilities for industrial non-hazardous wastes, rather than in more protective and costly Subtitle C hazardous waste facilities.
  - Avoided Capital Costs: Generators of HWIR exempt wastes may also realize cost savings by avoiding capital costs associated with maintaining and/or upgrading permitted on-site hazardous waste treatment facilities. A generator that implements HWIR exemptions for wastestreams that formerly were treated on-site may no longer need to maintain on-site

[13] USEPA, "1993 National Biennial RCRA Hazardous Waste Report", (http://www.epa.gov/epaoswer/hazwaste/data/index.htm).

[14] HWIR Implementation Costs: Although HWIR is a deregulatory action intended to reduce the regulatory burden of current RCRA industrial hazardous waste regulations, it is nevertheless expected to impose certain costs on generators and managers who seek exemptions for HWIR-eligible wastes. The most significant of these are the costs of implementing an exemption for an eligible listed waste. Waste generators and managers must comply with a number of requirements to gain an HWIR-exemption for their low-risk wastes. First, the generator must develop a waste analysis plan and test for constituents reasonably expected to be present in the listed hazardous waste. A notification and certification package must then be prepared and submitted to the overseeing authority (i.e. State agency or USEPA). The generator must continue to test the waste to ensure that the waste meets the exemption criteria for the duration of an HWIR exemption. Finally, related documentation must be maintained on-site and be available for review.

treatment facilities. In addition, the generator may avoid future investments in such facilities to comply with new standards and regulations (e.g. combustion MACT standards).

- State Tax Cost Savings: Generators and managers of HWIR exempt wastes may accrue cost savings by avoiding state taxes imposed on hazardous waste generation and/or disposal.

- Administrative Cost Savings: Wastes gaining exemption under HWIR will not be subject to certain reporting, recordkeeping, and other administrative requirements for hazardous wastes. Thus, generators and managers of exempt wastes may realize reduced administrative costs associated with managing these wastes.

- Public Relations Benefits: Generators and managers of HWIR exempt wastes may also benefit from positive publicity by reporting a reduction in the quantity of hazardous waste they generate. Although HWIR would only re-classify exempt wastes as non-hazardous and the actual quantity of waste generated may not change, generators and managers could inform the public that these wastes are considered low-risk and that they have made progress in minimizing hazardous waste.

- Innovation and Waste Minimization: By establishing target concentration levels and a mechanism for gaining exemption from certain Subtitle C requirements, HWIR may provide incentives for waste generators and managers to develop innovative treatment technologies. These technologies include process changes and treatment methods that would allow generators to cost-effectively meet the HWIR exemption levels by reducing the toxicity of their wastes.

I.E. OMB REVIEW COMMENTS AND RESULTANT CHANGES TO THIS DOCUMENT

White House Executive Order (EO) 12866 "Regulatory Planning and Review" (30 September 1993) contains a statement of philosophy, principles, procedures, guidelines, and a planning mechanism, for Federal regulatory agencies to follow during the development, evaluation, selection and finalization (i.e. promulgation) of "*significant*" regulatory actions. EO12866 applies to all existing regulations, as well as to new proposed and to new final Federal regulatory actions. Section 3(f) of EO12866 defines "significant" regulatory actions any action which may result in a rule that may:

- Have an annual [adverse] effect on the economy of $100 million or more (or other material effect).
- Create a serious inconsistency or otherwise interfere with another Federal agency.
- Materially alter the budgetary impact of Federal entitlements, grants, user fees, or loan programs.
- Raise novel legal or policy issues.

As stated in its Federal Register preamble, the USEPA has designated the 1999 HWIR notice as a "significant" regulatory action for the fourth reason listed above.

Among its multiple requirements as specifically applicable to this Economic Background Document, EO12866 (Section 6(a)(3)(E)(ii)) requires Federal regulatory agencies to identify for the public, the substantive changes made between the draft economic assessment document submitted for review to the Office of Management and Budget (OMB), and the final version in conjunction with publication of the regulatory action in the Federal Register. Based on OMB's three separate sets of written review comments on the draft 1999 HWIR notice submitted to USEPA-OSW (dated 29 September, 06 October, and 19 October 1999), only one OMB review comment affected a change to this Economic Background Document. OMB requested USEPA to explicitly address the types [and burdens] of recordkeeping and reporting requirements envisioned under the 1999 HWIR notice. In response to this comment, this document contains an expanded presentation (in Section IV) of the estimated burden and types of requested HWIR implementation elements, compared to the 15 October 1999 draft submitted to OMB for review. Refer to the preamble of the Federal Register notice for identification of and responses to OMB's other review comments.

EO12866 and other Executive Orders are available to the public over the Internet at the following websites: http://www.legal.gsa.gov/legal1geo.htm and http://www.nara.gov/fedreg/eo.html#top . On 11 January 1996, OMB issued "best practices" guidance to Federal agencies for compliance with the regulatory development and analysis requirements of EO12866; OMB's guidance is also available to the public over the Internet at the following website: http://www.whitehouse.gov/WH/EOP/OMB/html/miscdoc/riaguide.html .

SECTION II: ECONOMIC IMPACT OF THE DECHARACTERIZED WASTE EXEMPTION PROPOSED IN THE 1999 HWIR

II.A. SUMMARY OF PROPOSED "DECHARACTERIZED WASTE" EXEMPTION

One of the provisions of the 1999 HWIR proposes to expand the existing RCRA exemption (i.e. 40 CFR 261.3(a)(2)(iii)) for industrial wastes that are listed solely for the presence of the ignitability, corrosivity, or reactivity hazardous waste characteristic. Based on the inventory of RCRA hazardous wastes listed as of mid-1999, this provision will apply to a total of 29 "characteristically-listed" waste types (i.e. RCRA wastecodes) and their associated hazardous characteristics (refer to following exhibits in this section for an overview of these eligible wastestreams).

As described in the 1999 HWIR notice, the exemption requirements for characteristically-listed wastes are similar to current RCRA requirements for characteristic only wastes. That is, any characteristically-listed waste may exit the Subtitle C system if it meets the following conditions:

- The waste has been treated to remove the hazardous characteristic(s); and
- The waste meets the appropriate LDR treatment standards (including treatment for all underlying hazardous constituents).

If finalized, this provision will allow industrial wastes meeting these requirements to be disposed in RCRA Subtitle D facilities for non-hazardous wastes. Thus, generators and managers of these wastes may avoid the cost of disposal in more expensive RCRA Subtitle C facilities for hazardous wastes.

II.B. OVERVIEW OF 29 APPLICABLE RCRA HAZARDOUS WASTECODES

To assess the potential economic benefits of this exemption, USEPA screened a database containing dscriptive, quantitative information on a sample sub-population of US industrial hazardous wastes. This database is a "hybrid" database, constructed by combining two USEPA industrial hazardous waste databases: the USEPA's existing 1986 "National Survey of Hazardous Waste Generators", and the USEPA's new 1996 survey "National Hazardous Waste Constituent Survey". Section III of this report describes both the new 1996 survey database, as well as the "hybrid" database. USEPA based its analysis of the proposed "decharacterized waste" exemption upon the information contained in this "hybrid" database.

The USEPA also proposes to apply this database for use in the "HWIR Economic Model", which is under development by USEPA for future assessment of the potential economic impacts associated with the "exemption level" and "minimize threat" HWIR regulatory provisions. Section IV of this report describes the computational elements and logic of the "HWIR Economic Model". (Both the new 1996 NHWCS database and the "hybrid" database are available for public review from the RCRA Docket, according to the instructions in the preamble of the Federal Register notice).

Based on the information contained in the database, as shown in Exhibit II-1, 236 RCRA hazardous wastestreams associated with the 29 characteristically-listed waste types, are potentially eligible for this proposed exemption. These wastestreams total 3.6 million tons in annual generation quantity. The majority of these wastestreams carry only the F003 wastecode (indicating that they consist of spent non-halogenated solvents), or carry the F003 wastecode plus a RCRA characteristic code such as D001, which indicates that the waste is ignitable (see 40 CFR 261.32).

It is estimated that 18 of the 236 wastestreams also contain either of two metals (i.e. chromium (D007) or barium (D005), which are subject to the toxicity characteristic test at 40 CFR 261.24 (i.e. may not exceed regulatory concentration levels expressed in milligrams-per-liter). According to the industrial waste database, these two metals are at or lower than the toxicity characteristic regulatory limit concentrations, so no additional treatment costs are assumed in this economic analysis. Otherwise, wastestreams must meet the toxicity characteristic standards.

Wastes identified as potentially eligible for exemption commonly contain organic constituents such as toluene, acetone, methanol, and xylenes, and others which are also subject to the toxicity characteristic test. The database indicates that all eligible wastestreams are currently incinerated (i.e. thermal waste treatment applied), which are assumed in this analysis to mostly destroy the organic compounds, so no further treatment cost is assumed required for meeting the toxicity characteristics.

As of mid-1999, there are 29 industrial hazardous wastecodes within the RCRA program listed *solely* for three "hazardous" chemical properties of industrial wastes, which the USEPA uses for defining "characteristics" of industrial hazardous wastes, as displayed in Exhibit II-1:

Exhibit II-1:
Relationship Between Three Hazardous Waste "Characteristics" and RCRA Codes

Type of RCRA Hazardous Waste "Characteristic"	RCRA Hazard Code (40 CFR 261.30)	RCRA Characteristic Wastecode
1. Ignitability (40 CFR 261.21)	I	D001
2. Corrosivity (40 CFR 261.22)	C	D002
3. Reactivity (40 CFR 261.23)	R	D003

One of the following exhibits below presents a list of the identity of these 29 wastecodes, summarizes the basis for their RCRA listing, and provides their associated RCRA Land Disposal Restriction (LDR) treatment standards for wastewaters and non-wastewaters, according to 40 CFR 268.40. The distribution of characteristic hazard codes (i.e. I, C or R; see 40 CFR 261.30), and wastecode categories (i.e. Fxxx, Kxxx, Pxxx or Kxxx; see 40 CFR 261.31-33) for these 29 RCRA wastecodes are displayed in Exhibit II-2:

Exhibit II-2:
Overview of 29 RCRA Wastecodes Eligible for the 1999 HWIR Proposed Decharacterization Exemption

RCRA Hazard Code Count		RCRA Wastecode Count	
I = Ignitability	20	Fxxx (non-specific industry sources)	1
C = Corrosivity	1 (also with an R)	Kxxx (specific industry sources)	3
R = Reactivity	9	Pxxx (off-spec/discarded acute toxic chemicals)	3
		Uxxx (off-spec/discarded toxic chemicals)	22

As currently specified at 40 CFR 261.3(a)(2)(iii), a mixture of such characteristic wastes and a solid waste, is no longer a RCRA hazardous waste if the mixture does not exhibit one or more of these three hazardous characteristics (i.e. hazard codes I, C, or R), and meets the RCRA Land Disposal Restriction (LDR) treatment standards.

However, this decharacterized waste mixture exemption currently does not apply to other types of decharacterized wastes, even if they no longer exhibit a characteristic at the point of land disposal. From a human and environmental risk perspective, it is not consistent to address characterized waste mixtures differently from other characteristically listed wastes, namely "as-generated" and "derived-from" characteristically-listed wastes. USEPA believes that all types of industrial wastes listed solely because they exhibit the ignitability, corrosivity or reactivity characteristics, should be regulated similarly, whether they are waste mixtures, waste treatment residuals, or as-generated wastes meeting the original listing description.

The proposed exemption would exempt industrial characteristic wastes listed solely under I, C or R hazard codes, from RCRA Subtitle C waste regulation, if such wastes have been de-characterized and meet the associated LDR treatment standards.

II.C. ESTIMATE OF US NATIONAL QUANTITIES OF ELIGIBLE WASTE

To estimate the potential economic impact of exempting these 29 characteristically-listed RCRA wastecodes, USEPA first analyzed the type and quantity of industrial hazardous wastes contained in the two combined databases (i.e. the "hybrid" database) which underlie the HWIR Economic Model (i.e. the 1986 "Generator Survey", and the 1996 "National Hazardous Waste Constituent Survey"). This hybrid database is described in Section IV of this document. USEPA estimated the following seven quantitative indicators of wastes potentially eligible for this "decharacterization waste" exemption proposal. (Note: the raw data extracted from the "hybrid" database, and analyzed data findings of this impact analysis, are presented in a series of exhibits at the end of this section of the report). The major findings are:

• Eligible wastestreams: 236 potentially eligible industrial wastestreams, totaling 3.6 million short tons in annual generation by an estimated 120 facilities, located in at least 15 states (AL, AZ, CA, GA, IL, IN, KS, LA, MI, MO, OH, PR, TX, WI, WV). Note: these 15 states are associated only with the the 24 eligible facilities identified in the HWIR Economic Model database [48 eligible database wastestreams are displayed in Exhibit II-8, associated with a non-duplicative count of 24 facilities based on USEPA ID numbers shown]; the estimated total of 120 applicable facilities, represents an additional 96 unidentified facilities located in unidentified states, estimated by applying a database "scaling" (i.e. extrapolation) factor. This factor is applied for the purpose of estimating the relevant universe of wastestreams and facilities for this HWIR exemption.

• Waste form: As generated, these wastestreams consist of 87% wastewaters and 13% non-wastewaters.

• Universe subset: The 3.6 million annual tons of applicable "as generated" wastestreams, represents only 1.4% of the total RCRA industrial hazardous waste universe (1993 BRS = 258 million tons), and it represents 2.2% of the 162.0 million ton subset of the RCRA waste universe corresponding to characteristic wastes only.

• Predominant wastecode: Approximately 75% of the applicable wastestreams are identified by wastecode F003 (spent non-halogenated solvents), plus a characteristic wastecode (e.g. D001= ignitability), and 19% are identified by wastecode F003 only.

• Industry sectors: Applicable wastestreams are located in 17 four-digit level SIC code industrial sectors. 146 (62%) of the 236 estimated number of applicable wastestreams are generated by industries in SIC code 28 (i.e. NAICS code 325), particularly in the four-digit sectors SIC 2869, 2833 and 2851. Three other sectors have relatively large shares of applicable wastestreams (SIC codes 7389, 3711, 7532). In addition, the local trucking services sector (SIC= 4212, NAICS= 562111 (non-hazardous waste shipment) & 562112 (hazardous waste shipment)) will be affected, by no longer requiring processing of EPA hazardous waste manifests and using special trucking equipment (note: because the unit costs for waste treatment and disposal applied in this document include average trucking costs, the incremental cost savings impacts to the trucking sector are not estimated separately in this document).

• Constituents: There are 51 different hazardous chemical constituents in these wastestreams; prevalent ones include: ethylbenzene, toluene, methyl ethyl ketone, methanol, ethyl acetate, xylenes, acetone, methylene chloride, and n-butyl alcohol. Two wastestreams contain metals (chromium and barium).

• Post-treated waste: After treatment to destroy their hazardous "characteristic" properties, the 236 wastestreams result in the annual disposal of about 57,400 short tons of treatment residuals, primarily in the form of incineration ash. This quantity of waste would potentially become eligible for RCRA exemption under this proposal (after conformance with all relevant LDR treatment standards). This estimated annual quantity represents a very small percentage (i.e. 0.00075%) of the US national RCRA Subtitle D (i.e. non-hazardous industrial waste) land-based disposal capacity, according to the 1987 statistics summarized below in Exhibit II-3.

Exhibit II-3:
US National RCRA Subtitle D (Non-Hazardous Industrial Waste) Land Disposal Capacity (1987 survey)

Type of Disposal Unit	Nr. of Establishments	Nr. of Units	1987 US Capacity (mst*)
1. Landfills	2,320	2,760	86.4
2. Surface impoundments	6,680	15,250	7,366.9
3. Land application units	2,140	4,300	99.3
4. Wastepiles	4,200	5,330	77.1
Column totals** =	12,000	27,640	7,629.7

Explanatory Notes:
(1) * mst = million short tons (1.0 short ton = 2,000 pounds = 0.9070 metric tons).
(2) ** Column total establishments reflects non-duplicative count of total establishments (i.e. some establishments operate multiple units).
(3) The 1987 survey actually estimated a total of 72,400 establishments using US RCRA Subtitle D units, of which 12,000 estimated as using the four types of land-based disposal units on-site; the remainder 60,400 establishments used other (i.e. non-land based) types of disposal units on- and off-site, such as incineration, boiler combustion, underground injection, tank treatment, and recycling.
(4) Source: USEPA "Screening Survey of Industrial Subtitle D Establishments: Draft Final Report", prepared by Westat, Inc. (contract nr. 68-01-7359), for Office of Solid Waste, 29 Dec 1987, p.xii (note: metric tons data from source transformed to short-tons for this exhibit).
(5) Although this study is over ten years old, it represents the most comprehensive US national survey on this topic available as of 1999. Some or many of the establishments and units estimated in 1987 may have closed, whereas new establishments/units may have opened.

II.D. ESTIMATE OF POTENTIAL NATIONAL ECONOMIC IMPACT (COST SAVINGS)

The economic impact estimated in this analysis, consists of potential reduction in two industry activities associated with the management of industrial waste:

- Reduction in the cost of disposing wastestream treatment residuals.
- Reduction in the preparation cost of manifesting waste residuals for shipment as "hazardous" waste.

In this study, USEPA modeled the potential disposal cost savings as the $80/ton unit cost difference, between disposing of waste treatment residuals for these 29 wastecodes in RCRA hazardous landfills at an average unit cost of $130/ton (i.e. current or "baseline" practice), compared to the average $50/ton unit cost for non-hazardous landfill disposal under the proposal. These unit costs include the average cost of truck shipment of wastes to disposal sites, but do not include the burden hours associated with hazardous waste manifesting (which are estimated separately below).

The cost savings associated with fewer annual waste shipment manifests was modeled based on manifest preparation burden-hour and burden cost information provided in the "Information Collection Request" (ICR) for the RCRA Hazardous Waste Manifest System (Nr. 801.12, 26 July 1999).[15] The ICR is available from the RCRA Docket (see instructions in the Federal Register notice). USEPA estimated the reduction in the number of annual manifests, by dividing the estimated eligible 57,400 tons in annual post-treatment waste residual, by an average of 20 tons per truckload shipment to (RCRA Subtitle D) disposal site, which provides an estimate of 2,870 truck shipments and associated manifests avoided. The supporting data for truckload shipment volumes of industrial waste are displayed in Exhibit II-4.

[15] The RCRA Subtitle C program is designed to manage hazardous waste from "cradle-to-grave". The "Uniform Hazardous Waste Manifest" (USEPA Form 8700-22) plays a crucial part in this management system, by allowing all parties involved in hazardous waste management (e.g. generators, transporters, TSDFs, USEPA, state agencies), to track the movement of hazardous waste from the point of generation, to the point of ultimate treatment, storage, and/or disposal. Each time a waste is shipped, the manifest must be signed to acknowledge receipt of the waste, a copy retained by each individual in the shipment chain, and a copy returned to the generator by the ultimate recipient. A RCRA manifest consists of one-page with a one-page continuation sheet, and contains basically four types of information: name/address/EPAID number of all parties; USDOT description of the waste's hazards; quantity of the waste shipped and container type; and generator certification.

Exhibit II-4: Truckload Volumes for Shipping Industrial Waste by Roadways - Supporting Data*			
Physical Form of Waste	Waste Density	Full Truckload Volume	Type of Truck Waste Container
1. Bulk liquids	8.34 lbs/gallon	25 tons	6,000 gallon tanker truck
2. Bulk solids	1.2 tons/cu.yard	24 tons	20 cubic yard roll-off trailer
3. Drums (liquid, solid, semi-solid)	55 gallons or 500 lbs/drum (9.09 lbs/gal.)	20 tons	40 drums truckload full capacity
Truckload size applied in this study as "average" size =		20 tons	(lower-end of range for solids)

Explanatory Notes:
(1) Maximum allowable highway vehicle weight = 72,000 pounds (36 tons); this includes the weight of the truck, plus the weight of the truck's cargo load (source: US Dept of Transportation Federal Highway regulations).
(2) Average weight of an unloaded heavy-duty type truck = 22,000 pounds (11 tons).
(3) Maximum allowable truckload cargo weight = (1) - (2) = 36 tons - 11 tons = 25 tons.
(4) Some industrial waste truckloads may be "partial truckloads" (i.e. less than 20 to 25 tons).
(5) * Data source: DPRA Inc. "Transportation Cost Model" developed for the USEPA-OWPE study: "Estimating Costs for the Economic Benefits of [RCRA] Noncompliance", 1993).

Based on the burden hour and burden cost equivalent estimated provided in the RCRA Hazardous Waste Manifest System ICR, the average manifest requires 1.3 hours preparation time; at a loaded labor cost of $122 per hour, reduction in 2,870 manifests annually, equates to a reduction in 3,730 preparation hours, which equates to $455,000 in annual cost reduction (rounded to nearest $1,000). Based on these two costs saving elements, USEPA estimates potential annual industry cost savings for this provision of the HWIR notice, at **$5.048 million**, consisting of:

- **$4.593 million** in annual savings from disposing the wastestream treatment residuals in Subtitle D (i.e. $50/ton RCRA-D non-hazardous rather than in $130/ton RCRA- C hazardous) landfills; and

- **$0.455 million** in annual savings from avoided hazardous waste shipment manifest preparation costs (i.e. 2,870 manifests per year x 1.3 hours per manifest x $122 per hour).

Applying an analytical estimation uncertainty range[16] of -15% to +30%, to the point estimate of $5.048 million/year, results in an annual cost savings estimate range of **$4.29 to $6.56 million**. Exhibit II-5 summarizes these findings.

It is important to note that this "average annual" type of estimate is contingent upon the 1986, 1993, and 1996 data reflected in the waste database used in deriving this estimate. This estimate of expected average annual cost savings is dependent upon the extent to which future industrial waste production trends for RCRA characteristically-listed wastestreams, may deviate (i.e. increase or decrease), relative to this annual waste quantity. Consequently, this cost savings estimate is contingent upon at least four factors: (a) the USEPA's eventual finalization (i.e. promulgation) of this regulatory provision; (b) industry's eventual voluntary implementation of this provision; (c) future quantities of eligible waste generation, as determined by future numbers of applicable facilities and applicable wastestreams, and (d) state adoption of this voluntary regulatory proposal.

[16] The cost (savings) estimation uncertainty range of -15% to +30% adopted above, is based on the "Class 4" type estimate prescribed by "Recommended Practice Nr. 18R-97" (15 June 1998), of the Association for the Advancement of Cost Estimation (AACE) International (http://www.aacei.org/newdesign/technical/rps/welcome.shtml). This cost estimate classification system provides guidelines for applying general principles to various phases and stages of cost estimating projects, which can be applied across a wide variety of industries. The "Class 4" uncertainty category reflects a screening type study involving a relatively low degree of unit cost itemization, and based on stochastic estimating methods using gross unit costs, numerical factors, and/or other parametric techniques. The computations in this Economic Background Document involve both a relatively gross level of unit cost itemization, as well as the use of waste data sample extrapolation factors.

Exhibit II-5: Summary of Applicable Industrial Wastestreams and Cost Savings Estimates (Quantities below scaled from sample "hybrid" database, to applicable facility universe)				
Waste Category	Quantity of Wastestreams (tons per year)		Number of Applicable Industrial Facilities	Residual Disposal + Truck Manifest Cost Savings ($/year)
	Pre-treatment	Post-treatment		
1. Wastewaters	3,166,800 (87%)	2,400 (4%)	10	$210,000 (4%)
2. Non-wastewaters	455,700 (13%)	55,000 (96%)	110	$4,838,000 (96%)
Column Totals	3,622,500	57,400	120	$5,048,000
Uncertainty range applied to total (-15% to +30%) =				$4.29 to $6.56 million

It is important to recognize that the above estimates are based on available "snapshot" survey sample databases of industrial hazardous waste generators and treatment/disposal facilities, compiled by USEPA in 1986 and 1996. Although these findings are based on identification of specific facilities and wastestreams from the combined database, conditions in these industries change over time (e.g. facility closures, new facilities, increase or decrease in facility waste generation, chemical feedstock changes, chemical processing changes, waste composition and volume changes, etc.). Consequently, some of the facilities identified in the database may no longer be applicable to this provision; the findings in this document should be interpreted as estimates, rather than as exact and conclusive findings.

Additional details of this analysis are provided in supplemental exhibits in the next few pages, which present the extracted data associated with the 29 wastecodes in the HWIR Economic Model database, including the following data elements:

- Identity of database sample generator facilities (n=48; this count is unscaled, and facilities listed may no longer generate the type of waste shown in the database; additional US facilities not in the database are represented by "scaling" the sample data shown).
- Waste treatment techniques applied.
- "Unscaled" and "scaled" waste quantities.
- Potential annual cost savings.
- Unit cost assumptions for landfill disposal as RCRA hazardous versus non-hazardous waste.

The extracted raw data are "unscaled" in the sense that the associated unscaled quantities (i.e. numbers of wastestreams and wastestream volumes) only represent responses to the survey questionnaires which form the underlying databases, not all relevant wastestreams and facilities suspected to be present in the industrial RCRA hazardous waste universe.

As displayed in the final two exhibits at the end of this section, there are 17 industry sectors expected to benefit from this HWIR provision. In addition to the 17 sectors, the local trucking services sector will be affected by a reduction in manifest requirements. Exhibit II-6 summarizes the estimated annual cost savings, according to three categories corresponding to these 17 industry sectors (trucking sector not shown).

Exhibit II-6: Summary of Industry Sectors Potentially Beneficially Impacted Under the Proposed "Decharacterized Waste" Exemption Provision of HWIR 1999						
Industry Sector Categories	Nr. of 4-digit SIC Codes	Nr. of Waste streams	Pre-treatment waste quantity (tons/yr)	Post-treatment waste quantity (tons/yr)	Estimated Average Annual Cost Savings (millions)	Row % $

1. Manufacturing Industries	12	196	1,343,363	37,230	$3.274	65%
2. Utilities	1	5	4,120	412	$0.036	< 1%
3. Service Industries & Other	4	35	2,274,989	19,772	$1.738	34%
Column Totals=	17	236	3,622,472	57,414	$5.048	100%

Explanatory Notes:
(1) The industry sector and SIC code count in this exhibit do not include the local trucking services sector (SIC= 4212, NAICS= 562111 & 562112), which will be affected by a reduction in waste manifesting requirements; however, the costs of reduced manifesting are estimated separately in this document.
(2) Source: Based upon the disaggregated data displayed in the final exhibit of this Section of the report.

The series of computer spreadsheets reproduced on the next few pages of this section as Exhibits II-7 to II-11, provide the detailed, supporting data and cost savings computations for this 1999 HWIR regulatory feature.

EXHIBIT II-7
29 RCRA Characteristically Listed Wastecodes and Associated LDR Treatment Standards

Item	Waste Code	Waste Description	Hazard Code	LDR Treatment Standard (Wastewaters)	LDR Treatment Standard (Non-wastewaters)
1	F003	Spent xylene and other non-halogenated solvents	(I)	0.014 to 5.6 mg/L, varies with constituent	2.6 to 170 mg/kg, varies with constituent
2	K044	Wastewater treatment sludges from manufacturing or processing of explosives	(R)	DEACT	DEACT
3	K045	Spent carbon from the treatment of wastewater containing explosives	(R)	DEACT	DEACT
4	K047	Pink/red water from TNT operations	(R)	DEACT	DEACT
5	P009	Ammonium Picrate	(R)	CHOXD; CHRED; CARBN; BIODG; or CMBST	CHOXD; CHRED; or CMBST
6	P081	Nitroglycerine	(R)	CHOXD; CHRED; CARBN; BIODG; or CMBST	CHOXD; CHRED; or CMBST
7	P112	Tetranitromethane	(R)	CHOXD; CHRED; CARBN; BIODG; or CMBST	CHOXD; CHRED; or CMBST
8	U001	Acetaldehyde	(I)	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
9	U002	Acetone	(I)	0.28 mg/L	160 mg/kg
10	U008	Acrylic Acid	(I)	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
11	U031	n-Butyl alcohol	(I)	5.6 mg/L	2.6 mg/kg
12	U020	Benzenesulfonyl chloride	(C,R)	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
13	U055	Cumene	(I)	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
14	U056	Cyclohexane	(I)	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
15	U057	Cyclohexanone	(I)	0.36 mg/L	CMBST or 0.75 mg/L TCLP
16	U092	Dimethylamine	(I)	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
17	U096	Cumene Hydroperoxide	(R)	CHOXD; CHRED; CARBN; BIODG; or CMBST	CHOXD; CHRED; or CMBST
18	U110	Di-n-propylamine	(I)	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
19	U112	Ethyl Acetate	(I)	0.34 mg/L	33 mg/kg
20	U113	Ethyl Acrylate	(I)	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
21	U117	Ethyl Ether	(I)	0.12 mg/L	160 mg/kg
22	U124	Furan	(I)	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
23	U125	Furfural	(I)	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
24	U154	Methanol	(I)	(WETOX or CHOXD) fb CARBN; or CMBST or 5.6 mg/L	CMBST or 0.75 mg/L TCLP
25	U161	Methyl isobutyl ketone	(I)	0.14 mg/L	33 mg/kg
26	U186	1,3 Pentadiene	(I)	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
27	U189	Sulfur phosphide	(R)	CHOXD; CHRED; or CMBST	CHOXD; CHRED; or CMBST
28	U213	Tetrahydrofuran	(I)	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
29	U239	Xylene	(I)	0.32 mg/L	30 mg/kg

EXHIBIT II-8

PROPOSED EXTENSION OF RCRA DECHARACTERIZED WASTE EXEMPTION IN THE 1999 HWIR:
IDENTIFICATION OF ELIGIBLE INDUSTRIAL HAZARDOUS WASTESTREAMS
AND ESTIMATION OF POTENTIAL WASTE DISPOSAL COST SAVINGS
RAW DATA EXTRACTED FROM COMBINED USEPA DATABASES IN THE HWIR ECONOMIC MODEL

Data from	Facility EPA ID Number	SIC code	Facility waste stream ID number	RCRA Hazardous Wastecodes Designated by Survey Respondents	Waste water? (Yes/No)	BRS physical form code*	Unscaled** pre-treatment wastestream quantity (tons/year)	RCRA LDR hazardous waste treatment	Unscaled** post-treatment waste residual for disposal (tons/year)	Unscaled potential annual cost savings for disposal of waste residual****	
A. NHWCS RCRA-Listed Only Eligible Wastestreams:											
	1 ILD066018327	3089	3	F003	N	B203	770.1	incin CT	77.3	$6,185	
	2 KSD980633259	2851	11	F003	N	B204	2,155.8	incin CT	215.6	$17,246	
	3 MID980615298	3711	17	F003	N	B203	2,727.8	incin CT	272.8	$21,822	
	4 MID980684088	2833	2	F003	N	B203	580.0	incin CT	58.0	$4,640	
	5 MID900684008	3479	15	F003	N	B202	451.6	incin CT	45.2	$3,613	
	6 MID900684008	3711	10	F003	N	B203	459.0	incin CT	45.9	$3,672	
	7 WID990829175	7389	1	F003	N	B602	9,007.2	incin CT	2,251.8	$180,144	
	8 WVD004341491	2869	1	F003	N	B201	9,956.0	incin CT	995.6	$79,648	
	9 WVD004341491	2869	6	F003	N	B201	5,740.0	incin CT	574.8	$45,984	
	Listed Only Subtotals =						31,850.4		4,536.9	$362,950	39%
B. NHWCS RCRA-Listed and RCRA-Characteristic Eligible Wastestreams:											
	10 ALD981019045	2834	12	D001, F003	N	B204	565.4	incin CT	56.5	$4,523	
	11 CAD008252405	7532	2	D001, F003	N	B203	8,926.6	incin CT	892.7	$71,413	
METAL***	12 GA1570024330	9711	1	D007, F003	Y	B101	483,088.3	incin CT	925.5	$96,086	
	13 IND001859032	2821	4	D001, F003	N	B219	819.0	incin CT	81.9	$6,552	
	14 IND001859032	2869	7	D001, F003	N	B219	619.7	incin CT	61.9	$4,950	
	15 IND006050967	2833	11	D001, F003	N	B204	643.3	incin CT	64.3	$5,147	
	16 IND006050967	2833	14	D001, F003	N	B201	412.1	incin CT	41.2	$3,297	
	17 IND072040348	2833	3	D001, F003	N	B203	2,942.0	incin CT	294.2	$23,536	
	18 IND072040348	2833	15	D001, F003	N	B201	551.6	incin CT	55.2	$4,413	
	19 KSD980633259	2851	2	D001, F003	N	B204	2,155.8	incin CT	215.6	$17,246	
	20 LAD040776809	2869	6	D001, U154	N	B207	4,645.7	incin CT	464.6	$37,165	
	21 MID980615298	3711	10	D001, F003	N	B203	2,724.1	incin CT	272.4	$21,793	
	22 MID980684088	3479	3	D001, D035, F003	N	B203	850.0	incin CT	85.0	$6,800	
	23 MID980684088	3711	4	D001, F003	N	B202	706.5	incin CT	70.6	$5,652	
	24 MID900684008	3711	10	D001, F003	N	B203	610.2	incin CT	61.0	$4,881	
	25 MID900684008	2833	12	D001, D018, F003	N	B202	435.0	incin CT	43.5	$3,480	
	26 MID980684088	3711	20	D001, F003	N	B203	1,849.0	incin CT	184.9	$14,792	
	27 MOD029729688	2800	1	D001, F003	N	B203	765.0	incin CT	76.5	$6,120	
	28 MOD029729688	2819	4	D001, F003	N	B203	1,087.8	incin CT	108.8	$8,702	
	29 MOD029729688	2800	7	D001, F003	N	B203	765.0	incin CT	76.5	$6,120	
	30 MOD029729688	4953	8	D001, F003	N	B203	826.0	incin CT	82.6	$6,608	
	31 MOD029729688	2869	15	D001, F003	N	B203	765.0	incin CT	76.5	$6,120	
	32 MOD029729688	3241	16	D001, F003	N	B203	950.1	incin CT	95.8	$7,665	
	33 MOD029729688	7399	10	D001, F003	N	B203	765.0	incin CT	76.5	$6,120	
METAL***	34 OHD004172623	2869	1	D001-003, D005, D018, D021,I	N	B206	9,181.0	CT, incin CT, stab	1,390.9	$111,274	
	35 OHD005048947	9511	13	D001, D018, F003	N	B204	1,516.7	incin CT	151.7	$12,133	
	36 OHD093945293	9511	2	D001, D035, F003	N	B207	1,450.4	incin CT	145.9	$11,675	
	37 OHD093945293	9511	3	D001, F003	N	B102	470.2	incin CT	119.8	$9,585	
	38 PRD090399718	2834	3	D001, F003	N	B203	700.7	incin CT	70.9	$5,670	
	39 PRD090399718	2833	4	D001, F003	N	B203	750.0	incin CT	75.8	$6,064	
	40 PRD090399718	2834	7	D001, F003	N	B203	1,450.2	incin CT	145.0	$11,602	
	41 PRD090399718	2879	12	D001, F003	N	B203	1,454.8	incin CT	145.5	$11,638	
	42 PRD090613357	2834	1	D001, F003	N	B201	1,180.0	incin CT	118.0	$9,440	
	43 TXD008076853	2819	3	D001, F003	N	B201	493.7	incin CT	49.4	$3,949	
	44 TXD008079212	2879	8	D001, F003	N	B219	836.0	incin CT	83.6	$6,688	
	45 TXD078432457	2869	1	D001, D002, D008, U113	Y	B101	200,987.0	neut CT, incin CT	152.2	$12,177	
	46 TXD078432457	2869	3	D001, F003	N	B203	4,093.0	incin CT	409.3	$32,744	
	47 WVD004325353	2869	2	D001, F003	N	B212	501.6	incin CT	50.2	$4,012	
Listed & Characteristic subtotals =							694,374.2		6,972.3	$557,781	61%
	Total NHWCS Unscaled =						726,232.6		11,509.2	$920,734	100%
	Total NHWCS Scaled =						3,622,440.1		57,407.8	$4,592,622	
C. 1986 Generator Survey, RCRA-Listed and RCRA-Characteristic Eligible Wastestreams:											
	48 AZD980585238	2800	3	U154, U213	N		16.21	incin CT	**4.1**	$324	
	Scaled Quantities =						23.51		5.9	$470	
D. 1986 NHWCS + 1986 Gen Survey Combined (A+B+C):											
	Total Unscaled Quantities =						726,248.8		11,513.2	$921,058	
	Total Scaled Quantities =						3,622,471.6		57,413.6	$4,593,092	
E. Scaled Quantities by Wastewater & Non-Wastewater Subtotals:											
	Wastewater subtotals =				Y		3,166,758.0		2,382.6	$190,607	4%
	Non-wastewater subtotals =				N		455,713.6		55,031.1	$4,402,485	96%

F. Explanatory Notes:

(a)* BRS = USEPA's Biennial Reporting System for RCRA Industrial Hazardous Wastes (http://www.epa.gov/epaoswer/hazwaste/data/#brs)

Item	Code	Definition of Codes	Item	Code	Definition of Codes
1	B101	Aqueous inorganic liquid waste with low solvents.	7	B206	Waste oil (organic liquid).
2	B102	Aqueous inorganic liquid waste with low other toxic organics.	8	B207	Concentrated organic liquid aqueous solution and other organics.
3	B201	Concentrated organic liquid solvent water solution.	9	B212	Reactive or polymerizable organic liquid.
4	B202	Halogenated organic liquid solvent.	10	B219	Other organic liquids (not elsewhere classified).
5	B203	Non-halogenated organic liquid solvent.	11	B602	Organic sludge still bottoms of nonhalogenated organic liquids.
6	B204	Halogenated/Non-halogenated organic liquid solvent mixture.			

(b)** Unscaled = Waste quantities in reference database reflect sample subset facilities; must be "scaled" up to all applicable facilities nationwide.

Scaling Factors: 1.45 Brings model totals to universe totals
3.44 Brings NHWCS respondents up to total NHWCS

Both multipliers applied for scaling NHWCS data (i.e. 1.45 x 3.44 = 4.99); only 1.45 multiplier applied for scaling 1986 Gen Survey data.

(c)*** Metal = indicates that facility reported at least one metal constituent (among other constituents) in the particular wastestream listed above.

(d)**** Waste management unit cost assumptions ($/ton nat'l averages); $80/ton savings between C ($130) minus D ($50) disposal costs below:

Item	Method	Residual Factor	<=470 tons	<4,700 tons	<47,000 tons	<470,000 tons	<4,700,000 tons	>4,700,000 tons
1	Deactivation	0.01	$449	$449	$449	$449	$449	$449
2	General Incineration	0.25	$1,428	$1,428	$283	$165	$164	$152
3	Organic Liquid Incineration	0.10	$1,428	$1,428	$283	$165	$164	$152
4	Neutralization	1.01	$270	$34	$4	$1	$0	$0
5	HTMR	0.00	$191	$191	$191	$191	$191	$191
6	Stabilization	1.50	$200	$150	$60	$23	$21	$21
7	Vitrification	1.50	$230	$230	$230	$230	$230	$230
8	Retort	1.00	$653	$653	$446	$194	$194	$194
9	Underground Injection	0.00	$0	$0	$0	$0	$0	$0
10	Acid regen/recy	0.00	$0	$0	$0	$0	$0	$0
11	**Subtitle C Disposal**		**$130**	**$130**	$130	$57	$31	$23
12	**Subtitle D Disposal**		**$50**	**$50**	$14	$14	$14	$14

EXHIBIT II-9

PROPOSED EXTENSION OF RCRA DECHARACTERIZED WASTE EXEMPTION:
IDENTIFICATION OF ELIGIBLE WASTESTREAMS IN THE HWIR DATABASE, 10/07/99
AND ESTIMATION OF POTENTIAL INDUSTRY COST SAVINGS. OSW EMRAD

ALPHABETIC LIST OF WASTESTREAM CONSTITUENTS

					Pre-treatment		
	Consti-tuent count	CAS Nr.	Industrial Hazardous Waste Constituent	Nr. of waste streams >0 ppm	Whole waste min conc. (ppm)	whole waste max conc. (ppm)	Constituent subtotal mass (tons)
	1	71-55-6	1,1,1-Trichloroethane [Methyl chloroform]	13	1	40,000	303.8
	2	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	4	3	9,000	45.8
	3	79-00-5	1,1,2-Trichloroethane [Vinyl trichloride]	3	3	13	4.4
	4	95 50 1	1,2 Dichlorobenzene [o Dichlorobenzene]	5	2	4,300	25.5
	5	95 94 3	1,2,4,5 Tetrachlorobenzene	1	1,000	1,000	2.0
	6	106 46 7	1,4 Dichlorobenzene [p Dichlorobenzene]	1	2	2	0.0
	7	123 91 1	1,4 Dioxane [1,4 Diethyleneoxide]	1	4,000	4,000	10.9
	8	110-80-5	2-Ethoxyethanol	1	2,000	2,000	4.0
	9	67-64-1	Acetone [2-Propanone]	30	30	874,000	29,610.0
	10	75-05-8	Acetonitrile [Methyl cyanide]	2	3,900	176,000	490.7
	11	79-10-7	Acrylic acid	1	3,700	3,700	2,659.8
METALS	12	7440-39-3	Barium	1	100	100	3.3
	13	71-43-2	Benzene	8	3	5,000	71.5
	14	75-15-0	Carbon disulfide	1	3	3	3.9
	15	56-23-5	Carbon tetrachloride	2	3	310	14.1
	16	108-90-7	Chlorobenzene	3	3	5,000	24.2
	17	67-66-3	Chloroform	1		100,000	221.4
METALS	18	7440-47-3	Chromium	1	1	1	1.0
	19	1319-77-3	Cresols, mixed isomers	2	16	255	33.1
	20	110 82 7	Cyclohexane	4	7,000	33,000	190.4
	21	108 94 1	Cyclohexanone	3	102	30,000	1,151.9
	22	141-78-6	Ethyl acetate	16	102	962,000	11,293.9
	23	140-88-5	Ethyl acrylate	1	20	20	14.1
	24	60-29-7	Ethyl ether [Ethane 1,1'-oxybis]	2	3	500	20.1
	25	100-41-4	Ethylbenzene	13	3	77,200	3,819.8
	26	50-00-0	Formaldehyde	1	10,000	10,000	29.3
	27	64-18-6	Formic Acid	1	3,900	3,900	9.0
	28	78-83-1	Isobutyl alcohol	12	102	51,400	1,991.7
	29	108-39-4	m-Cresol [3-Methyl phenol]	3	10	2,500	98.3
	30	67-56-1	Methanol [Methyl alcohol]	27	2,506	913,000	67,395.5
	31	78 93 3	Methyl ethyl ketone [2 Butanone][MEK]	14	376	412,000	5,780.6
	32	108 10 1	Methyl isobutyl ketone	19	35	582,000	7,675.0
	33	80 62 6	Methyl methacrylate	1	5,000	5,000	17.1
	34	75 09 2	Methylene chloride [Dichloromethane]	14	105	100,000	3,461.7
	35	91-20-3	Naphthalene	2	4,000	4,000	29.8
	36	71-36-3	n-Butyl alcohol [n-Butanol]	14	102	150,000	3,263.5
	37	98-95-3	Nitrobenzene	2	5	120	12.2
	38	95-48-7	o-Cresol [2-Methyl phenol]	3	0	50	11.8
	39	106-44-5	p-Cresol [4-Methyl phenol]	4	0	10,000	41.4
	40	108-95-2	Phenol	2	1,000	3,900	11.0
	41	110-86-1	Pyridine	2	5	25	39.5
	42	127-18-4	Tetrachloroethylene [Perchloroethylene]	9	3	10,000	387.4
	43	109-99-9	Tetrahydrofuran	10	1,000	78,000	585.4
	44	74-93-1	Thiomethanol [Methyl mercaptan][Methanethiol]	1	32,300	32,300	96.6
	45	108-88-3	Toluene [Methylbenzene]	31	8	500,000	20,543.7
	46	79-01-6	Trichloroethylene	6	3	7,500	339.6
	47	75 69 4	Trichlorofluoromethane	3	3	5,000	13.3
	48	121 44 8	Triethylamine	1	20,000	20,000	46.0
	49	108 05 4	Vinyl acetate	2	5,000	21,000	75.7
	50	75 01 4	Vinyl chloride	1	1,000	1,000	2.0
	51	1330-20-7	Xylenes, mixed isomers [Xyenes, total]	27	8	690,000	28,682.2
			Column totals (non-duplicative) =	48			190,659

EXHIBIT II-10

PROPOSED EXTENSION OF RCRA DECHARACTERIZED WASTE EXEMPTION IN THE 1998 HWIR:
IDENTIFICATION OF ELIGIBLE INDUSTRIAL HAZARDOUS WASTESTREAMS
AND ESTIMATION OF POTENTIAL WASTE DISPOSAL COST SAVINGS

ELIGIBLE WASTESTREAMS SORTED BY SIC CODES (ASCENDING SORT ORDER)

A. WASTE DATA EXTRACTED FROM SURVEYS (UNSCALED):						B. SCALED* WASTE DATA:			C. SIC CODE SUBTOTALS:		
Data item	SIC code count	SIC code	Pre-treatment wastestream quantity (tons/year)	Post-treatment waste residual for disposal (tons/year)	Potential annual cost savings for disposal of waste residual	Pre-treatment wastestream quantity (tons/year)	Post-treatment waste residual for disposal (tons/year)	Potential annual cost savings for disposal of waste residual	Pre-treatment wastestream quantity (tons/year)	Post-treatment waste residual for disposal (tons/year)	Potential annual cost savings for disposal of waste residual
1	1	2800	16.21	4.05	$324	23.5	5.9	$470	7,666.2	769.0	$61,524
2		2800	765.0	76.50	$6,120	3,815.8	381.6	$30,527			
3		2800	765.0	76.50	$6,120	3,815.8	381.6	$30,527			
4	2	2819	493.7	49.37	$3,949	2,462.3	246.2	$19,699	7,088.1	788.8	$63,105
5		2819	1,087.8	100.70	$0.702	5,425.8	542.6	$43,406			
6	3	2821	819.0	81.90	$6,552	4,085.3	408.5	$32,682	4,085.3	408.5	$32,682
7	4	2833	412.1	41.21	$3,297	2,055.6	205.6	$16,445	31,533.9	3,153.4	$252,271
8		2833	435.0	43.50	$3,480	2,169.8	217.0	$17,358			
9		2833	551.8	55.18	$4,413	2,751.3	275.1	$22,010			
10		2833	580.0	58.00	$4,640	2,893.0	289.3	$23,144			
11		2833	648.3	64.83	$5,147	3,208.9	320.9	$25,671			
12		2833	758.0	75.80	$6,064	3,780.8	378.1	$30,246			
13		2833	2,942.0	294.20	$23,536	14,674.6	1,467.5	$117,397			
14	5	2834	565.4	56.54	$4,523	2,820.3	282.0	$22,562	19,474.6	1,947.5	$155,797
15		2834	708.7	70.87	$5,670	3,534.9	353.5	$28,279			
16		2834	1,180.0	118.00	$9,440	5,885.8	588.6	$47,087			
17		2834	1,450.2	145.02	$11,602	7,233.8	723.4	$57,869			
18	6	2851	2,156.8	215.68	$17,246	10,752.9	1,075.3	$86,023	21,505.8	2,150.6	$172,046
19		2851	2,156.8	215.68	$17,246	10,752.9	1,075.3	$86,023			
20	7	2869	501.6	50.16	$4,012	2,501.7	250.2	$20,014	1,179,892.3	20,829.5	$1,666,361
21		2869	618.7	61.87	$4,950	3,086.2	308.6	$24,689			
22		2869	765.0	76.50	$6,120	3,815.8	381.6	$30,527			
23		2869	4,093.0	409.30	$32,744	20,415.9	2,041.6	$163,327			
24		2869	4,645.7	464.57	$37,165	23,172.5	2,317.8	$185,390			
25		2869	5,748.0	574.80	$45,984	28,671.0	2,867.1	$229,368			
26		2869	9,181.0	1,390.92	$111,274	45,794.8	6,937.9	$555,033			
27		2869	9,956.0	995.60	$79,648	49,660.5	4,966.1	$397,284			
28		2869	200,937.0	152.21	$12,177	1,002,273.8	759.2	$60,738			
29	8	2879	836.0	83.60	$6,688	4,170.0	417.0	$33,360	11,426.3	1,142.6	$91,410
30		2879	1,454.8	145.48	$11,638	7,256.3	725.6	$58,051			
31	9	3089	773.1	77.31	$6,185	3,856.1	385.6	$30,849	3,856.1	385.6	$30,849
32	10	3241	958.1	95.81	$7,665	4,779.1	477.9	$38,233	4,779.1	477.9	$38,233
33	11	3479	461.6	46.16	$3,693	2,302.6	229.8	$18,090	6,492.4	649.2	$51,939
34		3479	850.0	85.00	$6,800	4,239.8	424.0	$33,918			
35	12	3711	459.0	45.90	$3,672	2,289.5	228.9	$18,316	45,273.5	4,527.3	$362,188
36		3711	610.2	61.02	$4,801	3,043.5	304.4	$24,348			
37		3711	706.5	70.65	$5,652	3,523.9	352.4	$28,191			
38		3711	1,849.0	184.90	$14,792	9,222.8	922.3	$73,782			
39		3711	2,724.1	272.41	$21,793	13,587.8	1,358.8	$108,701			
40		3711	2,727.8	272.78	$21,822	13,606.2	1,360.6	$108,849			
41	13	4953	826.0	82.60	$6,608	4,120.3	412.0	$32,962	4,120.3	412.0	$32,962
42	14	7389	9,007.2	2,251.81	$1811,144	44,927.9	11,232.0	$898,567	48,743.7	11,613.6	$929,084
43		7389	765.0	76.50	$6,120	3,815.8	381.6	$30,527			
44	15	7532	8,976.6	892.66	$71,413	44,796.0	4,452.6	$356,208	44,796.0	4,452.6	$356,208
45	16	9511	479.2	119.81	$9,505	2,390.1	597.6	$47,808	17,291.8	2,082.0	$166,564
46		9511	1,459.4	145.94	$11,675	7,279.3	727.9	$58,234			
47		9511	1,516.7	151.67	$12,133	7,565.1	756.5	$60,521			
48	17	9711	433,938.3	325.45	$26,036	2,164,484.2	1,623.4	$129,869	2,164,484.2	1,623.4	$129,869
Column totals =						3,622,471.6	57,413.6	$4,593,092	3,622,471.6	57,413.6	$4,593,092

Explanatory Notes:

Source: Facility wastestream data as displayed in the prior exhibit in this report (EPA ID numbers have been removed). "Tons" = short tons = 2,000 pounds.

* Scaled = Waste quantities in reference database subset sample subset facilities; must be "scaled" up to all applicable facilities nationwide.

Scaling Factors: 1.45 Brings model totals to universe totals
3.44 Brings NI MWCS respondents up to total NI MWCS

Both multipliers for scaling NHWCS data (i.e. 1.45 x 3.44 = 4.99); only 1.45 multiplier for scaling 1986 Cen Survey data.

OSW-EMRAD

PROPOSED EXTENSION OF RCRA DECHARACTERIZED WASTE EXEMPTION (40 CFR 261.3) IN THE 1999 HWIR:
IDENTIFICATION OF ELIGIBLE INDUSTRIAL HAZARDOUS WASTESTREAMS
AND ESTIMATION OF POTENTIAL WASTE DISPOSAL COST SAVINGS
SUBTOTALS BY SIC CODES (ASCENDING SORT ORDER)

OSW EMRAD

A. IDENTITY OF INDUSTRY SECTORS:				B. NUMBER OF WASTESTREAMS:		C. SCALED* WASTE DATA:		D. POTENTIAL ANNUAL COST SAVINGS:			
SIC code count	SIC code**	Type of Industry	NAICS code***	Unscaled from database	Scaled to estimate universe	Pre-treatment wastestream quantity (tons/year)	Post-treatment waste residual for disposal (tons/year)	Disposal of treated waste residual	Reduction in waste shipment manifests****	Total cost savings	Percent of total cost savings
		Manufacturing Industries:									
1	2800	Chemicals & allied products	32xxxx	3	11	7,655.2	769.0	$61,524	$6,099	$67,622	1.3%
2	2819	Industrial inorganic chems.	See below	2	10	7,888.1	788.8	$63,105	$6,255	$69,360	1.4%
3	2821	Plastics materials & resins	325211	1	5	4,085.3	408.5	$32,682	$3,240	$35,922	0.7%
4	2833	Medicinal chems & botanicals	325411	7	35	31,533.9	3,153.4	$252,271	$25,006	$277,278	5.5%
5	2834	Pharmaceutical preparations	325412	4	20	19,474.8	1,947.5	$155,797	$15,443	$171,241	3.4%
6	2851	Paints & allied products	32551	2	10	21,505.8	2,150.6	$172,046	$17,054	$189,100	3.7%
7	2869	Industrial organic chems.	See below	9	45	1,179,392.3	20,829.5	$1,666,361	$165,178	$1,831,539	36.3%
8	2879	Pesticides & agricultural chems.	32532	2	10	11,426.3	1,142.6	$91,410	$9,061	$100,471	2.0%
9	3089	Plastics products	See below	1	5	3,856.1	385.6	$30,849	$3,058	$33,907	0.7%
10	3241	Hydraulic cement products	32731	1	5	4,779.1	477.9	$38,233	$3,790	$42,023	0.8%
11	3479	Metal coating & allied services	See below	2	10	6,492.4	649.2	$51,939	$5,148	$57,087	1.1%
12	3711	Motor vehicles & car bodies	See below	6	30	45,273.5	4,527.3	$362,188	$35,902	$398,090	7.9%
		Utilities:									
13	4953	Refuse systems	See below	1	5	4,120.3	412.0	$32,962	$3,267	$36,229	0.7%
		Service Industries & Others:									
14	7389	Business services, n.e.c.	See below	2	10	48,743.7	11,613.6	$929,084	$92,095	$1,021,179	20.2%
15	7532	Auto repair & auto paint shops	811121	1	5	44,526.0	4,452.6	$356,208	$35,309	$391,517	7.8%
16	9511	Waste management	92411	3	15	17,234.8	2,082.0	$166,564	$16,511	$183,074	3.6%
17	9711	National security (military bases)	811121	1	5	2,164,484.2	1,623.4	$129,869	$12,873	$142,742	2.8%
Column totals =				48	236	3,622,472	57,414	$4,593,092	$455,290	$5,048,382	100.0%

Explanatory Notes:

(a) Source: Facility wastestream data from prior exhibit in this report (EPAID numbers have been removed). All "tons" = short tons (i.e. 2,000 pounds).

(b) * Scaled Waste quantities in referenced database reflect sample subset facilities; must be "scaled" up to all applicable facilities nationwide.

Scaling Factors:		
1.45		Brings model totals to universe totals
3.44		Brings NI WCS respondents up to total NI WCS

Both multipliers for scaling NI-WCS data (i.e. 1.45 x 3.44 = 4.99); only 1.45 multiplier for scaling 1988 Gen Survey data.

(c) ** SIC Standard Industrial Classification System (http://www.census.gov/epcd/www/sic.html)

(d) *** NAICS = North American Industrial Classification System (http://www.census.gov/epcd/www/naicstab.htm)

SIC 2819	NAICS 211112, 325131, 325188, 325998, or 331311.
SIC=2869	NAICS=32511, 32512, 325188, 325193, or 325199.
SIC=3089	NAICS=326121, 326122, 326199, or 337215.
SIC 3479	NAICS 332812, 339911, 339912, or 339914.
SIC=3711	NAICS=336111, 336112, 33612, 336211, or 336992.
SIC 4953	NAICS 562211, 562212, 562213, 562219, or 56292.
SIC=7389	NAICS=36 possible alternative NAICS codes (refer to http://www.census.gov/epcd/www/naics0h.htm).

(e) **** Reduction in hazardous waste shipment manifest costs estimated with following assumptions:

Average industrial waste shipment truckload (short tons) =	20
Average hours to prepare waste shipment haz. manifest =	1.3
Average hourly technical level labor cost to prepare manifest	$122

(f) In addition to the 17 sectors above, the local trucking services sector (SIC=4212, NAICS=562111 (non-hazardous waste) & 562112 (hazardous waste)) will also be affected, by no longer requiring to carry/process hazardous waste manifests and to use special hazardous waste containers and other special provisions.

SECTION III: SURVEY DATABASE OF CONSTITUENTS IN INDUSTRIAL HAZARDOUS WASTES

III.A. SOURCES OF US INDUSTRIAL HAZARDOUS WASTE DATA

The prospective future analysis of eligible wastestreams and potential waste management cost savings under HWIR "exemption levels" and the "minimize threat" provision, relies primarily on two USEPA data sources for industrial hazardous wastestream information:

- USEPA's 1996 *National Hazardous Waste Constituent Survey* (i.e. "NHWCS"), and
- USEPA's 1986 *National Survey of Hazardous Waste Generators* (i.e. "1986 Generator Survey").

These two sources contain the most complete constituent data for a US national sample of industrial hazardous wastestreams. The 1996 NHWCS is the more recent of the two datasets; however, it targeted primarily "large quantity" waste generators and managers. It does not include data for "small quantity" generators. For these, the 1986 Generator Survey provides such data, which is the only existing database with constituent data for smaller quantity generators.[17] Combined in the form of a single, non-duplicative "hybrid database", these two data sources represent the database which underlies the USEPA's analysis of the "decharacterized waste" exemption of the 1999 HWIR notice, as described in Section II of this report. This database also underlies USEPA's "HWIR Economic Model" under development for assessing the potential impacts of the "exemption level" and "minimize threat" provisions described in the 1999 HWIR notice; Section IV of this report describes the elements and logic of the "HWIR Economic Model".

1996 National Hazardous Waste Constituent Survey

USEPA administered the NHWCS survey instrument in 1996, to a sample of relatively large industrial hazardous waste generators, and to treatment, storage, and disposal facilities (TSDFs). The purpose of this survey was to collect constituent-specific hazardous waste data, in support of developing the 1999 HWIR notice.[18] To capture a significant portion of the RCRA waste universe, USEPA targeted a sample of 221 facilities that manage over 90 percent of hazardous waste in each of the following categories: total waste, listed waste, characteristic waste, listed and characteristic waste, non-wastewaters, and combusted waste.[19] By using this design, the Survey focused on off-site TSDFs, as well as on very large quantity waste generators that manage their own waste on-site. For practical purposes, this survey population of 221 facilities may be considered a census (i.e. survey of the entire population) of all large quantity industrial hazardous waste handlers in the US.

To reduce the overall reporting burden to targeted facilities, USEPA used facility and wastestream information from the 1993 *National Biennial RCRA Hazardous Waste Report* (BRS) database and pre-loaded each facility's BRS responses into their questionnaire. Hence, unless respondents needed to correct their responses to the 1993 BRS, the Survey only requested respondents to provide physical characteristic and constituent concentration data. The survey was voluntary participation.

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[17] The USEPA's 1986 Industrial Waste Generator Survey also includes data for large quantity wastestreams, however, the 1996 NHWCS contains more recent data for these, which were used to replace the earlier data for this waste quantity size class.

[18] For a complete description of the USEPA's 1996 NHWCS database, see the report, *National Hazardous Waste Constituent Survey: Summary Report*, prepared by Industrial Economics Inc, for the Office of Solid Waste, July 1999, which is available to the public through the RCRA Docket (follow the public access instructions provided in the Introduction to the 1999 HWIR Federal Register notice).

[19] To identify the industrial waste treatment, storage and disposal facilities (TSDFs) and other facilities that account for handling of the majority of hazardous waste, USEPA used facility and waste quantity data from the *1993 National Biennial RCRA Hazardous Waste Report* (released in August 1995), as a benchmark for designing the NHWCS in 1996 (see http://www.epa.gov/epaoswer/hazwaste/data/br93.htm).

To provide further NHWC survey reporting relief, USEPA only requested data on the top twenty 'major' wastestreams generated or managed by a facility.[20] However, many facilities opted to provide data on more than twenty major wastestreams. To incorporate data on all wastestreams into the survey, USEPA created statistical weights to account for all of the wastestreams at each facility.

The NHWCS sample population consists of 221 facilities, which reported in the survey that they generate 1,760 industrial hazardous wastestreams. However, not all of the facilities provided waste type, waste quantity and waste constituent data with sufficient detail to use in assessing the potential economic impacts of HWIR. In particular, due to non-responses by some survey facilities, a portion of the wastestreams in the NHWCS survey sample, sub-population does not include information on constituent concentrations. A respondent population of 156 facilities (i.e. 71%) responded with constituent data for 1,020 wastestreams, including (a) chemical name of hazardous waste constituents, and (b) onstituent concentration data, in the form of single point numerical measurements of either "wholewaste" or "leachate" concentrations in *parts-per-million*.[21]

To account for waste quantities and potential cost savings under HWIR that are represented by wastestreams without constituent data, it is necessary to apply a scaling factor to the NHWCS wastestreams in the hybrid database used within the HWIR Economic Model.[22] Specifically, two "scaling factors" (i.e. extrapolation multipliers) of 1.45 and 3.44, enable projection of the NHWCS eligible waste quantities and potential cost savings, to the relevant large quantity waste handler universe.[23]

1986 National Survey of Hazardous Waste Generators

The USEPA's 1986 *National Survey of Industrial Hazardous Waste Generators* (i.e. the "1986 Generator Survey") provides data for individual listed and characteristic wastestreams, including information on waste quantity, constituent concentrations (as numerical "minimum-to-maximum" ppm ranges), and physical form (i.e. wastewater or non-wastewater), as well as on the RCRA wastecodes carried by the wastestream.

Before administration of the 1996 NHWCS, the 1986 Generator Survey (and its companion "1986 TSDR Ssurvey") represented the most comprehensive and available information about the generation and management of US industrial hazardous wastes. The 1986 Generator and TSDR surveys comprised USEPA's third effort to develop reliable national information on this topic; two separate reports dated July and October 1991 presented the 1986 survey findings. USEPA's April 1984 report *National Survey of Hazardous Waste Generators and Treatment, Storage, & Disposal Facilities Regulated Under RCRA in 1981* (1981 mail survey), presented the first US national picture of the hazardous waste system. USEPA's March 1989 report *1985 National Biennial Report of Hazardous Waste Generators & TSDFs Regulated Under RCRA*, updated the 1981 mail survey as a second effort. Subsequent to its start in the data year 1985, the Biennial Reporting System (BRS) continues as USEPA's primary vehicle for collecting information about US large quantity hazardous waste generators and handlers (see USEPA's Internet website for more information about more recent BRS reports at http://www.epa.gov/epaoswer/hazwaste/data/index.htm). In comparison to all of these prior data sources, the 1986 Generator Survey was unique in that it also provided waste constituent information. Complementary to these earlier but comprehensive survey efforts, USEPA focused on "small quantity generators" in a 1983-1984 survey: *National Small Quantity Hazardous Waste Generator Survey*,

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[20] USEPA defined in the 1996 NHWCS 'major' wastestreams as greater than or equal to 40,000 tons/year for wastewater wastestreams, or greater than or equal to 400 tons/year for non-wastewater wastestreams.

[21] "Parts-per-million" (ppm) is a unit of measurement for expressing *trace* concentrations. It may be expressed as three alternative ratios of the quantity of waste constituent, in the quantity of the waste sample (adopted from Christian, Gary D., Analytical Chemistry, 2nd edition, John Wiley & Sons Inc., 1977, p.14):

(a) weight/weight (i.e. milligrams-per-kilogram)
(b) weight/volume (i.e. milligrams-per-liter), or
(c) volume/volume ratios (i.e. microliters-per-liter).

In comparison, "parts-per-billion" (ppb) is a unit of measurement for expressing *ultratrace* concentrations (1,000 ppb = 1.0ppm).

[22] The characteristics (e.g. annual waste quantity distribution) of the NHWCS wastestreams without constituent concentrations (i.e. 740 wastestreams), are similar to those of the wastestreams with constituent concentration data (i.e. 1,020 wastestreams). Therefore, scaling quantities and cost savings to account for NHWCS wastestreams not in the hybrid database within the HWIR Economic Model is a reasonable method.

[23] The two sample:to:universe waste scaling factors (i.e. numerical multipliers) are based on the following ratios in waste quantities: (a) total quantity of listed and listed-&-characteristic wastes in the 1996 NHWCS data is 86 million tons, and the total quantity of these wastes that include constituent concentrations is 25 million tons. Using these totals, the NHWCS scaling factor is: 86/ 25 million tons = 3.44.
(b) total quantity of listed and listed-&-characteristic wastes in the 1993 BRS benchmark universe is 97 million tons, and the total quantity of these wastes represented in the "hybrid" survey is 67 million tons. Using these totals, the second scaling factor is: 97/67 million tons = 1.45.

(prepared by Abt Associates Inc), February 1985.

Because industrial hazardous waste generation and management have changed since 1986, the USEPA attempted in 1997-98 to verify and update this data source, through telephone contacts with selected facilities and related analyses (i.e. by cross-referencing to the data contained in the USEPA's 1993 and 1995 BRS). USEPA also updated the data for petroleum wastes in response to data provided by industry in 1996-97.

Because the Land Disposal Restrictions (LDRs) significantly affect the management of these wastes but became effective after the data were collected (the LDRs became effective in multiple, sequential stages beginning 07 November 1986, and continuing through to 12 May 1997)[24], USEPA also developed a series of decision rules to determine likely waste treatments under the Land Disposal Restrictions, to supplement this 1986 database as a new datafield.

To account for wastes from small- and medium-sized generators that are not directly represented in the 1986 Generator Survey, a "scaling factor" of 1.45 is applied to each sample wastestream (the second 3.44 scaling factor is only applicable to the NHWCS database).

III.B. TYPES AND QUANTITIES OF INDUSTRIAL WASTES IN THE DATABASE

The 1996 NHWCS provides data to analyze large wastestreams, and the 1986 Generator Survey provides data representing medium- and small quantity industrial process wastestreams. As defined for purpose of classifying the wastestreams in these databases, for the large generators and managers, the NHWCS includes wastewater streams greater than or equal to 40,000 tons and non-wastewater streams greater than or equal 400 tons. To complement this, from the Generator Survey data, medium- and small-size wastewater streams are less than 40,000 tons and non-wastewater streams are less than 400 tons (see Exhibits III-1 and III-2). Combining these two datasets within the HWIR Economic Model captures a representative sample of the full generator size-range within the US industrial hazardous waste universe.

Exhibit III-1
Industrial Hazardous Waste Generator Size Classifications Applied in the HWIR Economic Model

Size Categories	Wastewaters (tons/yr)	Non-Wastewaters (tons/yr)
1. Small Quantity Generator*	< 10,000	< 100
2. Medium Quantity Generator	10,000 to 40,000	100 to 400
3. Large Quantity Generator	> 40,000	> 400

Ton = short-ton = 2,000 pounds.
* The RCRA regulations actually define three different waste generator size categories:
- "Large Quantity Generators" defined as generating > 1,000 kilogram per month (> 13.23 short-tons/yr).
- "Small Quantity Generators" (40 CFR 260.10) < 1,000 kilograms per month (< 13.23 tons/yr).
- "Conditionally Exempt Small Quantity Generators" (40 CFR 261.5) < 100 kilograms per month (< 1.32 tons/yr).

Note: In comparison to these size classes, the 1995 HWIR Economic Assessment report, defined only two size classes (undifferentiated by physical form): small quantity generators < 10,000 tons/year, and large quantity generators > 10,000 tons per year.

Industrial Hazardous Waste Characteristics

Exhibit III-3 provides an overview of the types and quantities of waste in the "hybrid" database underlying the HWIR Economic Model (the Model is described in the next section of this report). Wastes that are hazardous solely due to the presence of a characteristic (i.e.

[24] The definition, purpose and history behind USEPA's RCRA "Land Disposal Restrictions" (LDRs), as well as other RCRA concepts, terms, and regulations, are available to the public in one convenient source document: "RCRA Orientation Manual" USEPA Office of Solid Waste and Emergency Response, Report Nr. EPA-530-R-98-004, May 1998, 290pp. This document is available from the National Service Center for Environmental Publications, P.O. Box 42419, Cincinnati, OH 45242-2419, (phone number: 800-490-9198, fax number: 513-489-8695); or via the Internet at http://www.epa.gov/epaoswer/general/orientat/index.htm .

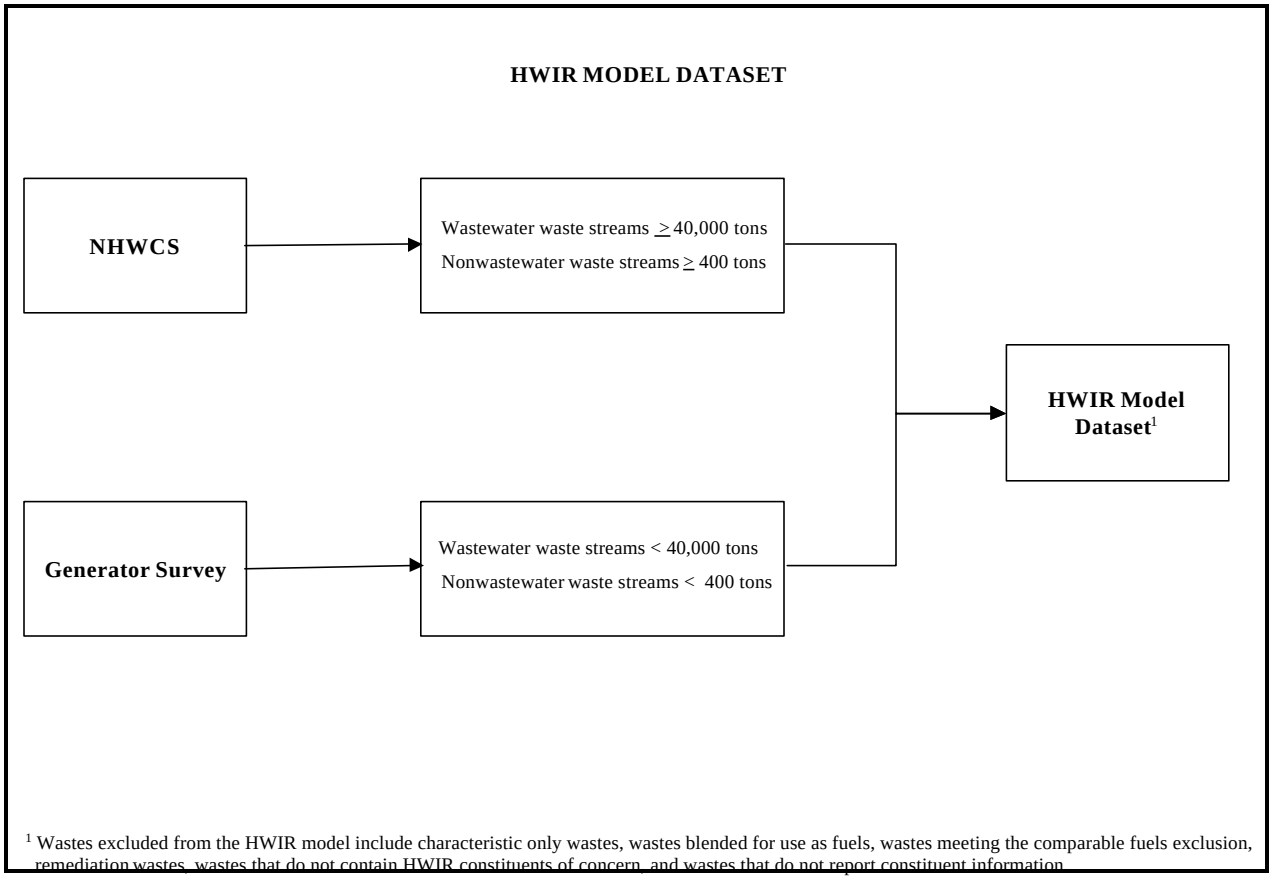
"characteristic wastes") are not shown in the exhibit nor considered in this analysis because they are not eligible for exemption under HWIR. Instead, the analysis addresses only listed and listed and characteristic wastes. The waste totals presented here are those in the model and are not scaled to hazardous waste universe totals. Wastes analyzed in the model include:

- 23.2 million tons of total waste.
- 11.6 million tons of RCRA-listed only wastes.
- 11.6 million tons of RCRA-listed and RCRA-characteristic wastes.
- 8,343 wastestreams (i.e. 6,441 RCRA-listed only, plus 1,902 listed and characteristic).

Most of the industrial wastes represented in the database are liquids. Liquids account for 22.1 million tons of the reported quantity, while solids represent 0.7 million tons, and "semi-solids" account for 0.5 million tons. As reflected in the exhibit below, a large number of wastestreams and facilities contribute a relatively small quantity of semi-solid wastes, indicating that these wastestreams are generally smaller than liquid and solid wastestreams in the model.

With regard to the split of wastes between the 1986 Generator Survey and the 1996 NHWCS, the wastes in the Generator Survey are nearly all liquid wastes (5.5 million tons). Liquid wastes also constitute the majority of the NHWCS wastes (16.5 million tons, or 93 percent), with semi-solids accounting for slightly more (4 percent) than solids (3 percent). The Generator Survey comprises 8,016 wastestreams in the database, while 327 wastestreams are represented by the NHWCS. In addition, the 1996 NHWCS database, as modified for purpose of HWIR economic analysis, contains data for 140 facilities, and the 1986 Generator Survey data for 4,036 facilities.

EXHIBIT III-2



[1] Wastes excluded from the HWIR model include characteristic only wastes, wastes blended for use as fuels, wastes meeting the comparable fuels exclusion, remediation wastes, wastes that do not contain HWIR constituents of concern, and wastes that do not report constituent information.

EXHIBIT III-3

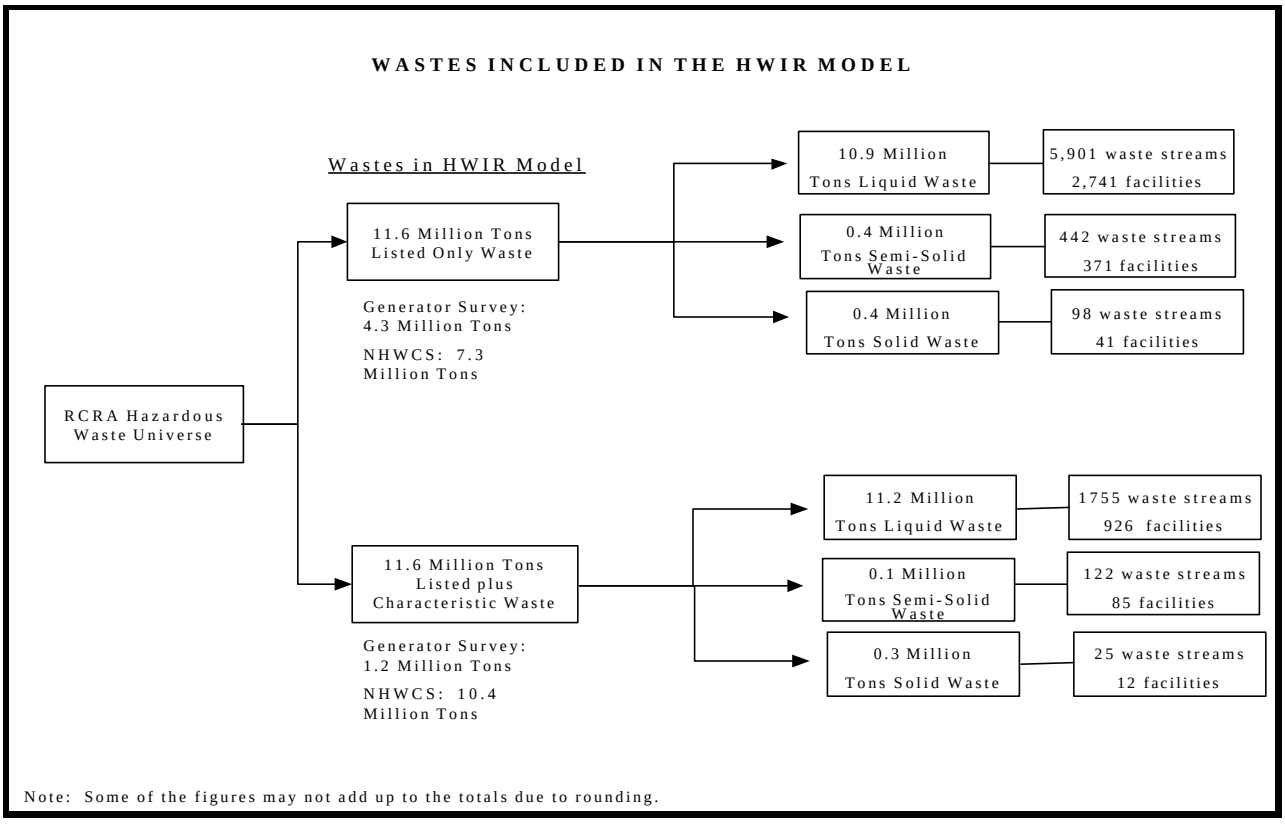


Exhibit III-4:
Summary of Data Elements Contained in the "Hybrid" (1986 & 1996 Combined) Industrial Waste Database

USEPA Data Sources	Count of Facilities	Count of Waste streams	Average Nr. Wastestreams Per Facility	Total Waste Stream Quantity (tons/yr)	Average Quantity Per Wastestream (tons/year)
1986 Generator Survey	4,036	8,016	2.0	5.5 million	686
1996 NHWC Survey	140	327	2.3	17.7 million	54,128
Both surveys combined	4,176	8,343	2.0	23.2 million	2,780

Note: For purpose of providing a benchmark to the universe of facilities, recent estimates for 1997 are as follows:
Large quantity RCRA "hazardous" industrial waste generators = 20,000 facilities.
Small (and "conditionally" small) quantity RCRA "hazardous" industrial waste generators = 691,000 to 936,000 facilities.
RCRA permitted waste treatment, storage, disposal facilities (TSDFs) = 2,000 facilities.
Benchmark source: USEPA "RCRA Orientation Manual", EPA530-R-98-004, May 1998, pp.III-46, III-47, and USEPA 1997 BRS.

To provide additional background for interpreting the waste information in the HWIR Economic Model, Exhibit III-5 below displays summary statistics for the new database, and Exhibit III-6 displays the frequency and cumulative distribution of model waste quantities. As is true for the larger RCRA waste universe, the distribution of waste quantities among facilities, wastestreams, and waste types is highly skewed. This is illustrated by the significant difference between average wastestream quantity (2,780 tons per year) and median wastestream quantity (16 tons per year), indicating that a small number of very large-quantity wastestreams dominate total waste quantity.

As shown in Exhibit III-7, the following three categories of waste are highly prevalent in the hybrid database:

- Spent solvents: Spent solvents (i.e. RCRA wastecodes F001 to F005) are the most common, occurring as four of the ten most prevalent waste types. Wastestreams that carry spent solvent wastecodes also account for at least 24 percent of the total quantity in the model. Spent halogenated solvents (i.e. wastecodes F001 & F002), which are present in at least 22 percent of the wastestreams, are the most common type of waste.

- Characteristic wastes: The second highly prevalent waste category are wastes that exhibit a characteristic (i.e. containing one of the RCRA wastecodes D001 to D043). For example, ignitable waste (D001) is a property of approximately 13 percent of the wastestreams, and corrosivity (D002) is a characteristic of at least 28 percent of the total waste in the model. In addition, chromium (D007) and lead (D008) are prevalent characteristic wastes, with each of these constituents present in at least five percent of the wastestreams and chromium present in wastestreams that constitute 17 percent of the total quantity in the model.

- Electroplating wastes: The final category of prevalent waste are from electroplating processes. Wastewater treatment sludges from electroplating (F006) and spent cyanide plating bath solutions from electroplating (F007) account for at least four percent of the total wastes in the model, with F006 wastes present in 12 percent of the total wastestreams.

Chemical Constituent Prevalence in Industrial Hazardous Wastes

As Exhibit III-8 illustrates, the distribution of constituents across wastestreams indicates that the majority (i.e. 90 percent) of industrial hazardous wastes represented in the hybrid database, contain 15 or fewer chemical constituents.[25] In addition, a large number of wastestreams (approximately 85 percent) reportedly contain only one chemical constituent, with the following, overall statistical indicators:

- Maximum survey-reported number of chemical constituents for a single wastestream = 111
- Average (mean) number of chemical constituents per industrial wastestream = 5.3
- Median number of constituents per wastestream = 3.0

Analysis of constituents indicates that metals are the most prevalent chemical constituents in the hybrid database. As Exhibit III-9 shows, lead, the most common constituent, occurs in 37 percent of the model's wastestreams. Cadmium, nickel, copper, and chromium are also highly prevalent - each appears in nearly 30 percent of the wastestreams.

Chemical Constituent Concentrations

In an analysis of concentrations of highly prevalent constituents in the hybrid database, reported concentrations of nickel, copper, and zinc are higher than those reported for the other prevalent metals. Exhibit III-10 illustrates the median, 10th percentile, and 90th percentile concentrations of the ten most highly prevalent constituents. As shown in the exhibit, the median concentration for nickel, copper, and zinc is approximately 10 parts per million. Lead has the next highest median concentration at 2.4 parts per million. For the remaining prevalent metals, the median concentration is between 0.01 part per million (mercury) and 1.0 part per million (chromium and barium).

Industrial Waste Constituent Prevalence in 1996 NHWCS

Because of the fact that the 1996 NHWCS database is also being made available to the general public for the first time in conjunction with the 1999 HWIR notice, readers of this document may be interested in obtaining additional information about it. The NHWCS database is available for public review via the RCRA Docket, according to the instructions contained in the Federal Register notice for HWIR 1999.

[25] Occurrences refer to the number of times the constituent is reported in the database (i.e. the number of wastestreams that contain the constituent).

USEPA designed the NHWCS in 1996 specifically to support the development of HWIR, and for that reason, it is being made available to the public in conjunction with the 1999 HWIR notice. The USEPA mailed-out the NHWCS survey questionnaires to 221 facilities on 09 August 1996 (including nine pre-test facilities), and the questionnaire response period was extended through to 08 December 1996. The 221 facilities selected represented the universe of known waste management facilities which handled the largest industrial RCRA "hazardous" wastestreams, defined as representing 90% of the total US annual volume of industrial hazardous waste, as benchmarked against the USEPA's 1993 Biennial Reporting System (BRS) statistics for such large quantity wastes. For the 156 survey responses received (which represents a 71% response rate; the survey was voluntary participation), the USEPA's survey contractors (ICF Inc. and Westat, Inc.) conducted survey response data combing, data entry, and data QA/QC tasks through 1997, resulting in the database being ready for exploratory use in the development of HWIR in 1998.

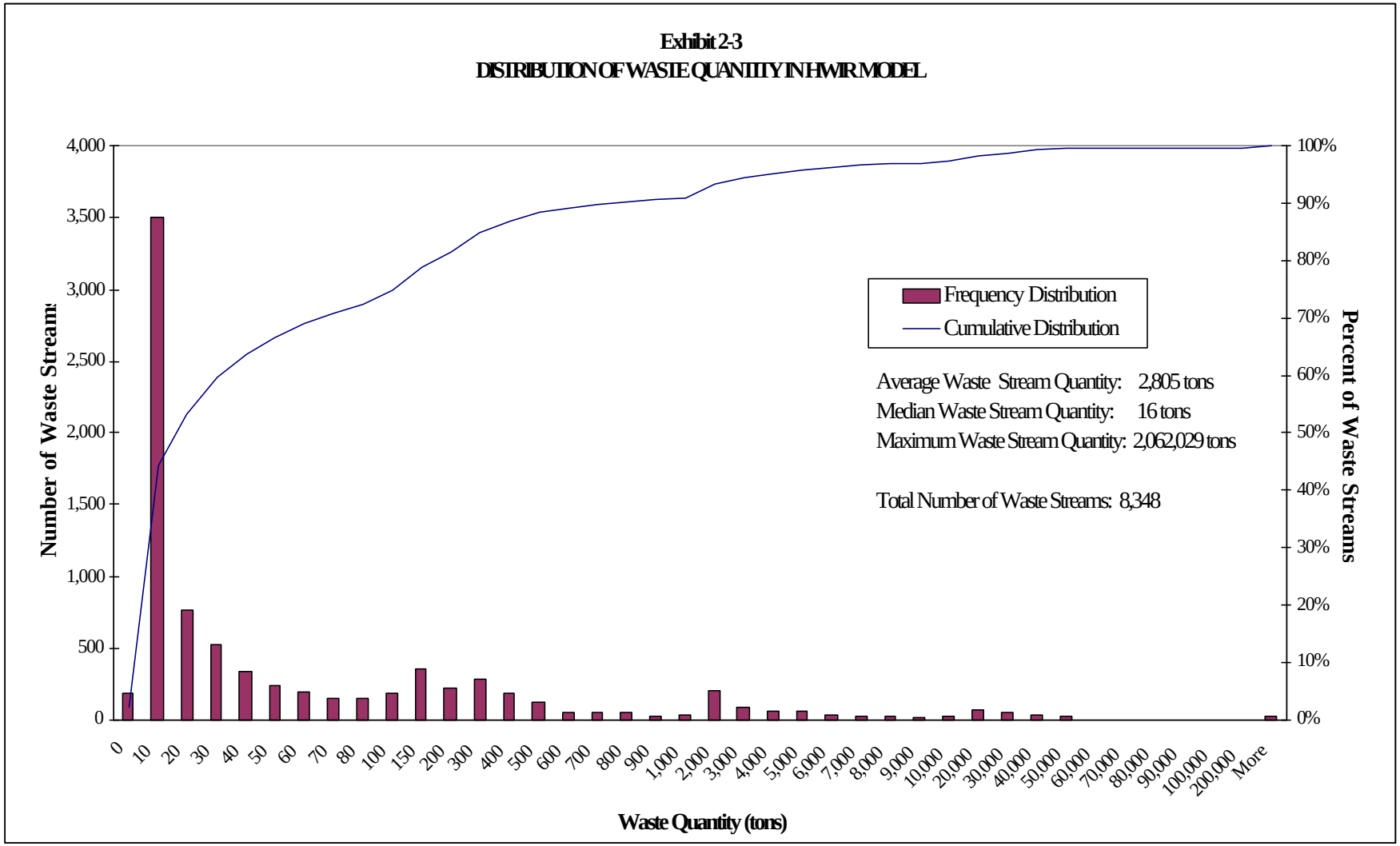
For purpose of providing additional information to the public about the more recent NHWCS, Exhibit III-11 provides a list of 100 chemical constituents in industrial hazardous wastes, descending sorted according to their respective prevalence in the 1996 NHWCS database wastestreams. This list provides the chemical class association for each constituent (e.g. inorganic, chlorinated aliphatic, ohc=oxygen/hydrogen/carbon, PAH= polycyclic aromatic hydrocarbon), the associated number of wastestreams reported in the 1996 survey (maximum possible of 1,760 wastestreams), the number of 1994 Toxic Release Inventory (TRI) reporting forms[26] (i.e. number of "toxic" chemicals reported as manufactured, processed or otherwise used by industrial manufacturing facilities), the quantity of the associated wastestream, the mass of the constituent in the wastestream, and the constituent 1994 TRI release quantity.

Exhibit III-5:
Summary of USEPA's 1996 National Hazardous Waste Constituent Survey - Waste Universe Coverage

	Nr. of large hazardous waste generator facilities	Nr. of large industrial hazardous wastestreams	Quantity of Large Hazardous Waste (million tons/yr)	Quantity as % of 1993 BRS Large Generator Universe
NHWC Survey Mail-Out Sample	221*	1,760	216.8	42%
NHWCS Survey Respondents**	156	1,020	114.7	22%
1993 USEPA BRS Benchmark Waste Universe Data***	24,362	48,724****	521.6	100%
1993 USEPA BRS Benchmark Listed Waste Data*****	10,700	25,300	303.6	58%

Explanatory Notes:
(1) * Count of 221 NHWCS mail-out sample facilities includes nine "pre-test" facilities.
(2) ** Number of NHWCS voluntary respondents represents survey responses which included waste chemical constituent information.
(3) *** BRS= USEPA's "Biennial Reporting System" which collects descriptive data from large quantity waste generators, about industrial hazardous waste sources, types, quantities, and waste management methods (http://www.epa.gov/epaoswer/hazwaste/data/index.htm#brs).
RCRA "Large Quantity Generator" (LQG) defined as any facility which generated > /=1,000 kilograms (2,200 lbs) of RCRA "hazardous" waste in any single month, or generated 1.0 kilograms (2.2 lbs) of RCRA "acute hazardous" waste in any single month.
(4) **** The total number of 1993 BRS wastestreams is estimated above, by multiplying the 24,362 total number of BRS facilities, by the 2.0 average number of NHWCS wastestreams per facility (from the previous exhibit in this report).
(5) ***** The 1993 BRS total industrial hazardous waste universe benchmark, consists of 218.0 million tons "characteristic-only" wastes.
(6) Source for NHWCS statistics: USEPA "National Hazardous Waste Constituent Survey: Summary Report", prepared by Industrial Economics Inc., for the Office of Solid Waste, January 1999, 73 pp., and the 1995 HWIR Economic Assessment report (Chapter 2).

[26] The USEPA's "Toxic Chemical Release Inventory" (TRI) is an annual database of quantities of over 640 different "toxic" chemicals (as of 1997) manufactured or processed (if >25,000 pounds per year per chemical),or otherwise used (if >10,000 pounds per year per chemical), and released to the environment, by US industrial facilities in manufacturing sectors (i.e. SIC codes 20 to 39), with ten or more full-time employees. A separate "reporting form" is required for each TRI-listed chemical; for 1996, 21,626 manufacturing facilities filed 71,381 TRI forms, which represents an average of 3.3 forms per facility. For more information about the USEPA's TRI, refer to http://www.epa.gov/opptintr/tri .

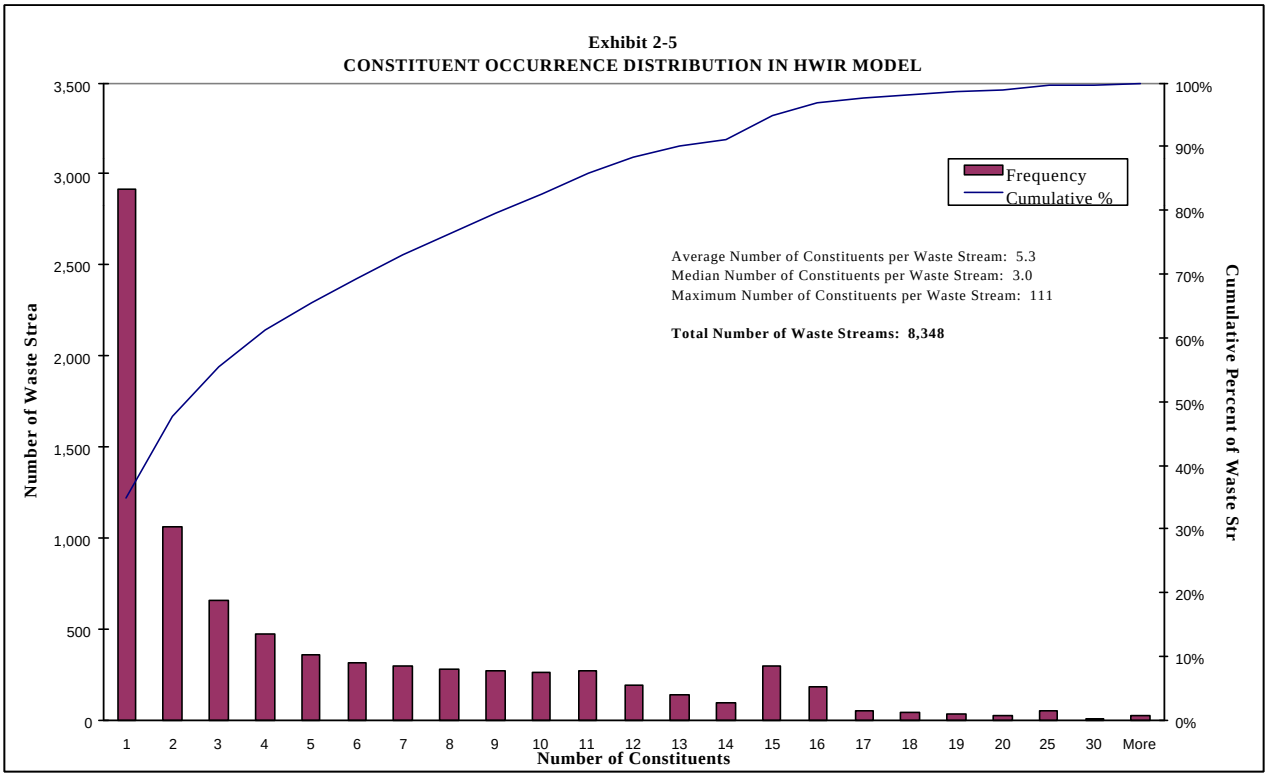


EXHIBITS III-7 AND III-8

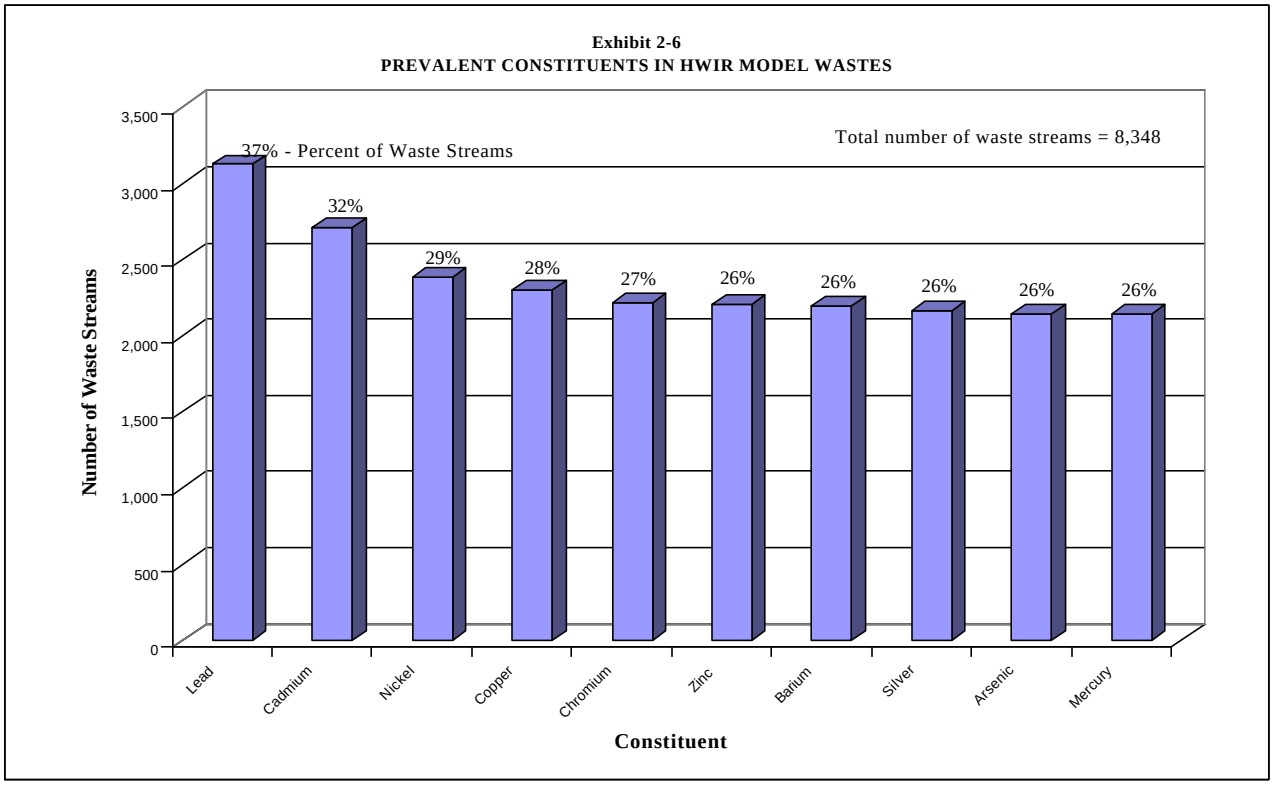
PREVALENT WASTE TYPES IN THE HWIR MODEL

Ten Most Prevalent Waste Codes	Waste Description	Number of Waste Streams	Percent of Waste Streams	Quantity of Waste Streams (tons)	Percent of Total Quantity
F002	Spent halogenated solvents	1,818	22%	5,550,664	24%
F001	Spent halogenated solvents	1,780	21%	2,662,307	11%
F005	Spent non-halogenated solvents	1,727	21%	3,738,814	16%
F003	Spent non-halogenated solvents	1,148	14%	3,459,180	15%
D001	Ignitable waste	1,090	13%	1,706,117	7%
F006	Wastewater treatment sludges from electroplating	984	12%	889,560	4%
D007	Chromium	403	5%	3,881,600	17%
D008	Lead	392	5%	1,201,446	5%
D002	Corrosive waste	316	4%	6,572,010	28%
F007	Spent cyanide plating bath solutions from electroplating	285	3%	1,007,227	4%

Notes: - Based on total number of waste streams of 8,348 and total waste quantity of 23,413,482 tons.
- Because waste streams can have more than one assigned waste code, there is double-counting in this estimates.



EXHIBITS III-9 AND III-10



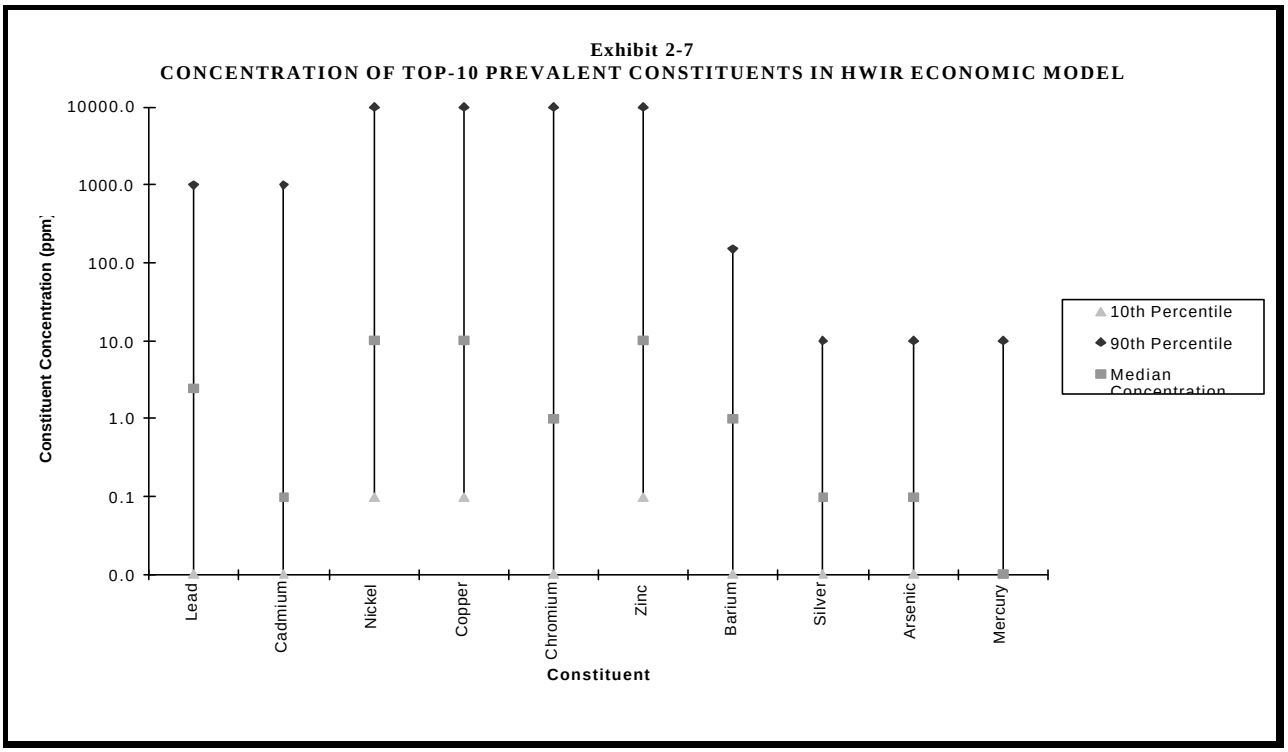


EXHIBIT III-11

TOP-100 SORT BY NUMBER OF NHWCS WASTESTREAMS

BASED ON REFERENCE LIST OF 466 CHEMICAL CONSTITUENTS IN INDUSTRIAL HAZARDOUS WASTE (OSW-EMRAD)

CANDIDATE INDUSTRIAL HAZARDOUS WASTE CONSTITUENTS FOR HWIR99 RISK ANALYSIS MODELING

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Sort rank	Chemical constituent class	CAS Nr	Chemical Name [Alternate Names]	SORT #1 Nr. waste streams in NHWCS	SORT #2 Total 1994 TRI forms	SORT #3 Total mass of wastestream (tons/yr)	SORT #4 Total mass of chemical (tons/yr)	OSW EMRAD SORT #5 Total 1994 TRI releases (pounds/yr)
1	inorganic	7440-47-3	Chromium	402	see TRI-059	20,000,000.0		Covered by TRI 059
2	inorganic	7439-92-1	Lead	377	817	16,144,515.2	183,954.1	920,659
3	Aromatic Hydrocarbon	108-88-3	Toluene [Methylbenzene]	357	3,586	15,770,570.4	91,357.4	100,950,027
4	Aromatic Hydrocarbon	1330-20-7	Xylenes, mixed isomers [Xylenes, total],Dimethyl benzenes]	305	2,316	8,786,162.1	80,027.3	108,035,077
5	Aromatic Hydrocarbon	71-43-2	Benzene	307	471	73,748,381.0	4,413.3	9,702,115
6	other	67-64-1	Acetone [2 Propanone]	292	-	8,107,000.0	37,101.7	not on TRI
7	inorganic	7440-43-9	Cadmium	265	55	11,160,641.1	1,344.1	10,470
8	other	78-93-3	Methyl ethyl ketone [2-Butanone] MEK	261	2,029	6,200,700.0	27,002.2	79,360,956
9	chlorinated aliphatic	75-09-2	Methylene chloride [Dichloromethane]	232	1,050	10,719,085.6	15,617.4	63,774,586
10	inorganic	7440-39-3	Barium	215	37	14,700,727.1	11,120.0	365,910
11	inorganic	7440-38-2	Arsenic	211	39	21,135,627.1	1,760.2	27,052
12	other	67-56-1	Methanol [Methyl alcohol]	212	2,430	12,779,995.0	721,132.8	200,702,904
13	Aromatic Hydrocarbon	100-41-4	Ethylbenzene	212	959	6,391,000.7	17,101.0	12,807,150
14	other	108-10-1	Methyl isobutyl ketone [Hexone][4-Methyl-2-pentanone]	195	1,071	4,402,719.4	12,614.7	25,501,577
15	other	141-78-6	Ethyl acetate	192	-	1,549,427.7	12,101.9	not on TRI
16	chlorinated aliphatic	127-18-4	Tetrachloroethylene [Perchloroethylene]	187	450	8,761,112.7	3,004.1	10,214,427
17	inorganic	7440-22-4	Silver	185	30	17,340,570.0	412.7	11,631
18	chlorinated aliphatic	71-55-6	1,1,1-Trichloroethane [Methyl chloroform]	183	1,207	4,778,013.7	1,451.5	38,065,871
19	inorganic	7439-97-6	Mercury	174	21	18,263,548.3	3,654.0	12,100
20	inorganic	7440-02-0	Nickel	171	1,729	13,246,077.7	895.2	685,458
21	other	71-36-3	n-Butanol [n-Butyl alcohol]	164	1,145	6,120,335.0	7,771.5	30,001,140
22	chlorinated aliphatic	79-01-6	Trichloroethylene	162	720	7,340,075.9	3,095.9	30,875,240
23	inorganic	7782-49-2	Selenium	127	12	6,730,607.3	37.0	575
24	chlorinated benzene	108-90-7	Chlorobenzene	121	35	15,205,004.2	2,077.4	1,522,719
25	chlorinated aliphatic	56-23-5	Carbon tetrachloride	105	39	14,523,535.8	1,230.8	632,824
26	other	108-95-2	Phenol	101	719	26,151,215.0	5,140.2	11,941,178
27		109-99-9	Tetrahydrofuran	100	2	1,288,945.8	1,758.3	not on TRI
28	org nitrogen	110-86-1	Pyridine	97	35	6,343,405.8	1,047.0	405,512
29	PAH	91-20-3	Naphthalene	90	627	6,300,150.0	691.6	3,237,142
30	org nitrogen	98-95-3	Nitrobenzene	87	14	5,130,464.0	406.6	552,222
31	chlorinated aliphatic	67-66-3	Chloroform	85	157	6,357,062.0	3,020.0	11,877,517
32	other	78-83-1	Isobutyl alcohol	84	-	3,757,744.5	1,275.0	not on TRI
33	other	106-44-5	p-Cresol [4-Methyl phenol]	82	27	1,502,105.4	3,920.1	372,053
34	chlorinated aliphatic	79-00-5	1,1,2-Trichloroethane [Vinyl trichloride]	81	28	3,392,800.5	3,735.8	811,056
35	other	95-48-7	o-Cresol [2-Methyl phenol]	81	25	3,380,600.8	240.0	677,724
36	chlorinated aliphatic	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane [Freon 113]	80	257	2,381,875.9	374.1	5,077,542
37	chlorinated benzene	95-50-1	1,2-Dichlorobenzene [o-Dichlorobenzene]	77	33	3,780,305.0	476.8	275,140
38	other	108-39-4	m-Cresol [3-Methyl phenol]	77	21	1,301,270.0	270.9	665,142
39	inorganic	7440-66-6	Zinc	73	410	26,253,834.5	3,037.3	10,152,249
40	sulfur	75-15-0	Carbon disulfide	73	32	4,124,015.7	214.2	83,881,729
41	other	108-94-1	Cyclohexanone	72	-	1,562,087.4	1,735.5	not on TRI
42	inorganic	7440-36-0	Antimony	71	130	10,295,022.7	1,920.2	125,853
43	chlorinated aliphatic	75-69-4	Trichlorofluoromethane [Trichloromonofluoromethane][CFC-11]	70	32	4,253,885.7	93.7	2,004,474
44	chlorinated aliphatic	107-06-2	1,2-Dichloroethane [Ethylene dichloride]	63	70	11,214,828.2	12,260.4	1,912,630
45	other	60-29-7	Ethyl ether [Ethane,1,1-oxybis]	63	-	1,555,447.0	268.5	not on TRI
46	other	110-80-5	2-Ethoxyethanol [Ethylene glycol monoethyl ether][Cellosolve]	60	40	105,150.4	1,074.1	227,821
47	metal	7440-50-8	Copper	57	3,577	10,188,414.5	255.1	2,204,032
48	other phthalate	117-81-7	Bis-(2-ethylhexyl) phthalate [Di-2-ethylhexyl phthalate]	50	327	254,493.5	90.0	562,325
49	inorganic	7440-41-7	Beryllium	48	10	2,253,627.2	0.5	25,775
50	PAH	85-01-8	Phenanthrene	45	-	508,262.0	202.7	not on TRI
51	org nitrogen	75-05-8	Acetonitrile	41	30	9,102,001.0	13,431.7	18,984,054
52	chlorinated aliphatic	75-35-4	1,1-Dichloroethylene [Vinylidene chloride]	44	22	2,760,804.1	137.6	102,917
53	PAH	129-00-0	Pyrene	44	-	201,152.2	11.4	not on TRI
54	org nitrogen	79-46-9	2-Nitropropane	44	7	80,142.6	30.3	42,520
55	PAH	218-01-9	Chrysene	40	2	200,347.4	44.4	not on TRI
56	other phthalate	84-74-2	Di-n-butyl phthalate	39	126	523,195.0	13.7	357,173
57	chlorinated aliphatic	75-01-4	Vinyl chloride [Chloroethylene][Ethylene chloride]	38	48	5,272,605.0	429.4	1,002,019
58	inorganic	7440-28-0	Thallium [I]	35	1	2,246,351.7	575.5	1,010
59	PAH	50-32-8	Benzo[a]pyrene	35	-	567,275.1	20.5	not on TRI
60	chlorinated aliphatic	87-68-3	Hexachloro-1,3-butadiene [Hexachlorobutadiene]	37	7	2,004,404.0	1,420.0	1,952
61	chlorinated benzene	106-46-7	1,4-Dichlorobenzene [p-Dichlorobenzene]	34	28	2,356,235.4	107.7	201,023
62	PAH	120-12-7	Anthracene	34	30	207,021.0	11.1	85,808
63	PAH	56-55-3	Benz[a]anthracene	32	-	576,181.9	7.9	not on TRI
64	chlorinated benzene	118-74-1	Hexachlorobenzene	32	5	3,206,016.0	622.7	958
65	chlorinated aliphatic	67-72-1	Hexachloroethane	32	19	2,303,800.7	671.6	35,750
66	org nitrogen	121-14-2	2,4-Dinitrotoluene	31	7	2,550,805.3	61.6	2,250
67	PAH	86-73-7	Fluorene	31	-	127,000.0	21.0	not on TRI
68	other	98-86-2	Acetophenone	31	35	127,507.3	12,507.2	695,022
69	other phthalate	117-84-0	Di-n-octyl phthalate	30	-	1,207,110.0	44.4	not on TRI
70	PAH	83-32-9	Acenaphthene	28	-	540,127.8	7.4	not on TRI
71	org nitrogen	107-13-1	Acrylonitrile [2-Propenenitrile]	27	114	11,400,444.5	1,404.7	6,372,821
72	Aromatic Hydrocarbon	100-42-5	Styrene [Vinyl benzene][Phenylethylene]	25	1,459	2,555,755.0	1,581.1	40,155,848
73	other phthalate	131-11-3	Dimethyl phthalate	25	75	36,750.8	7.5	202,729
74	chlorinated pesticide	72-20-8	Endrin	27	-	128,151.9	1.9	not on TRI
75	other	105-67-9	2,4-Dimethylphenol	24	21	350,265.5	36.7	122,722
76	other phthalate	84-66-2	Diethyl phthalate	22	30	52,570.0	7.4	167,070
77	other phthalate	85-44-9	Phthalic anhydride	21	170	46,887.1	24.0	402,921
78	other phthalate	85-68-7	Butyl benzyl phthalate	21	-	41,904.0	11.7	not on TRI
79	other	79-10-7	Acrylic acid	19	155	8,779,505.2	11,944.6	6,915,156
80	chlorinated phenol	87-86-5	Pentachlorophenol [PCP]	19	35	1,472,494.0	39.4	22,321
81		110-82-7	Cyclohexane	18	374	3,557,740.2	471.5	8,027,373
82	chlorinated pesticide	58-89-9	gamma-Hexachlorocyclohexane [gamma-BHC] [Lindane]	18	5	1,452,214.3	8.1	529
83	org nitrogen	79-06-1	Acrylamide	17	70	7,171,101.1	2,407.7	5,217,675
84	chlorinated benzene	95-94-3	1,2,4,5-Tetrachlorobenzene	15	-	63,085.7	100.0	not on TRI
85	other	80-62-6	Methyl methacrylate	15	202	5,705,072.9	205.9	2,585,557
86	other	50-00-0	Formaldehyde	15	751	4,572,755.4	5,806.0	10,755,829
87	other	78-59-1	Isophorone	15	2	90,330.4	100.0	not on TRI
88	chlorinated pesticide	8001-35-2	Toxaphene [Chlorinated camphene]	14	2	387,505.0	0.9	0
89	chlorinated phenol	94-75-7	2,4-Dichlorophenoxyacetic acid [2,4-D]	14	20	202,307.7	12.6	15,222
90	chlorinated pesticide	57-74-9	Chlordane [Chlordane alpha & gamma isomers]	14	1	85,562.9	0.7	1,313
91	chlorinated aliphatic	74-87-3	Methyl chloride [Chloromethane]	13	170	4,783,615.1	127.8	5,174,927
92	chlorinated aliphatic	79-34-5	1,1,2,2-Tetrachloroethane	13	10	1,270,012.7	4,700.7	14,057
93	inorganic	7440-48-4	Cobalt	12	236	3,102,147.5	4.3	62,024
94	org nitrogen	62-53-3	Aniline	12	37	3,352,052.0	4,000.2	1,975,326
95		7421-93-4	Endrin aldehyde	12	-	198,785.0	7.9	not on TRI
96	other	64-18-6	Formic Acid	11	210	7,701,505.0	694.5	11,267,672
97	chlorinated aliphatic	78-87-5	1,2-Dichloropropane [Propylene dichloride][same as 26638-19-7]	11	13	4,162,875.5	3,006.8	715,353
98	chlorinated aliphatic	75-34-3	1,1-Dichloroethane [Ethylidene dichloride]	11	5	2,780,767.6	706.0	22,422
99	other	108-05-4	Vinyl acetate	11	[illegible]	[illegible]	[illegible]	[illegible]

SECTION IV: FRAMEWORK FOR ANALYZING THE ECONOMIC IMPACTS OF TWO PROSPECTIVE HWIR EXEMPTIONS IDENTIFIED IN THE 1999 HWIR

The remainder of this report presents a methodology for analyzing the potential impacts of the two prospective regulatory components of the 1999 HWIR Federal Register notice:

- HWIR "***exemption levels***" (i.e. an implementation framework in the Federal Register notice).
- HWIR "***minimize threat***" (i.e. potential future replacement of LDRs with HWIR exemption levels).

This section describes USEPA's methodology (i.e. analytical modeling approach) under development for estimating eligible industrial waste quantities and potential annual waste management cost savings under these two HWIR prospective regulatory features.

IV.A. HWIR ECONOMIC MODEL

This analytical approach involves development of an "HWIR Economic Model" as a computer-based tool for estimating potential economic impacts of a concentraction-based exemption.[27] The HWIR Economic Model has several primary components:

- First, it identifies the type and quantity of waste that may be eligible for exemption under HWIR, for different "exemption level" options (i.e. the "generic" and "landfill only" exemption options). It accomplishes this task by comparing the constituent concentrations in a large sample of hazardous waste to the exemption levels developed under HWIR.

- Second, the model aggregates the results for all of the analyzed wastestreams, providing an estimate of the quantity and type of waste that may be eligible for exemption under HWIR. The number and volume of wastestreams potentially eligible for HWIR exemption is dependent upon the number of constituents assigned HWIR "exemption levels".

- Finally, the model uses the eligible wastes estimates, in conjunction with information on HWIR implementation costs, to determine potential overall cost savings of the exemption level framework. Other outputs from the model include data on prevalent constituents in HWIR-eligible wastes, industry sector-specific information, and wastestream-specific characteristic and cost savings information.

IV.B. DESCRIPTION OF THE 1999 HWIR "EXEMPTION LEVELS" FRAMEWORK

The 1999 HWIR notice describes a risk analysis, computer modeling approach to establishing risk-based "exemption levels" for constituents expected to be present in hazardous industrial process waste. Because of the complexity of the risk assessment modeling, the 1999 HWIR notice, which is under a court-ordered, consent decree deadline of 31 October 1999, does not contain any exemption levels. USEPA may conduct risk analyses and establish exemption levels for hazardous industrial waste constituents at a later date.

[27] The underlying industrial hazardous waste "hybrid" database (as described in the previous Section of this document), and user inerface input and output computer screens for the HWIR Economic Model are available for public review from the USEPA's RCRA Docket. Because of the relatively large size of its databases, the model is programmed for installation and running on a server computer. Follow the instructions on how to obtain public access to the supporting materials, as contained in the introduction to the 1999 HWIR Federal Register notice.

USEPA designed the 1999 HWIR notice to address extensive comments provided by the public and USEPA's Science Advisory Board on the 1995 proposed HWIR. As a result of these comments, the 1999 HWIR notice describes a revised risk assessment methodology to establish constituent "exemption levels", which includes a regulatory option that is designed to exempt wastes contingent upon management of the wastes in Subtitle D landfills (i.e. a "landfill only" exemption option). The 1999 HWIR notice also includes revised implementation requirements designed to reduce the burden to industry, associated with pursuing HWIR exemptions for low-risk wastes, while assuring human health and environmental protectiveness.

1999 HWIR "Exemption Level" Regulatory Options

The prospective economic analysis of HWIR "exemption levels" may address two HWIR regulatory options. These two options vary in terms of risk-based exemption levels and presumed disposal destinations:

- "Generic" Exemption Option: Under the generic exemption option, a listed hazardous waste would become exempt from Subtitle C regulation once the risk-based levels for all constituents of concern have been satisfied and the generator receives confirmation that the notification package has been received by the overseeing authority (i.e. State or USEPA Region). Importantly, a waste cannot gain exemption unless HWIR levels have been established for all constituents reasonably expected to be present in the waste. The generic exemption option is based on the premise that HWIR exemption levels generated from the risk model are protective of all reasonable waste disposal scenarios. Therefore, there are no restrictions on where a generator could dispose of HWIR exempt waste under this option (except for any restriction under existing non-hazardous waste requirements in Subtitle D of RCRA).

- "Landfill Only" Exemption Option: USEPA believes that landfills represent a lower-risk disposal destination for HWIR exempt wastes in comparison to other Subtitle D waste management units. Therefore, USEPA has determined that restricting waste to landfills allows for the use of less conservative exemption levels while continuing to protect human health and the environment. Under the landfill only exemption option, USEPA has established constituent exemption levels that are designed specifically for waste disposed in non-hazardous landfill units. If a wastestream gains exemption by meeting these levels, the generator or manager of the waste must dispose of it in a landfill unit.[28] In addition, the generator or manager must meet other implementation requirements as described below.

"Exemption Level" Implementation Requirements

USEPA determined that the implementation requirements set forth in the 1995 proposed HWIR may prevent some generators and managers of low-risk wastes from seeking HWIR exemptions for their wastes. For many waste generators and managers, the cost of complying with the implementation requirements would outweigh the cost savings realized from the HWIR exemption. In particular, USEPA concluded that generators and managers of small- and medium-sized wastestreams are not likely to pursue exemptions when implementation costs are significant.

USEPA modified the implementation requirements for the 1999 HWIR notice, which is expected to reduce the cost of implementing an HWIR exemption. The requirements for the 1999 notice are summarized as follows:

- Notification to overseeing agency: As in the 1995 proposal, waste generators seeking HWIR exemptions must submit a notification package to the USEPA or authorized state agency. Exemptions will become effective upon written confirmation that this package has been received by the overseeing Agency. To ease the administrative burden on generators, USEPA has streamlined the requirements for the notification package in the 1999 HWIR notice.

- Public notification: The 1995 proposed HWIR required that generators notify the public of HWIR exemptions for their wastes by placing advertisements in local newspapers. To make the requirements

[28] This includes fulfilling waste tracking requirements to ensure that the waste is actually disposed at a landfill. Furthermore, "landfill only" HWIR conditionally-exempt wastes may not be stored temporarily on the land (e.g. in waste piles) prior to landfill disposal.

for HWIR-exempt wastes consistent with requirements for other non-hazardous wastes (e.g. de-characterized waste), USEPA has eliminated this requirement from the 1999 HWIR notice.

- Waste testing: Generators must test their wastes to ensure that hazardous constituent concentrations do not exceed the HWIR exemption levels. Rather than require testing for all HWIR constituents, as was necessary under the 1995 proposal, USEPA would require that a generator test only for chemicals reasonably expected to be present in the waste. Generators may also test or use process knowledge to determine that other constituents of concern are not present in the waste.

- Record retention: The 1999 HWIR would require that generators of HWIR-exempt waste maintain certain records on-site for as long as the exemption is effective, and for the three years that follow. These include copies of the notification package sent to the overseeing agency and the waste sampling and analysis plan, as well as all results of waste testing.

- Waste tracking: Wastes gaining exemption under the "generic" option would not have waste tracking requirements, because the generic levels are designed for appropriately managed disposal facilities for non-hazardous waste. However, generators of "landfill only" exempt waste would be required to track the arrival of the waste at a landfill and keep records of the shipments, because the landfill only exemption levels are based on disposal in landfill units only.

These requirements are designed to make the HWIR exemption self-implementing; that is, no prior governmental review or approval would be required before wastes are exempted from Subtitle C regulation. This would allow exemptions to take effect more quickly and reduce the administrative burden on both generators and overseeing agencies.

Analytical Framework for Assessing Economic Impacts of HWIR Eligibility

The 1999 HWIR "exemption level" framework consists of risk-based exemption criteria for RCRA "listed" and for RCRA "listed-and-characteristic" wastes. Under this framework, wastes that meet the HWIR exemption criteria would avoid RCRA Subtitle C "hazardous" waste regulation. This section briefly describes an approach for determining wastestream eligibility under this HWIR exemption framework.

The HWIR "exemption level" framework describes an approach to developing risk-based hazardous waste management exemption levels associated with the physical form of wastestreams (i.e. for constituents in liquid, semi-solid, and solid wastes). To estimate the average annual quantities of industrial wastes that may be eligible to become exempt from the RCRA Subtitle C regulatory system, the HWIR Economic Model is designed to compare "exemption levels" to constituent concentrations in the wastestreams contained in its underlying database. The HWIR Economic Model determines which listed hazardous wastestreams may be eligible for HWIR exemption as-reported and after treatment. Specifically, for each constituent in a wastestream, the Model determines whether the constituent's concentration is less than or equal to the exemption level established for that constituent (i.e. constituents in liquid wastestreams are compared to the exemption levels established for liquid hazardous wastes). If all of the reported constituents in a wastestream meet the exemption levels, the model identifies that wastestream as eligible to become exempt from requiremets under RCRA Subtitle C. This determination follows the decision rules illustrated in Exhibit IV-2.

The model tests wastestreams for HWIR eligibility at both the "as-generated" and "post-treatment" stages. To determine eligibility as-generated, the model uses the "as generated" constituent concentrations reported in the NHWCS and Generator Surveys. If the wastestream is not eligible as-generated, the model then determines whether the waste may be eligible after treatment. The model uses USEPA's Land Disposal Restriction Standards (LDRs) as a proxy for the concentrations achievable through treatment of each waste because these standards are based on the performance of the best demonstrated and available technology (BDAT) for each waste type. If the land disposal standards are below the HWIR exemption levels, then the waste is assumed to be eligible for exemption after treatment.[29]

Because the HWIR exemption levels are based on three classes of *physical form*, the HWIR Economic Model accordingly categorizes each wastestream in its underlying database as a "liquid", "semi-solid", or "solid". The 1999 HWIR notice defines physical

[29] In some cases, waste treatment technologies may be very effective and reduce constituent concentrations for many or all constituents in a single wastestream, below the levels specified in the RCRA LDRs (see 40 CFR 268.40 Subpart D). As described at the end of this Section, the HWIR Economic Model also provides a feature for conducting a sensitivity analysis to assess this potential effect.

form according to the percentage of ***total suspended solids*** (TSS) in a wastestream:

Exhibit IV-1: HWIR Industrial Process Waste Physical Forms		
Liquid waste	Semi-solid waste	Solid waste
< 1% TSS	1% TSS to < /=30% TSS	> 30% TSS

TSS= total suspended solids: refers to the nonfilterable residue that is retained on a glassfiber disk after filtration of a sample of waste. After oven-drying the residue at 103-105 degrees centigrade (i.e. 217-221 degrees Fahrenheit), the "TSS" is measured as the dried weight of the residue, divided by the volume of initial waste sample, usually expressed as a TSS concentration in "milligrams per liter". In contrast, "total dissolved solids" (TDS) are the solids in the waste sample which pass through the glassfiber filter; TSS+TDS equals "total solids" (source: Viessman, Warren Jr. & Mark J. Hammer, Water Supply and Pollution Control, 4th edition, Harper Collins Publishers, 1985, p.243).

To categorize the model database wastestreams according to physical form, the model first attempts to apply the percent TSS data reported in the surveys for each wastestream. However, there is limited TSS data in the two survey datasets, so for wastestreams without TSS data, the model interprets the BRS Form Codes reported in the survey, to assign physical form. Where these data are also missing, the model assigns form based on combining the BRS Wastecodes, followed by the wastewater/non-wastewater assignment, and the "waste description" (a brief textual description of the wastestream provided by the waste generator/manager). For residual and post-treatment wastestreams, the model assigns physical form based on the type of treatment the wastestream has undergone. For example, the model assumes that the physical form of the post-treatment residual of a wastestream that has been incinerated is a "solid".

Constituents Reasonably Expected to be Present in Wastes (CREW)

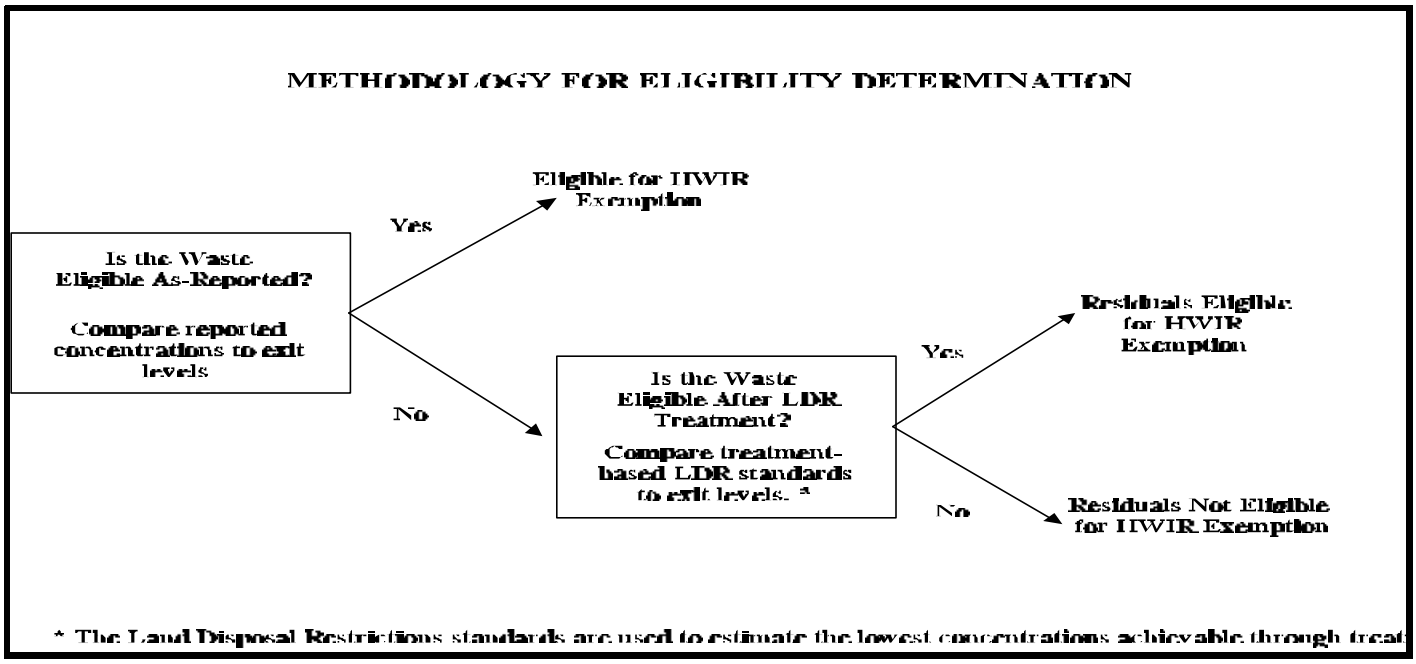
As part of the regulatory development process, USEPA is considering whether exemptions should be limited to only those wastes for which exemption levels have been developed for all constituents "reasonably expected to be present in the wastes (CREW)." Under this CREW approach, a generator with a waste that lacks an exemption level for a constituent that USEPA believes is reasonably expected to be present would not qualify for an exemption, even if the generator does not believe the constituent is present in the waste. The model will be capable of evaluating the impact of the CREW approach separately and report the impacts of this particular regulatory approach for implementing HWIR.

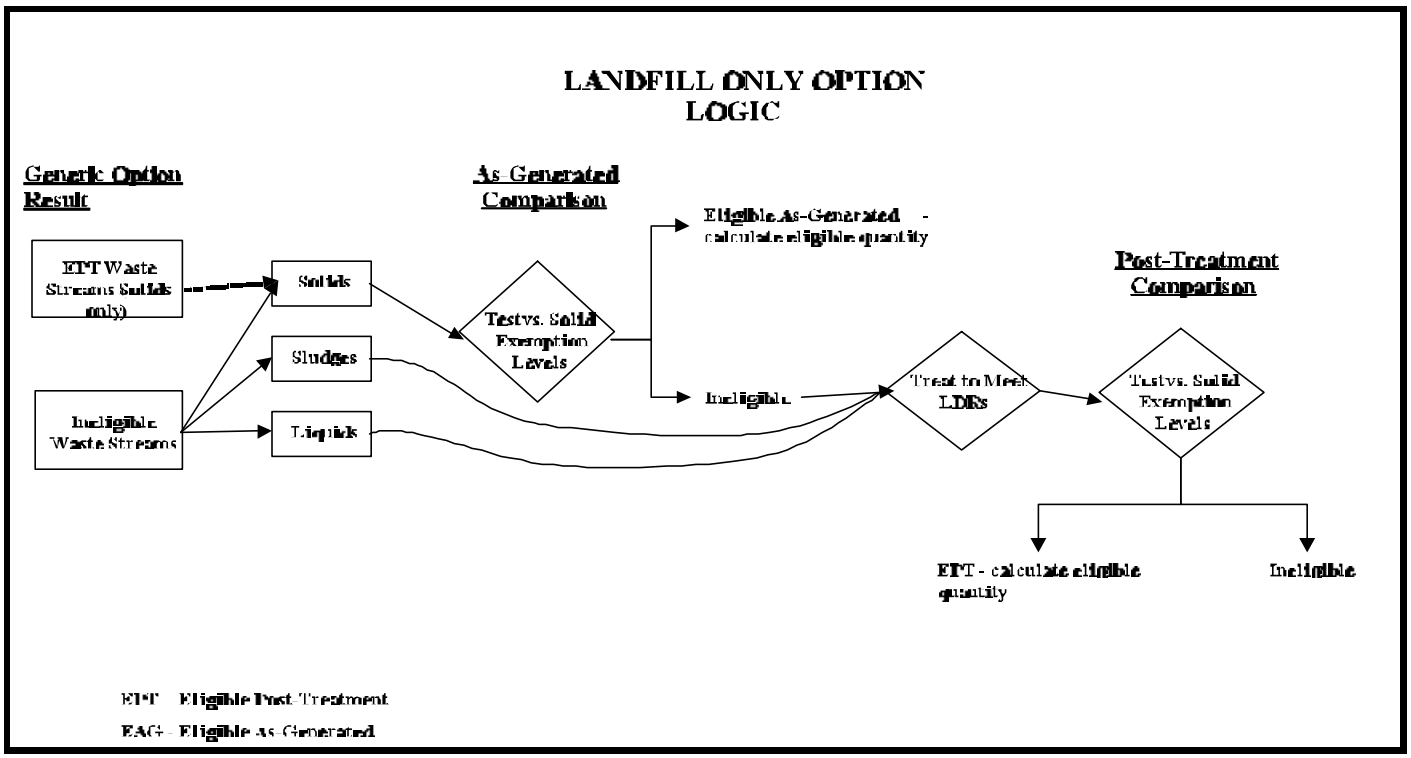
"Generic" Exemption Versus "Landfill Only" Exemption HWIR Options

The test for HWIR eligibility under the Landfill Only option differs somewhat from that for the Generic option. Whereas under the Generic option USEPA has established exemption levels for all three types of waste (i.e. liquids, semi-solids, and solids), under the Landfill Only option exemption levels have been developed only for solids. The Agency has not set levels for liquids and semi-solids because these wastes are not generally disposed of in landfills. Therefore, the model assumes that "as-generated" liquids and semi-solids are not eligible for HWIR exemption *as-generated.* Some of these wastes, however, may be eligible for exemption under the Landfill Only option following treatment, because certain treatments will transform the waste into a solid residual. For example, USEPA has determined that a liquid or semi-solid waste that has undergone incineration will likely become a solid and can therefore be compared to the solid exemption levels to determine eligibility. The model's logic for assessing eligibility under the Landfill Only option is illustrated in Exhibit IV-3.[30]

[30] For each HWIR "exemption level" option, different sets of risk-based exemption levels may be established according to alternative risk scenarios and waste physical forms.

EXHIBITS IV-2 AND IV-3





Estimates of Eligible Waste Quantity After Treatment

Determining the quantity of waste eligible for HWIR exemptions requires calculating the effect of treatment, if any, on waste quantity. Because some wastes must be treated before they are eligible for HWIR exemptions, the quantity of eligible waste is not necessarily the same as the quantity of waste reported in the HWIR Economic Model database. In addition, some wastes are hazardous because they are both listed and characteristically hazardous. These wastes must be treated to remove the characteristic before they become eligible for HWIR exemptions.

Treatment may either decrease or increase waste quantity; for example, non-wastewater residuals from incineration of semi-solids are assumed to be approximately 25 percent of the influent quantity (10 percent for liquids), while stabilization increases quantity by about 50 percent. In general, the assumed treatments are those identified as BDAT under the Land Disposal Restrictions. Exhibit IV-4 reflects the residual factors for estimating quantities of post-treatment wastes (i.e. treatment residual wastes).

Exhibit IV-4
RESIDUAL FACTORS FOR TREATED WASTES

Treatment or Disposal Method		Residual Factor
1	Deactivation	0.01
2	Incineration of Organic Liquids	0.10
3	Incineration of Other Wastes	0.25
4	Neutralization	1.01
5	HTMR	0.00
6	Mercury Retort	1.00
7	Stabilization	1.50
8	Vitrification	1.50
9	Underground Injection	0.00
10	Acid Regeneration/Recycling	0.00

Source: Residual factor values above compiled by Industrial Economics Inc., from (a) waste treatment technology literature review, (b) prior USEPA waste treatment studies, and (c) contacts with industries using waste treatment technologies.

Specifically eligible quantities are calculated as follows.

- If the waste is eligible for exemption as-reported and is only a listed waste, then the eligible quantity is equal to the reported quantity.
- If the waste is eligible for exemption as-reported and is both a listed and characteristic waste, then the eligible quantity is calculated by determining the quantity of residuals that will result from treatment to remove the characteristic.
- If the waste is eligible for exemption after treatment and is only a listed waste, then the eligible quantity is calculated by determining the quantity of residuals that will result from treatment to meet the land disposal standards.
- If the waste is eligible for exemption after treatment and is both a listed and characteristic waste, then

the eligible quantity is calculated by determining the quantity of residuals that will result after the treatments needed to both remove the characteristic and meet the land disposal standards.

IV.C. HWIR INDUSTRY CASE STUDIES

To supplement the analysis conducted using the HWIR Economic Model, USEPA undertook in-depth industry case studies in 1997-98, of industrial hazardous waste generating facilities. The findings of the case studies are presented in the USEPA Office of Solid Waste report "Hazardous Waste Identification Rule (HWIR): Industry Case Studies", (prepared by Industrial Economics, Inc.), January 1999. This case studies report is available for public review from the RCRA Docket, according to the instructions in the 1999 HWIR Federal Register notice. USEPA had three objectives in conducting these case studies:

- The case studies would provide insights about the validity of the analytical results of the HWIR Economic Model.

- The case studies could provide insights about qualitative impacts of the HWIR exemption framework, on individual hazardous waste generators, and on individual industry sectors.

- The case studies anticipated finding out about aspects of the HWIR framework that may inhibit the ability of specific industries and firms to take advantage of the deregulatory incentives of HWIR.

Scope of Industry Case Studies

To conduct these case studies, USEPA focused on facilities in industries identified as most likely to be affected by HWIR, as based on the 1995 HWIR economic analysis. The studies assessed the knowledge, attitudes, and perceptions of key facility and waste management staff at these facilities. These industries included: the chemicals and allied products industry (SIC 28), the petroleum refining industry (SIC 29), the primary and fabricated metal products industry (SICs 33 and 34), and the electronics and electrical equipment industry (SIC 36).[31]

Key Discussion Issues For Case Studies

The following were key themes and issues that were the focus of discussions with facility staff.

- **Potential Benefits of HWIR**: The 1995 economic assessment of HWIR assumed that waste management cost savings and regulatory relief are the major benefits of HWIR. The case study interviews attempted to discern how many, if any, of the firm's and facility's wastestreams may be eligible for exemption under HWIR. In addition, the interviews evaluated whether facilities that anticipate cost savings will avoid treatment or Subtitle C disposal of their wastes, and whether other costs would be avoided in addition to treatment and disposal. These studies also assessed factors that influence the magnitude of benefits, and what indirect or non-quantifiable benefits, if any, may result from HWIR exemptions.

- **HWIR Implementation Requirements**: Barriers to implementing HWIR exemptions include minimal or non-existent economic benefits, potential generator liability, and negative public perceptions about facility waste management practices. The interviews discussed factors that firms and industries consider when deciding to implement HWIR exemptions, various approaches for reducing costs to allow more facilities to benefit from the rule, and whether the requirements assure an appropriate level of protectiveness. More specifically, it also solicited ideas and attitudes about the sampling and testing provisions of these requirements, which account for a majority of the costs of implementation.

- **Incentives for Waste Minimization**: HWIR may provide opportunities for generators and managers of

[31] Under the requirements of the 1995 HWIR proposal, three of these five industry sectors accounted for over 50 percent of the total quantity of waste eligible for exemption and cost savings under HWIR.

listed hazardous waste to gain exemptions by reducing constituent concentrations in wastestreams. The interviews discussed the extent to which generators have opportunities for reducing waste toxicities through process changes, by increasing recycling, or via other approaches identified by the case study facilities. They also assessed not only whether these generators would be able to reduce toxicities, but also the methods and criteria they would use to decide whether to pursue incremental waste minimization projects as a direct result of HWIR.

- Accuracy of HWIR Economic Model and Assumptions: Based on information provided by generators about their typical waste generation patterns, potential cost savings, and quantities eligible for exemption under HWIR, the interviews assessed whether the 1995 HWIR Economic Process Model would be likely to predict accurately the economic impacts of HWIR on their facility. In cases where results of the model seemed to differ significantly from generator's expectations, the interviews sought insights about ways to adjust the basic modeling assumptions to increase the accuracy of results.

- Other Issues: Attitudes about other aspects of the 1995 HWIR proposal or related issues vary significantly across industries, firms, and individuals. Staff at some firms have strong opinions about specific aspects of the rule or related issues. These attitudes may reflect a sense that their facility or industry may not benefit enough from HWIR. Some of these issues include: the risk-based exit levels ("exemption levels" in HWIR 1999), used to determine exemptions, the delisting program, the mixture and derived-from rule, and the influence of other Federal environmental regulations, including the combustion MACT standards.

IV.D. KEY UNCERTAINTIES

There are several key uncertainties and limitations associated with estimating HWIR-eligible wastes under the 1999 HWIR "exemption level" framework:

- Waste Data: Although it is the most complete source of data for smaller wastestreams, the Generator Survey data underlying the HWIR Economic model dates from 1986. As a result, the types of constituents and concentrations reported in these data may be different from current hazardous wastes, which may affect HWIR eligible quantity and cost saving estimates produced by the model.

- Physical Form Assignments: The HWIR "exemption level" framework discusses risk-based exemption levels for three physical form categories for industrial hazardous wastes -- liquids, semi-solids, and solids -- prompting generators who seek the HWIR exemption to assign physical forms to wastestreams based on percent content of total suspended solids (TSS). As described earlier, for analysis of wastestream eligibility, the model uses TSS data to assign physical forms to the wastestreams in the NHWCS and Generator Survey data. However, TSS data is lacking for a significant portion of the wastestreams in the economic model. Where streams do not contain TSS data, the model applies alternative data points such as BRS form code and waste description to assign physical form. Therefore, some physical form assignments may be incorrect, which would alter the exemption levels the model uses to test eligibility, and in turn, affect the model's estimates of eligible waste quantities and cost savings.

- Scaling Factors. Because the underlying data in the HWIR model is from 1996 or earlier, the scaling factors are based on national waste totals for 1993. Therefore, the present actual eligible waste totals may vary from the totals presented in this document.

- Treatment Efficiency: When wastes are not eligible for HWIR "as-generated" at their source (i.e. before wastes are treated), the model will evaluate these wastes for eligibility in the post-treatment phase, by assuming that treatment has lowered their constituent concentrations to LDR levels. However, certain types of treatment may be more efficient (i.e. achieve concentration levels well below the required LDR levels), resulting in post-treatment constituent concentrations that are below the LDR levels. Under this scenario, constituent concentrations in additional wastes may be low enough to meet the HWIR exemption levels and in turn be eligible to become exempt from RCRA Subtitle C.

IV.E. HWIR IMPLEMENTATION COSTS

To gain exemption from the Federal hazardous waste system under HWIR, generators must first satisfy implementation requirements for waste analysis, reporting, and recordkeeping. The implementation requirements in the 1999 HWIR notice differ somewhat from the 1995 HWIR proposal requirements. Major changes include:

- Simplified notification package;
- Removal of the requirement to document the absence of a chemical in a generator's waste;
- Removal of the required newspaper notice; and
- Addition of tracking for Landfill Only Option.

In the 1995 *Assessment,* USEPA estimated that the costs of satisfying HWIR implementation requirements would range from **$21,000 to $169,000 per wastestream** depending on the complexity and quantity of the waste. Using this range of costs, the 1995 Assessment estimated that these costs would prevent some generators from participating in the program, because the implementation costs exceed the benefits to be gained from exemption, particularly for generators of small- and medium-sized wastes.

The influence of implementation costs on the benefits of HWIR continues to be a concern to USEPA. A key aspect of this 1999 economic analysis is that it considers specific characteristics of individual wastes to arrive at more refined estimates of likely implementation costs for each affected wastestream. In comparison to the implementing cost range estimated in the 1995 economic analysis, this report estimates a relatively lower, average annual, per-facility implementation cost range of **$6,000 to $50,000 per wastestream**. This lower range reflects two primary differences compared to the 1995 assumptions: (a) formulation of a refined testing cost estimation algorithm, and (b) net reduction in some implementation requirements, compared to 1995. The HWIR Economic Model will enable estimation of which wastes are likely to accrue cost savings large enough to outweigh implementation costs, and thereby justify such investments in HWIR exemptions. Some industrial process waste generators and waste handlers currently sample and test RCRA-listed wastes for purpose of determining LDR compliance; in such cases, the *incremental cost* of implementing an HWIR exemption relative to this baseline practice, may be less than the full implementation cost estimated below in this document.

As described in the 1999 HWIR notice, waste generators and handlers seeking to exempt wastestreams under HWIR must comply with the following requirements.[32]

- Submit an information package notifying the overseeing agency about the exemption.
- Prepare a plan for waste sampling and analysis.
- Perform an initial sampling test (i.e. constituent analysis) of the waste.
- Perform subsequent waste testing to ensure continued compliance with exemption levels.
- Maintain on-site records characterizing the exemption.
- Notify the facility receiving HWIR-exempted waste (required for "landfill only" option).

Preparation of Notification Package and Waste Sampling/Testing Plan

Each generator must submit a notification/certification package to the authority that oversees the exemption (i.e. state or USEPA). This package consists of general information about the generating facility (e.g. name and RCRA ID of the facility), a description of the process generating the waste, specific wastestream information (e.g. wastecodes, annual wastestream quantity), a statement that the generator is claiming the exemption, and certification that information contained in the package is accurate. An HWIR exemption becomes effective when a generator receives notice that the package has been received by the overseeing agency (i.e. self-implementing).

In addition, each generator must develop a plan for analyzing waste prior to conducting any waste sampling or testing. Each waste analysis plan should identify, at minimum:

- The chemicals which will be analyzed and the rationale for the selection of those chemicals.
- Sampling strategy and methods used to obtain representative samples of the wastestream.
- The sample preparation and test methods used to analyze the constituent chemicals in the waste.
- Sufficient sampling procedures and waste locations to characterize the entire wastestream.

[32] In this discussion, "generator" or "generating facility" refers to hazardous waste generators and managers of waste (i.e. treatment, storage, and disposal facilities) that may be seeking exemptions from Subtitle C waste management requirements under HWIR.

Sampling and Analysis of Exempt Waste

To certify a wastestream exemption under either HWIR regulatory option, generators must first perform an analysis of their waste for a "base set" of HWIR constituents. USEPA defines the base set as those reasonably expected to be in the waste:

- Constituents identified as the basis for any listing associated with the targeted wastestream(s);[33]
- Constituents listed in the Land Disposal Restrictions' Treatment Standards for hazardous waste;[34]
- Constituents detected in previous analyses of the same wastestream;
- Constituents introduced into the process that generates the waste;
- Constituents known to be by-products of the process that generates the waste.

Using this base set approach, many generators will be required to test for fewer constituents than are included on the more expansive list of HWIR exemption levels (i.e. those chemicals identified in the preamble to the HWIR 1999 Federal Register notice). Additionally, under the 1999 HWIR notice, generators may rely upon process knowledge to determine that constituents other than those included on the base list are not present in waste.

After determining the base set of constituents, generators must demonstrate that these chemicals meet HWIR exemption levels. To do so, a generator may use any reliable analytical method to demonstrate that constituents are present at concentrations below the exemption levels, so long as the testing method used is capable of detecting the presence of a constituent below the exemption level. Exhibit IV-5 outlines requirements for waste analysis and other implementation requirements. In addition, the exhibit shows the analytical approach and key assumptions used to evaluate each of these components.

It is important to note that USEPA requires generators to test that HWIR constituents in their base set meet exemption levels at all times. USEPA leaves it to the discretion of the generator to determine whether variability within a given wastestream will increase the likelihood that constituents in a given sample would test above HWIR exemption levels. Given that there is significant variability across generators and facilities in terms of the types and quantities of wastes generated, it is somewhat uncertain how much and what types of waste sampling, QA/QC, and analysis generators will conduct to have confidence of continued compliance with HWIR exemption levels.[35] USEPA would require generators to take and evaluate a minimum of four waste samples to characterize their wastestreams. It is up to each generator to determine if more samples are appropriate to gain confidence in their characterization. For the purpose of this economic analysis, USEPA assumes that generators will take four samples per year for simple and/or homogenous wastestreams, 11 samples per year for wastes of medium complexity and/or heterogeneity, and 23 samples per year for highly complex and/or variable wastestreams.

Exhibit IV-5
SUMMARY OF HWIR IMPLEMENTATION REQUIREMENTS AND ANALYTICAL APPROACH

HWIR Implementation Component	Requirements Under HWIR "Exemption Level" Options	Analytical Approach and Key Assumptions
Waste Sampling and Analysis Plan and Notification	• Develop a waste sampling and analysis plan prior to conducting waste analysis. • Submit notification package to overseeing agency after the initial analysis is complete. • For "landfill only" wastes, track the arrival of exempt waste at the designated landfill.	Estimate cost based on effort needed to: • Develop a plan for sampling and analysis and QA/QC, and • Prepare a notification package.

[33] Appendix VII in 40 CFR 261 contains a list of constituents identified as the basis for "F" and "K" listed wastecodes; constituents identified as the basis for "P" and "U" wastecodes are found in 40 CFR 261.33.

[34] These constituents are found in "Treatment Standards for Hazardous Wastes" in the Land Disposal Restrictions (40 CFR 268.40).

[35] For more information about generators' perceptions of the risk of incurring future CERCLA liabilities on waste that become exempt from RCRA Subtitle C requirements under HWIR, see: *Hazardous Waste Identification Rule: Industry Case Studies*, prepared by Industrial Economics, Incorporated, for the USEPA Office of Solid Waste, January 1999.

Waste Analysis	• Conduct sampling and testing for base set of constituents plus those expected to be present based on the generator's process knowledge. For any given waste sample, demonstrate that maximum concentration of all constituents of concern meet exemption levels. • Frequency of testing in a given year depends on physical form and waste quantity.	• Estimate costs associated with waste analysis based on the assumption that the number of samples, type of waste analysis, and QA/QC costs correlate with the complexity of waste. This analysis assumes waste complexity is represented by the number of constituents in a wastestream. • Number of testing events required each year of an exemption depends on eligible waste quantity.
Recordkeeping	Maintain records on-site characterizing the waste sample and analysis plan, analytical results, and a copy of the notification package.	Estimate the costs of recordkeeping in the first year and in subsequent years. This analysis assumes the majority of administrative costs are incurred in the first year, and that minor recordkeeping costs are incurred in subsequent years.

Waste Sampling Frequency

To maintain an HWIR exemption, the generator must continue to sample and test the waste periodically for the duration of an HWIR exemption, to confirm that a wastestream remains eligible.[36] The generator can use *process knowledge* to judge that a constituent is not present in the waste. During each year of an HWIR exemption, the frequency and number of waste sampling and testing events required, depends on annual wastestream quantity, as presented according to the "volume bin" categories displayed in Exhibit IV-6.

Exhibit IV-6
1999 HWIR Exemption Framework: Industrial Process Hazardous Waste Sampling Frequencies

Liquid Industrial Process Wastes		Solid and Semi-Solid Industrial Process Wastes	
Annual Waste Quantity	Sampling Frequency	Annual Waste Quantity	Sampling Frequency
0 to 35,000 tons/year	1 per year	0 to 2,000 tons/year	1 per year
35,000 to 500,000 tons/yr	2 per year	2,000 to 10,000 tons/yr	2 per year
Over 500,000 tons/yr	4 per year	Over 10,000 tons/yr	4 per year

The only exception to the above schedule is that in the event of significant process change(s), USEPA requires that wastes be sampled and tested immediately after such change(s).

Recordkeeping and Public Notification

The 1999 HWIR notice requires generators to maintain a copy of the notification package on-site for the duration of an HWIR exemption and for three years afterwards. In addition, the generator must maintain records of waste sampling test results for three years after each waste sampling/testing event.

[36] Periodic testing applies only to continuous process waste; one-time, batch wastes would not be subject to periodic testing requirements.

Estimates of Implementation Costs

This analysis defines the total costs of implementing HWIR exemptions is the sum of implementation "***fixed cost***" and "***variable cost***" components associated with the 1999 HWIR notice. In this analysis, fixed costs represent the costs of performing mainly administrative tasks (e.g. notification and recordkeeping).

For purpose of formulating a simple modeling approach, the model defines fixed costs as the same for each wastestream. Variable costs consist of annually recurring, waste sampling and analysis costs that vary according to the quantity and physical characteristics of individual wastestreams. Furthermore, the HWIR Economic Model defines wastestream exemptions as lasting for an average ten year period-of-analysis, applied for purpose of computing an average annual implementation cost in this analysis (the Model applies a seven percent discount rate per OMB January 1996 "best practices" Federal regulatory economic analysis guidance). The Model computes a both ***discounted present value*** of variable plus fixed implementation costs, and an ***average annualized value*** of discounted implmentation costs over the ten-year "period-of-analysis". The proposed analytical approach for estimating fixed and variable implementation costs is described below.

Fixed Costs

To develop an estimate of implementation costs per wastestream, the HWIR Economic Model defines the following three cost components as *fixed* in nature:

- Costs of developing a waste sampling plan (including waste testing QA/QC provisions).
- Costs of preparing a state/USEPA notification package for HWIR exemption.
- Costs of HWIR exemption-related recordkeeping and paperwork (and of waste tracking under the conditional management "landfill only" HWIR exemption option).[37]

While in reality these costs may be somewhat variable,[38] these ***fixed costs*** will account for a relatively insignificant portion of overall implementation costs for the majority of wastes (i.e. relative to the ***variable costs*** of waste sampling and laboratory testing, as described below). Thus, in an effort to keep this approach relatively simple, these costs are defined in the HWIR Economic Model as fixed.

Exhibit IV-7 displays the estimated costs and professional labor time associated with each of these implementation fixed cost categories, as estimated by USEPA for both the 1995 HWIR proposal, and for the 1999 HWIR notice. As shown in the exhibit, total fixed costs for HWIR95 were estimated at **$25,000 per facility**, consisting largely (i.e. 72%) of developing, submitting and newspaper notification (not required for HWIR99) of an exemption package. In contrast, the preliminary estimated fixed costs under HWIR99 is significantly less at **$1,300 per facility**, which reflects lower burden hour assumptions for legal, managerial, technical and clerical labor for developing a waste sampling/analysis plan, and for developing and submitting (without newspaper notification) an HWIR exemption package. By definition, industry will incur most of these implementation "fixed costs" in the initial (i.e. first) year of an HWIR exemption, while nominal recordkeeping costs will be incurred in each year thereafter for the duration of an exemption (as estimated separately below in this Section, waste sampling and analysis "variable costs" will also be incurred annually).

[37] Additional tracking documentation is required under the "landfill only" HWIR exemption level option, to ensure that the affected waste is actually disposed of at a landfill, not in other waste management units (e.g. wastepiles, surface impoundments, water treatment units).

[38] For example, the costs of recordkeeping will increase incrementally with each additional wastestream exemption.

Exhibit IV-7
Summary of Estimated Industry "Fixed Costs" Burden (Per Facility) for HWIR Implementation [5]

HWIR Implementation Activity Required ("fixed cost" elements only)	1995 Proposed HWIR		1999 HWIR Notice	
	Professional Labor[2] (hours)	Estimated Fixed Costs 1995[3]	Professional Labor (hours)	Estimated Fixed Costs 1999[4]
1. Read the HWIR rulemaking	16	$937	1.3	$89
2. Develop HWIR sampling/analysis plan (excluding actual costs of sampling/testing)	110	$5,436	2.3	$118
3. Develop & submit HWIR exemption notification package to agency	258	$18,028	8	$1,097
4. Maintain HWIR records & paperwork on-site:				
4a. First year HWIR recordkeeping	24	$571	0.5	$27
4b. Annual recurring HWIR recordkeeping	6/year	$229/year	0.5/year	$27/year
5. Report periodic information changes	No estimate	No estimate	1.8/year	$96/year
6. Total "Fixed Costs" Implementation Burden:				
6a. First year fixed costs (items 1+...+4a)	408	$24,972	12.1	$1,331
6b. First year fixed costs annualized*		$3,556		$190
6c. Annual recurring fixed costs (4b+5)	6/year	$229/year	2.3/year	$123/year
Average annualized* fixed costs (6b+6c)		$3,785/year		$313/year

Explanatory Notes:
(1) Items shown above do not include the initial and annually-recurring "variable costs" associated with waste sampling and analysis; this second category of HWIR implementation costs is estimated separately in this document (see exhibits following this one in this Section).
(2) Professional time comprises 'fully loaded' time spent by legal, managerial, technical, and clerical staff. The majority of these hours are incurred in the initial year, and some hours for recordkeeping are incurred in subsequent years.
(3) 1995 HWIR cost estimates (in 1993$) based on requirements as defined in the 1995 HWIR proposal, and as estimated in the Information Collection Request (ICR) for the1995 HWIR proposal (OMB control nr. 2050, 13 Nov 1995). The 1995 ICR contained three alternative burden hour estimates (i.e. "Low cost", "medium cost", and "high cost"); when different between the three alternative estimates (e.g. item 3: develop & submit notification package), the "medium cost" 1995 burden hour estimates are displayed above.
(4) 1999 HWIR implementation "fixed cost" estimates are based on preliminary, rough burden hour estimates supplied September 1999 to USEPA-OSW by the ICR contractor ICF, Inc. 1998 US average labor wage rates applied = $102 ($306) legal, $73 ($168) managerial, $53 ($122) technical, & $27 ($62) clerical staff (rates in parentheses loaded by overhead factors of 3.0 for legal and 2.3 for non-legal).
(5) Items above also exclude costs associated with consequences for not meeting an HWIR exemption properly.
(6) * Annualization of first-year fixed costs accomplished by multiplying first-year costs (item 6a), by a capital recovery factor (annuity factor) of 0.1424, which is based on the OMB-prescribed (i.e. 11 Jan 1996 Guidance for EO-12866) discount rate (dr) of 7.00% and a 10-year annualization period applied in this document, using the CRF algorithm: [dr(1+dr)^years]/[(1+dr)^years)-1].

Variable Costs

In addition to the fixed costs of HWIR implementation, USEPA estimates the *variable* component of implementation costs, i.e. the costs of conducting periodic wastestream analyses for the duration of a wastestream exemption. In the 1995 HWIR analysis, the costs associated with waste sampling and analysis were estimated as the most significant component of overall implementation costs, and range in the 1995 HWIR ICR (OMB control number 2050) from:

- 1995 HWIR Initial testing: $34,000 to $52,000 for waste testing (i.e. partial or full waste constituent scanning) in the initial (i.e. first) exemption year.
- 1995 HWIR Annual testing: $9,000 to $52,000 for annual recurring waste testing.

These 1995 HWIR cost ranges reflect low- and high-bounding assumptions about the number of waste constituents and associated number of different sample testing methods required. Because variable costs associated with waste analysis wield strong influence over net cost savings attributed to HWIR, this approach considers waste-specific data to generate a better estimate of how sampling and testing costs vary for given wastestreams.

Total variable costs of waste analysis for each wastestream equal the costs of sample analysis plus the costs of any quality assurance/quality control (QA/QC) methods used to verify results of the sample analysis. These analytical costs are assumed to be driven, in large part, by the complexity and volume of a wastestream. In a more complex waste, USEPA assumes that the number of constituent classes which must be analyzed are likely to be greater and that QA/QC methods used to ensure analytical results are more rigorous. USEPA also assumes that larger waste quantities pose greater environmental risk than smaller quantities, and therefore requires generators to test larger wastestreams more frequently.

Since sample analysis costs and the costs of QA/QC methods are, in part, a function of the number of constituents in waste, this analytical approach uses the number of constituents in waste as a proxy for wastestream complexity. This assumption is a simplification, as the types and classes of constituents found in waste and the waste matrix are also a key cost driver of required analytical methods. For example, because of analytical difficulties in determining the presence of dioxins and furans, testing unit costs for waste containing this analyte group are higher than average (e.g. $600 to $900 per testing event). Exhibit IV-8 shows some common SW-864 routine analytical methods and their associated unit costs, which cover a range of RCRA hazardous constituents.

Exhibit IV-8
INDUSTRIAL WASTE TESTING UNIT COST DATA PER SAMPLE (1999$)

Item	USEPA Waste Testing Method*	Class of Chemical Constituents in Waste	Number of Constituents**	Low End	High End
1	8240/8260	Volatile Organics GC/MS (30-50)	126	$300	$400
2	8015	Certain Volatile Solvents	32	$300	$400
3	8270	Base/Neutral/Acid GC/MS (60-80)	244	$550	$800
4	8280	Dioxins	25	$800	$900
5	8290	Dioxins	17	$800	$900
6	6010/AA	Metals (As, Pb, Se--AA)	26	$150	$250
7	8141	Organo Pesticides AA	25	$250	$350
8	8151	Chlorinated Herbicides	19	$250	$350
9	8082	PCBs	26	$250	$350
		Average of low- & high-ends of unit cost range (rounded) =		$400	$520

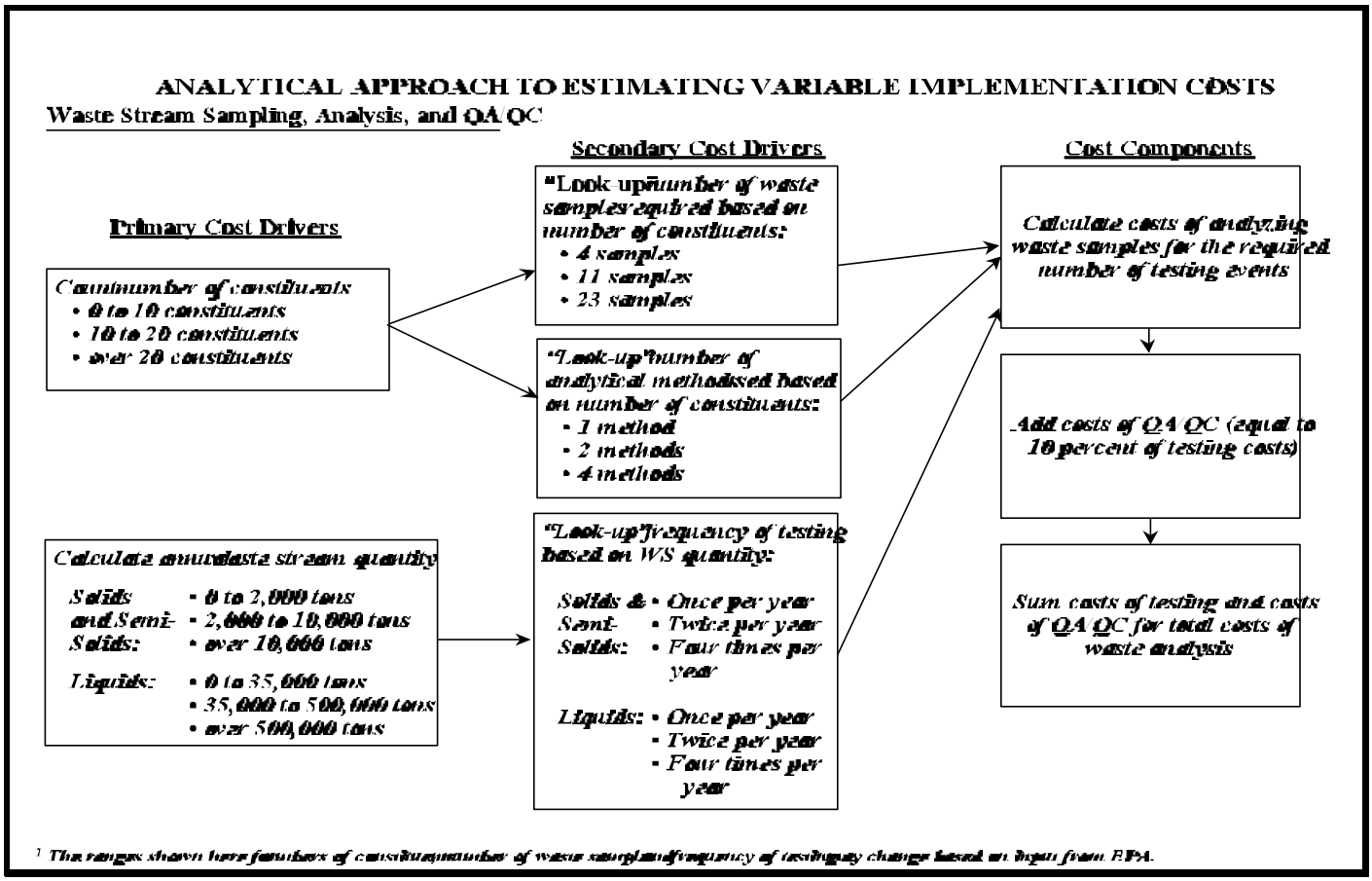
Explanatory Notes:
(1) * USEPA industrial waste sampling and laboratory analysis (i.e. testing) methods are defined at the Internet website: http://www.epa.gov/epaoswer/hazwaste/test/ , and in the USEPA "SW-846: Test Methods for Evaluating Solid Waste Physical/Chemical Methods" Version 2.0, (available on CD-ROM), Dec 1997.
(2) ** Maximum number of constituents tested as analytes in waste sample for the price (i.e. unit cost) ranges shown.
(3) The nine routine analytical methods and chemical classes listed in this exhibit do not necessarily represent all future HWIR constituents, and only one or a few of the analytical methods listed above may be needed for a give wastestream.
(4) Source: "Estimating HWIR99 Sampling Costs", memo prepared by Mike Gansecki, USEPA Region VIII, 17 May 1999. These ranges in unit costs are only approximate and should be checked with commercial laboratories or other sources. Laboratory waste testing prices may fluctuate: (a) by geographic regions, (b) by number of tests, and (c) from year-to-year.

This analytical approach also incorporates wastesteam annual volume. Exhibit IV-9 displays how the number of constituents in eligible wastestreams are used to "look up" the number of waste samples required, and to then calculate overall costs associated with sample analysis and QA/QC. Wastestream quantity is then used to "look up" the number of testing events required per year. In this approach, recent USEPA testing cost data is used, as well as data from the 1995 HWIR analysis.

As an example, an eligible solid wastestream of 58,000 tons containing thirteen constituents will require: testing four times each year, two different analytical methods and eleven waste samples per testing event. Annual variable costs are then calculated as follows:

Annual Testing Variable Costs per Wastestream = [(Unit cost of test method) x (2 test methods) x (11 waste samples) x (4 test events per year)] +[cost of testing QA/QC][39]

EXHIBIT IV-9



[39] For purpose of this study, USEPA estimates QA/QC costs for laboratory analysis of waste samples, are equal to ten percent of the costs of analyzing the waste (source: discussion with Barry Lesnik, Chemist, USEPA Office of Solid Waste, June 1999). QA/QC testing requirements largely consist of the costs associated with analyzing additional samples (e.g. field blanks and duplicates, trip blanks, matrix spikes and duplicates).

Based on the above-displayed 1999 unit costs (i.e. prices) for an assortment of different laboratory test methods and classes of chemical constituents, and on the HWIR99 cost estimation algorithm displayed above, waste generators and waste handlers seeking HWIR exemptions for eligible wastestreams, will incur costs for waste sampling and analysis estimated to range from $4,400 to over $50,000 annually per eligible wastestream, as displayed in Exhibit IV-10:

Exhibit IV-10
HWIR Eligibility Waste Testing Annualized Costs Per Wastestream

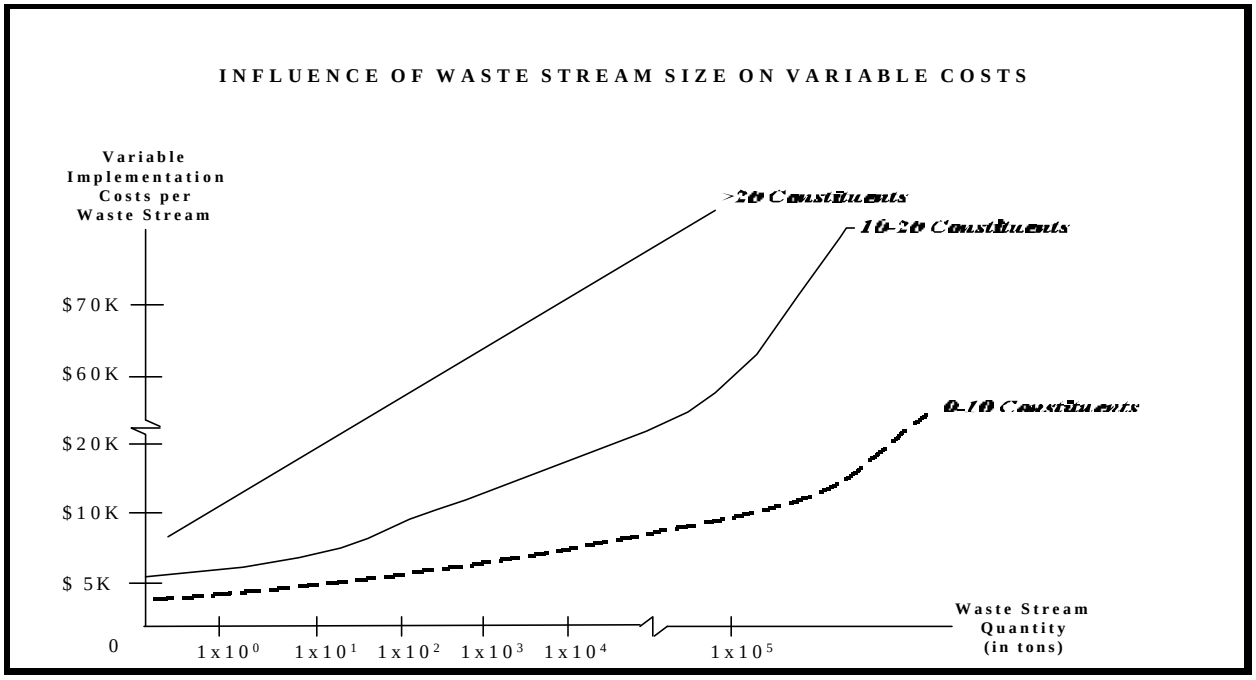
Range in number of waste constituents*	Wastestream quantity size class**	Median number of constituents	Annualized median testing cost per wastestream (1999$)
0 to 10	Small	1	$4,460
	Medium	2.5	$6,640
	Large	14	$11,010
10 to 20	Small	14	$14,280
	Medium	14	$32,300
	Large	14	$50,320

Explanatory Notes:
(1) * Number of constituents: The overall range (i.e. 0 to 20) shown above does not represent the entire range in possible number of constituents for all future HWIR-eligible wastestreams. As described in Section III of this document, based on the data contained in the HWIR Economic Model "hybrid database", the maximum possible number of HWIR constituents in industrial process waste, may range as high as 111 constituents in a single (complex) wastestream., although the majority (i.e. 90%) of industrial hazardous wastestreams contain 15 or fewer chemical constituents; the mean number is 5.3, and the median number is 3.0 constituents per hazardous wastestream. Consequently, the sampling costs estimated in this exhibit apply to over 90% of HWIR-relevant wastestreams. However, a small portion (i.e. < 10%) of wastestreams containing more than 20 constituents may have higher waste sampling and analysis annual costs than shown in this exhibit.
(2) ** Size class: Refer to Exhibit IV-5 of this document for definition of wastestream size classes, as applied in this HWIR background document. It is important to note that waste size classes, defined according to annual generation quantities, do not necessarily correspond to business size classes, as defined according to numbers of employees or dollar value of annual sales revenues.

This waste testing cost range represents a relatively significant variable cost, in relation to total HWIR implementation variable costs. It is expected that testing variable costs will be the primary driver of total implementation costs. This is particularly so for larger wastes and/or those that contain many constituents, since both these factors increase the number of test methods required and the frequency of testing events.

Note that these estimates of implementation costs represent costs for all eligible wastestreams, even wastes that are not likely to accrue cost savings sufficient to outweigh implementation costs. In the 1995 HWIR analysis, USEPA identified that variable costs associated with waste sampling and testing were the most significant component of total implementation costs. Thus, these costs were often a barrier to seeking exemptions, causing implementation costs to exceed cost savings. This barrier is particularly affects larger and/or more complex wastes. Exhibits IV-11, IV-12, and IV-13 illustrate the key cost drivers for waste testing variable costs.

EXHIBITS IV-11 AND IV-12



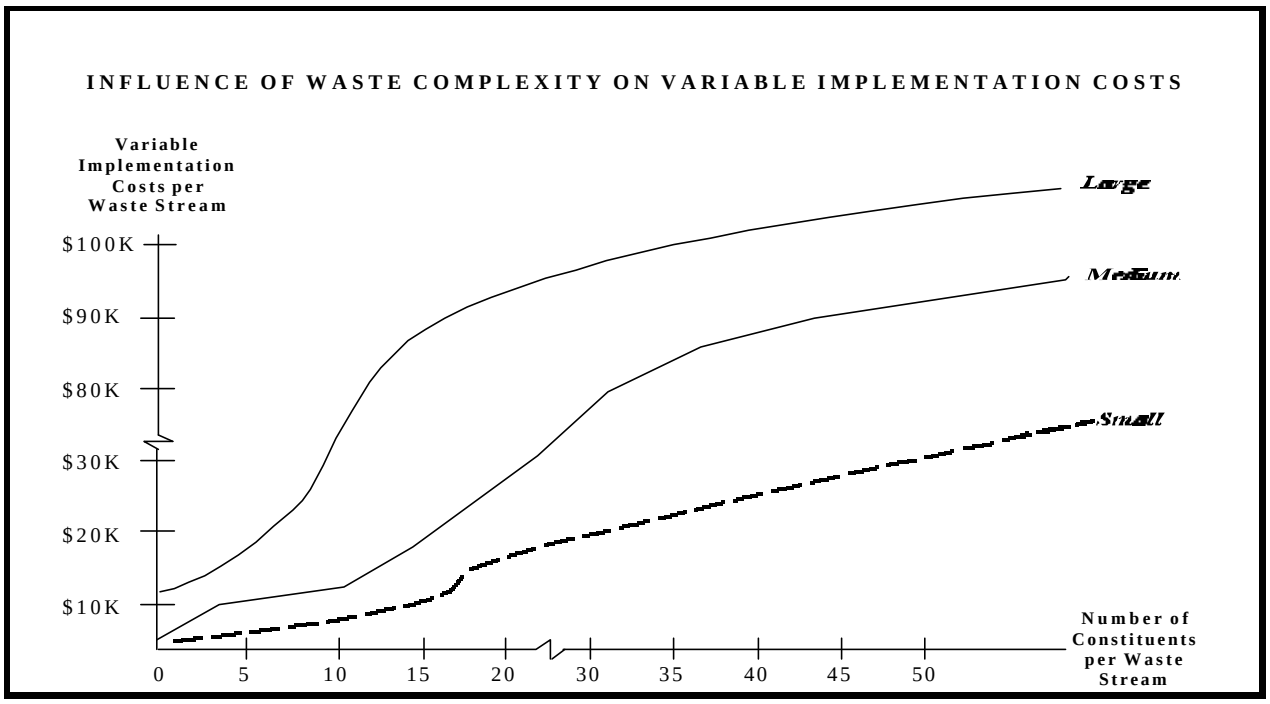
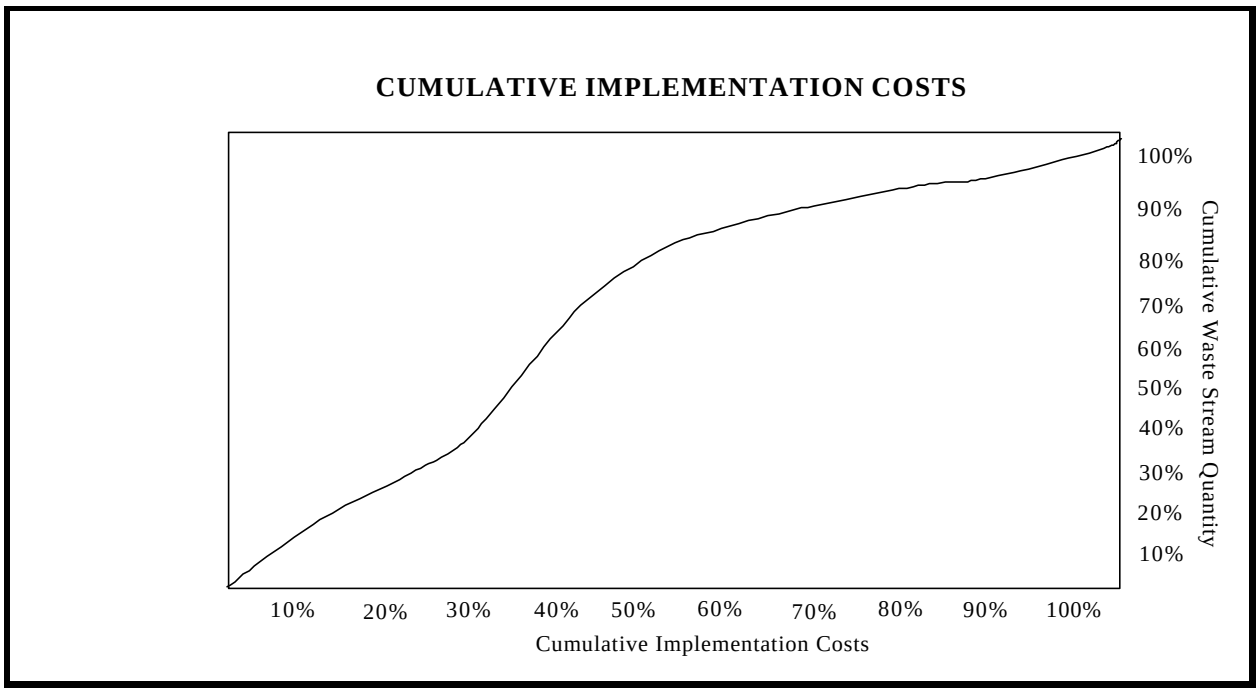


EXHIBIT IV-13



Baseline Testing under RCRA

Many generators who may pursue HWIR exemptions are currently conducting analyses of wastes to meet other requirements under RCRA. Under the Land Disposal Restrictions, for example, generators and managers of waste must demonstrate that exempt wastes do not exceed maximum acceptable constituent levels for particular waste groups. If waste analyses being done in the baseline are similar to those required under HWIR, then generators may simply adopt or modify their baseline testing regimens to meet the HWIR implementation requirements. To the extent that this is possible, the incremental costs associated with analyzing HWIR waste to generators with testing protocols already in place may be substantially less than if a generator must begin to test a wastestream anew.

Information from the LDR program suggests that about 20 percent of generators and managers with wastes affected by the LDRs (approximately 44,000 facilities) are expected to test their waste, while the remaining 80 percent (approximately 176,000 facilities) use process knowledge to characterize their waste.[40] As it is uncertain to what extent wastestreams currently being tested for compliance with LDRs overlap with wastestreams potentially exempt under HWIR, it is uncertain what percentage of testing costs will be incurred in the baseline, and what percentage of testing costs will be incremental to HWIR. However, this estimate of implementation costs is likely to be an overstatement of actual costs that will be incurred by generators with testing regimens in place.

Approaches to Reducing Implementation Costs

There are potential strategies and tradeoffs related to mitigating HWIR implementation costs in general, and HWIR waste eligibility testing costs in particular. Such tradeoffs are identifiable by considering the key cost drivers associated with HWIR implementation costs, and potential strategies or options for mitigating these key cost drivers. Using information about how costs vary with key cost drivers, a variety of possible approaches to assessing tradeoff strategies include waste minimization efforts that achieve the following:

[40] U.S. Environmental Protection Agency. 1994. "Information Collection Request for the Land Disposal Restrictions: Estimated Annual Respondent Burden and Cost."

- Reduction in wastestream quantity.
- Reduction in the number of constituents.
- Totally eliminating certain classes of constituents in waste.
- Reduction in the number of waste samples.

Spreading fixed costs over multiple wastestreams may also help to mitigate fixed costs of exemptions. At least one tradeoffs that may result from pursuing such strategies, is the loss of confidence in analytical results, for example, if the number of waste samples is reduced.

IV.F. TYPES OF POTENTIAL HWIR EXEMPTION FRAMEWORK BENEFITS

In the 1999 HWIR notice, USEPA describes an implementation framework which intends to reduce over-regulation of low-hazard industrial process wastestreams, by considering the risks that wastes pose under alternative management scenarios (i.e. according to conditions associated with alternative waste management units), to human health and the environment. Because HWIR is a de-regulatory measure, it is expected to provide certain benefits to generators and managers of wastes affected by the rule. This chapter discusses the economic benefits that are likely to result from this type of exemption. As summarized in the Introduction, the 1999 HWIR notice includes the four following components:

- It retains the RCRA "mixture and derived-from" rules.
- It discusses an "exemption level" framework from certain RCRA Subtitle C requirements for listed wastes that meet risk-based constituent exemption levels.
- It discusses potential revisions to the RCRA Land Disposal Restrictions (LDRs), by replacing certain constituent concentration standards with the HWIR exemption level concentrations (i.e. the "minimize threat" provision).
- It establishes an exemption for wastes listed solely for the presence of the ignitability, corrosivity, or reactivity characteristic (i.e. "characteristically-listed" wastes).

For waste generators and managers, the most significant benefits of HWIR are likely to arise from the exemption for listed wastes. The minimize threat provision, and the exemption for characteristically listed waste may provide additional economic benefits to industry, particularly as innovative treatment technologies are developed. By retaining the mixture and derived-from rules, USEPA expects to maintain the benefits of protecting the public and the environment from the risks posed by hazardous wastes.

HWIR establishes a risk-based system for exempting low-risk wastes from certain Subtitle C management requirements. By reducing over-regulation of low-risk wastes, USEPA expects that generators and managers will realize certain cost savings and other benefits associated with managing these wastes under less stringent Subtitle D requirements. The analytical approach under development will provide quantitative estimates of two significant types of cost savings expected to accrue to listed wastes achieving HWIR exemptions:

- The avoided costs of treatment required for compliance with the Land Disposal Restrictions.
- The avoided costs of disposal in highly protective Subtitle C facilities.

This analytical approach is based on deriving these estimates on industrial process waste data obtained from USEPA's 1986 *Survey of Hazardous Waste Generators* (the "Generator Survey") and 1996 *National Hazardous Waste Constituent Survey* (NHWCS).[41] This section describes the analytical approach under development to calculate cost savings associated with avoided Subtitle C treatment and disposal, including wastestream treatment assignments, unit cost assumptions, and cost savings calculations.

Waste Treatment Assignments

Determining the treatment and disposal cost savings that would accrue to generators and managers of exempt wastes under HWIR requires estimating the type of treatment that would be required in the absence of the HWIR exemption framework. The two sources of waste data used in the HWIR Economic Model (i.e. the "hybrid" 1986 Generator and 1996 NHWC Surveys) include treatment

[41] See Chapter 2 of this report for a more detailed discussion of the these data sources.

information for hazardous wastestreams. However, USEPA determined that using the older Generator Survey treatment data would not yield an accurate estimate of cost savings, for the following reasons:

- The 1986 Generator Survey data were collected before the Land Disposal Restrictions became effective. The LDRs impose significant treatment requirements for hazardous wastes and are likely to have influenced the management of wastestreams reported in the Generator Survey.
- In some cases the treatment data contained in the 1986 Generator Survey do not reflect all the treatment methods that may be applied to individual wastestreams.

To more accurately characterize treatment and disposal cost savings, USEPA developed a four-step process to assign the most likely treatment types to 1986 Generator Survey wastestreams:

- First, USEPA assigned treatments based on the reported wastecodes for each wastestream, applying the treatments identified as the "best demonstrated and available technology" (BDAT) under the Land Disposal Restrictions (LDRs).
- Next, USEPA reviewed the concentrations of selected constituents in each wastestream in the database, to determine whether alternative treatments are likely. For example, wastestreams containing high concentrations of metals may undergo high temperature metals recovery rather than stabilization.
- USEPA then reviewed the resulting treatment assignments to determine whether duplicate treatments had been assigned to individual wastestreams (e.g. both stabilization and slag vitrification), and eliminated the least likely of the treatments.
- Finally, USEPA ensured that the treatments were sequenced appropriately (e.g. incineration preceding stabilization) in a logical "treatment train".

Because the 1996 NHWCS data are more recent, USEPA decided to use the existing treatment data to calculate cost savings for wastestreams reported in the NHWCS. Only in a few limited cases where USEPA had reason to doubt the reported data did the Agency use the process described above to assign BDAT treatments to NHWCS wastestreams. For example, BDAT treatments were assigned in instances where a facility reported a nonspecific treatment type or where USEPA determined that additional treatments would likely be applied to a particular wastestream.

Waste Treatment & Disposal Unit Cost Assumptions

Generators and managers of HWIR exempt wastestreams accrue savings by avoiding the costs of treating and disposing these wastes under Subtitle C requirements. Exhibit IV-14 presents the unit cost assumptions for each waste treatment and disposal method considered in this Assessment.

Exhibit IV-14
Quantity-Based Industrial Hazardous Waste Treatment and Disposal Unit Costs
(1999$ average cost per ton, depending upon annual quantity treated by facility)

Item	Waste Treatment or Disposal Method	#470 tons/year	#4,700 tons/year	#47,000 tons/year	#470,000 tons/year
1	Deactivation	$820	$820	$200	$200
2	Incineration*	$730	$730	$730	$730
3	Liquid Incineration*	$301	$301	$301	$301
4	Neutralization	$270	$34	$4.48	$0.73
5	HTMR	$191	$191	$191	$191
6	Mercury Retort	$856	$856	$446	$194

7	Stabilization	$200	$150	$50	$23
8	Vitrification	$230	$230	$230	$230
9	Underground Injection	$0	$0	$0	$0
10	Acid Regeneration/Recycling	$0	$0	$0	$0
11	Subtitle C Disposal	$130	$130	$130	$57
12	Subtitle D Disposal	$50	$50	$14	$14

Explanatory Notes:
(1) Source: Industrial Economics Inc. analysis, based on: DPRA Incorporated, Baseline and Alternative Waste Management Cost Estimates for Third Third Land Disposal Restrictions, May 1990; and USEPA Office of Solid Waste, Economics, Methods, and Risk Analysis Division, Assessment of the Potential Costs, Benefits, and Other Impacts of the Hazardous Waste Combustion MACT Standards: Final Rule, July 1999.
(2) * Incineration cost estimates from USEPA, Assessment of the Potential Costs, Benefits, and Other Impacts of the Hazardous Waste Combustion MACT standards: Final Rule, July 1999. For liquid incineration, the cost estimate is for incineration of highly contaminated liquids. For non-liquid incineration, an average unit cost estimate for incineration of solids and sludges.
(3) Unit costs above represent national averages including average waste transportation costs from generator to off-site commercial treatment or disposal facility; unit costs may vary geographically, from year-to-year, and according to market conditions.

Industrial hazardous waste treatment/diposal unit costs vary depending on the annual quantity of waste treated or disposed, reflecting differences between on-site and off-site management and economies of scale. The analysis assumes that smaller wastestreams are generally treated at off-site commercial facilities and larger wastestreams are treated on-site. Costs per ton decrease as the quantities increase due to a facility's ability to spread certain costs over a larger quantity of waste.

Industry Waste Management Cost Savings Calculations

HWIR cost savings depend on whether: (1) the waste would require treatment prior to land disposal in the absence of the exemption (i.e. under the baseline); and (2) whether the waste is eligible for exemption before or after this treatment (if any) occurs. This section compares waste treatment and disposal requirements under current regulations to the requirements for HWIR exempt wastes, and describes the calculations used to determine treatment and disposal cost savings under different regulatory options and risk scenarios.

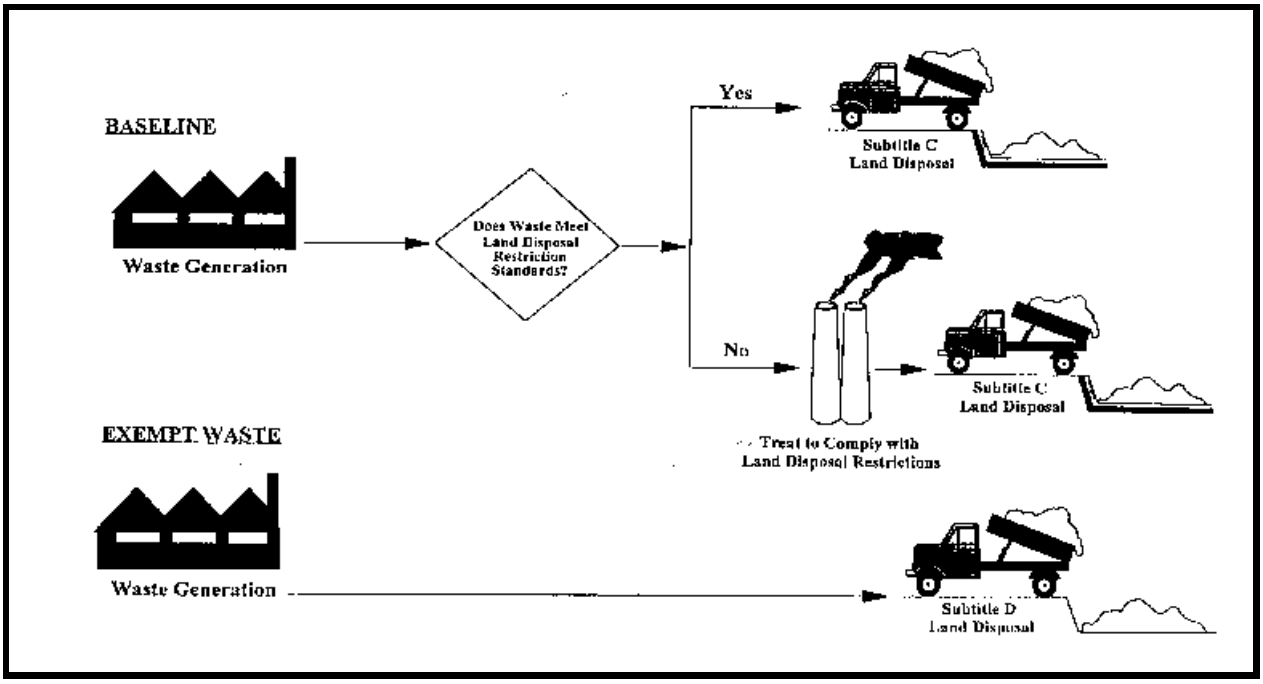
Comparison of Requirements Under Existing RCRA and the HWIR Framework

Exhibit IV-15 presents a simplified comparison of the treatment and disposal requirements for listed wastes under the current RCRA regulations, and under the HWIR framework. The exhibit shows that, under existing Subtitle C regulations, hazardous wastes must meet the Land Disposal Restrictions standards prior to Subtitle C land disposal. Under the listed waste exemption discussed in of the 1999 HWIR notice, the requirements for HWIR exempt wastes differ in two ways:

- Wastes that gain an HWIR exemption "as-generated" (i.e. at the point of generation in the industrial process), are not required to comply with the RCRA Land Disposal Restrictions and hence may avoid related LDR treatment requirements.

- Exempt wastes can be disposed of in a RCRA Subtitle D (non-hazardous waste) facility instead of in a RCRA Subtitle C (hazardous waste) facility.

EXHIBIT IV-15



Treatment and Disposal Cost Savings Outcomes

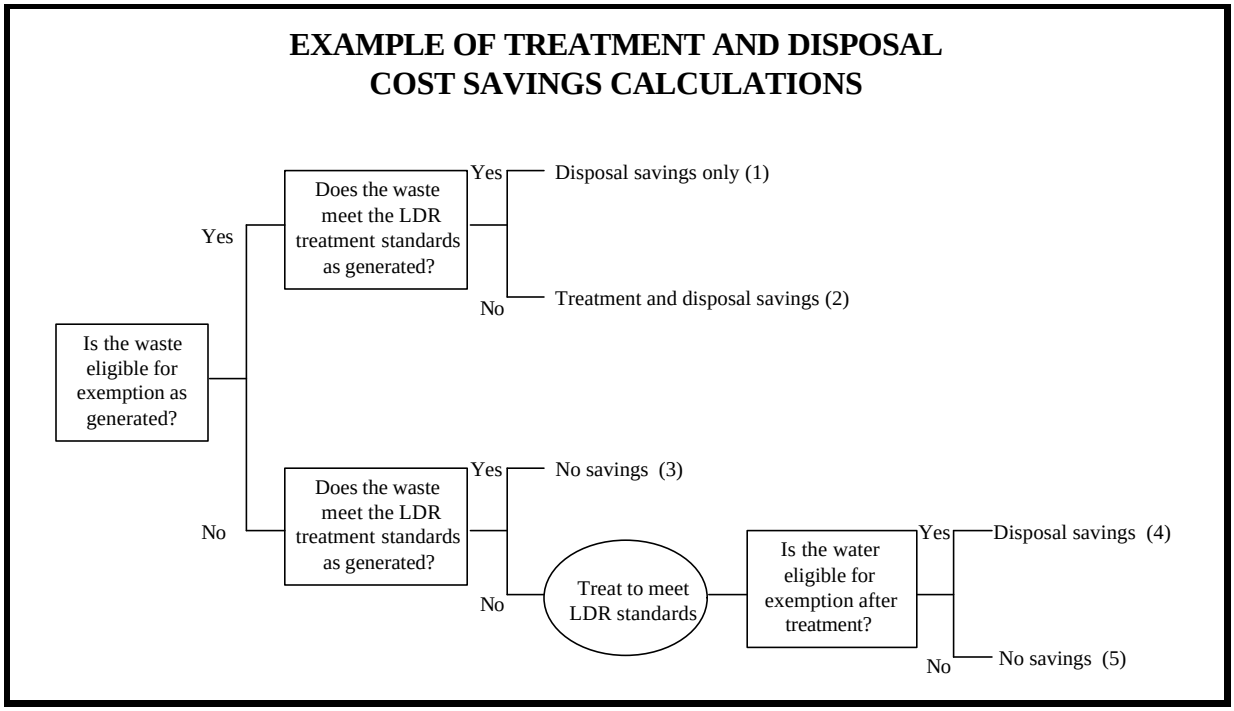
The HWIR model follows the decision tree presented in Exhibit IV-16 to determine cost savings associated with HWIR exemption. There are four possible savings scenarios:

- A waste that is eligible for HWIR exemption as-generated and meets the Land Disposal Restrictions accrues disposal cost savings only.
- A waste that is eligible for HWIR exemption as-generated and does not meet the Land Disposal Restrictions accrues both treatment and disposal cost savings.
- A waste that is eligible for HWIR exemption after treatment accrues disposal cost savings.
- A waste that is eligible for HWIR exemption neither as-generated nor after treatment does not accrue cost savings.

The model determines net savings by comparing treatment and disposal costs in the baseline to these costs under HWIR. Net savings are further reduced by the costs of gaining HWIR exemptions (i.e. implementation costs). Cost savings for an exempt wastestream are calculated according to the following formula:

Net Savings = (Baseline Subtitle C Treatment Costs + Subtitle C Disposal Costs) -
(HWIR Treatment Costs + Subtitle D Disposal Costs) -
HWIR Implementation Costs

EXHIBIT IV-16



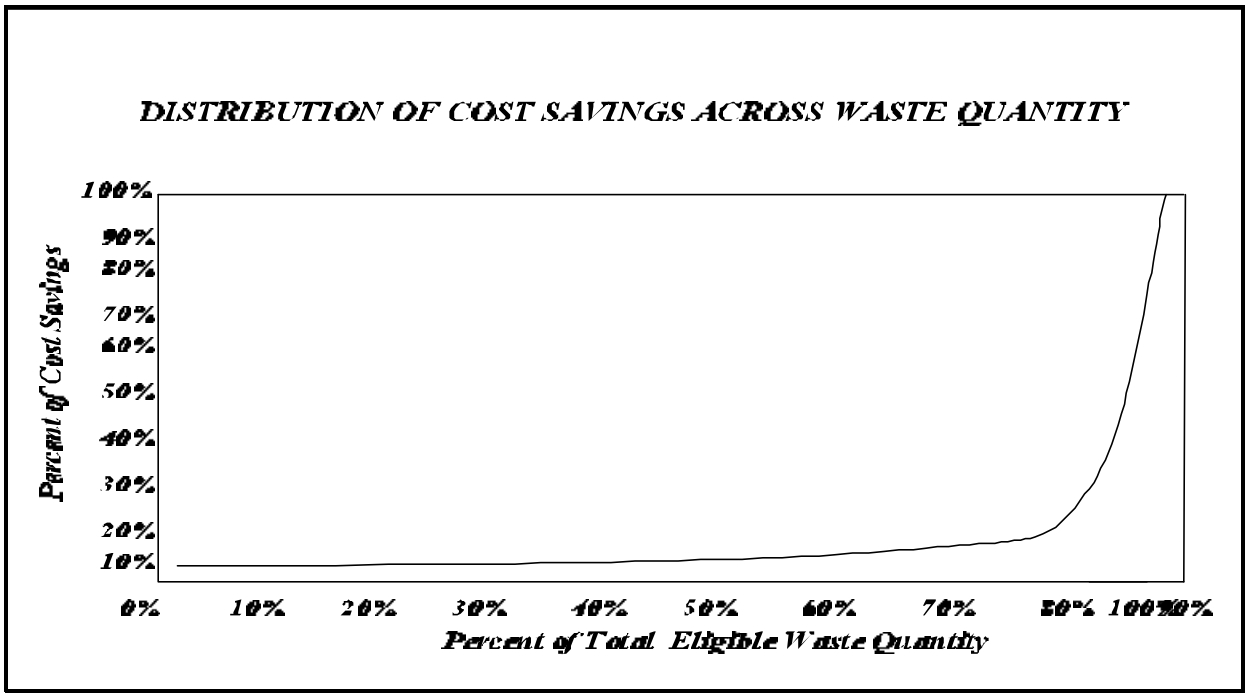
Special Issues for Wastewaters and Characteristic Only Wastes

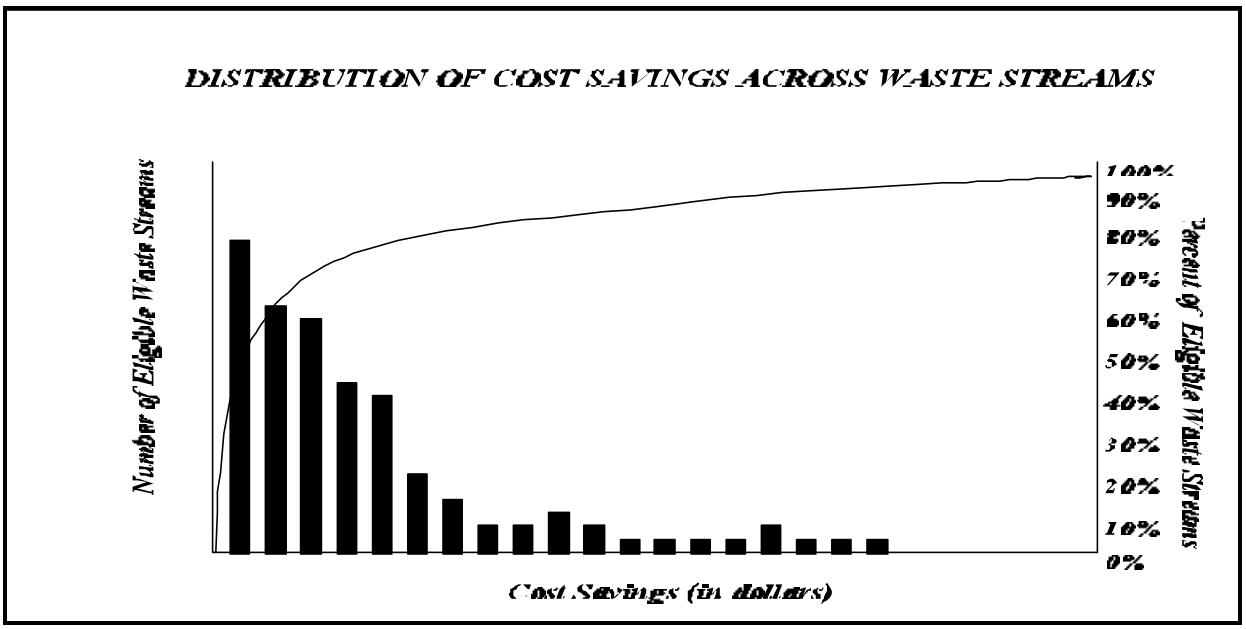
Wastewaters, listed plus characteristic wastes, and wastes reported as treatment residuals present special issues for the analysis of cost savings. Because the liquid effluent from wastewater treatment is often managed and discharged under the Clean Water Act, these liquids are generally handled in units exempt from Subtitle C requirements. Therefore, the liquid portion of these wastes do not accrue HWIR savings. The model calculates cost savings only for the semi-solid residuals that result from wastewater treatment.

The methodology used to analyze listed plus characteristic waste is similar to that for listed only waste; however, for these wastes, the characteristic must be removed before the waste may become exempt from RCRA Subtitle C. Treatment to remove the characteristic can affect cost savings in two ways. First, it may change the quantity of waste eligible for exemption. Second, if the characteristic treatment is the same process required to treat the listed waste, then treatment expenditures cannot be avoided.

Note that a limited number of wastestreams in the HWIR model data set are reported as residuals of treatment; i.e. they have already been treated for a hazardous characteristic and/or listing at the time of reporting. For these wastes, there is insufficient information to determine whether the wastes would have been eligible for HWIR exemption at the point of generation. Therefore, the HWIR model assumes that these wastes would not have been eligible for exemption as-generated and analyzes their potential eligibility after treatment. As a result, these wastes may accrue disposal cost savings, but do not accrue treatment cost savings.

EXHIBITS IV-17 AND IV-18





Expected Generalized Results

Exhibits IV-17 and IV-18 present generalized relationships (i.e. histogram and cumulative curves), between percentage of eligible quantities and numbers of industrial hazardous wastestreams, and percentage of total annual cost savings. The primary benefits to generators and managers of HWIR exempt wastes will be the avoided costs of managing these wastes under hazardous waste requirements. Major avoided costs include: the costs of Subtitle C treatment and disposal, future capital investments in on-site treatment facilities, state taxes levied on hazardous waste disposal, and administrative costs associated with Subtitle C management.

For some eligible wastestreams, the cost of Subtitle D disposal under HWIR is greater than the baseline Subtitle C cost of disposal, although total net savings, including treatment savings, will be positive. These are predominantly wastestreams that avoid incineration as a result of HWIR exemption. Because incineration greatly reduces waste quantity, the quantity of waste that must be disposed is significantly greater under HWIR than in the baseline. Thus, although the unit cost of Subtitle D disposal is less than the unit cost of Subtitle C disposal, HWIR exemption increases the cost of disposal for these wastes.

Effects of Implementation Costs

Cost savings may accrue to industrial waste generators, only when the incremental cost savings gained from an HWIR exemption, exceed the incremental costs to the generator of implementing an HWIR exemption. Generators and managers of wastes that do not yield positive net cost savings would be unlikely to pursue HWIR exemptions; the cost savings for these wastestreams are not included in the estimate of total cost savings. The cost of implementing an HWIR exemption for an eligible waste depends on the quantity and physical form of the waste, as well as the number and type of constituents present in the waste.

Key Uncertainties

The HWIR Economic Model accommodates sensitivity analyses to determine the extent to which model results are affected by certain key assumptions. In addition to the uncertainties associated with the (a) underlying industrial waste data , (b) determination of HWIR-eligibility, and (c) estimate of implementation costs, this section describes additional uncertainties related to quantified estimates of treatment and disposal cost savings. In combination, the factors discussed in this section suggest that estimates of treatment and disposal cost savings as explicitly modeled may be under-estimated, without further qualitative considerations.

- Number of constituent exemption levels: The number and quantity of wastestreams potentially eligible for HWIR exemptions, depend upon the number of constituents for which exemption levels have been developed. Wastes containing constituents for which exemption levels have not been developed are categorically ineligible for HWIR exemption. Hence the economic analysis of HWIR is also dependent upon the future development of exemption levels.

- Use of low- or high-end of the reported concentration range for the 1986 Generator Survey wastestreams: One component of the underlying wastestream in the HWIR Economic Model, is based on ranges in waste constituent concentrations, rather than on single-point concentrations. Consequently, two alternative interpretations and Economic Model runs are possible: using either the low- or high-ends of the concentration ranges. Using the lower bound of the concentration ranges reported in the 1986 Generator Survey results in higher estimates of industry annual cost savings, whereas using the upper bound of the range provides a relative lower estimate in cost savings.

- Use of simplified decision rules: As discussed above, simplified decision rules are used to determine likely treatments in the HWIR model and to estimate the unit costs of treatment and disposal. These assumptions are likely to lead to overstatement of actual cost savings. The treatment assignments often assume relatively expensive treatments (e.g. incineration), when waste generators and managers may in fact find less expensive alternatives. In addition, increasingly stringent state requirements for management of industrial wastes under Subtitle D may be narrowing the difference between the costs of Subtitle C and D disposal.

- Effectiveness of treatment: The HWIR Economic Model assumes that wastes not eligible for exemption as-generated are treated to comply with the Land Disposal Restrictions (LDRs). However, generators and managers may be able to reduce hazardous constituent concentrations below the LDR requirements. This assumption may cause the model to underestimate the number of wastestreams that are eligible for exemption after treatment and thus underestimate the total cost savings attributable to HWIR.

- Liability concerns: Due to concerns over potential liability, some hazardous waste generators may choose to continue to manage HWIR-eligible wastes in Subtitle C facilities despite the cost savings that could be achieved by sending these wastes to Subtitle D facilities. As indicated by the industry case studies, some large generators prefer to manage wastes on-site and avoid land disposal of wastes to reduce the likelihood that a waste could become associated with a CERCLA (i.e. Superfund) site. In some cases, these generators already have substantial Superfund liabilities and are very averse to the possibility of incurring additional liability. This logic underlying the HWIR Economic Model assumes that generators will seek exemptions for all wastes that accrue positive cost savings, so this analysis may overstate cost savings to particular generators.

Other Potential HWIR Benefits

In addition to creating direct cost savings, USEPA expects the waste exemption framework presented in the 1999 HWIR notice to provide additional, indirect benefits to generators and managers of exempt wastes. While these economic benefits are not quantified, they may represent added incentives for waste generators and managers to pursue HWIR exemptions for wastes that do not pose significant risks to human health or the environment. This section discusses benefits associated with exempt wastewaters, improved public perceptions, and incentives for waste minimization.

- Savings from Avoided Future Capital Investments: HWIR exemptions may enable some waste generators and managers to achieve cost savings by avoiding major future capital investments. Large generators and managers with on-site Subtitle C treatment units may no longer need to invest in the maintenance of these facilities if all or a significant proportion of wastes managed in these units become exempt under HWIR. For example, a generator that realizes HWIR exemptions for all wastestreams managed in an on-site Subtitle C incinerator can possibly avoid costs of upgrading the facility to comply with the combustion MACT standards. In case studies of industry sectors affected by HWIR, a few very large generators reported that the cost savings due to such avoided investments could be substantial, potentially surpassing the cost savings due to avoided Subtitle C treatment and disposal by orders of magnitude.[42]

- Savings from Avoided State Taxes: By re-classifying low-risk wastes as non-hazardous, HWIR may allow generators and managers of low-risk wastes to avoid taxes imposed by states on the generation and/or disposal of hazardous waste. Louisiana, for example, charges approximately $40 per ton of waste disposed at in-state Subtitle C landfills. Although some generators and managers may currently be able to avoid these costs by transporting wastes to states that do not tax hazardous waste, the added costs of transporting wastes to other states may offset associated cost savings. Therefore, allowing HWIR exempt wastes to avoid state taxes by re-classifying them as non-hazardous may provide additional cost savings to generators and managers.

- Savings from Avoided Subtitle C Administration: Gaining HWIR exemptions for low-risk wastes will allow generators and managers to avoid certain requirements associated with Subtitle C administration of individual wastestreams. For generators of hazardous wastes, such requirements include establishing and maintaining a manifest system, preparing biennial reports, and satisfying pre-transport requirements for shipping wastes off-site. For industrial waste managers (i.e. treatment and disposal facilities),

[42] For more information on this category of potential cost savings, see the report: *Hazardous Waste Identification Rule: HWIR Industry Case Studies*, prepared for the USEPA Office of Solid Waste by Industrial Economics, Incorporated; January 1999.

administrative requirements are more extensive. They include, for example, obtaining a RCRA Part B permit, maintaining security systems, developing waste analysis and contingency plans, and conducting training.

- Exemption of Wastewaters: The analysis reported above assumes that no cost savings will accrue for liquid residuals from the treatment of exempted wastewaters because these waste are often managed in units already exempt from RCRA and then discharged under Clean Water Act (i.e. National Pollutant Discharge Elimination System) permits. Changing the facility's processes to manage these liquids differently (i.e. to take advantage of the HWIR exemption) may require capital investments that exceed HWIR savings. However, in a few cases HWIR may provide cost savings for wastewaters. Potential benefits related to HWIR exemption of wastewaters include:

  - The re-use of water in the process system, which may result in a reduction in source water intake.
  - The use of water in non-process systems such as cooling systems.
  - The use of exempt wastewater as an emergency response reserve, allowing facilities to maintain larger supplies of reserve water and to manage a wider range of emergency scenarios.
  - Increased flexibility in dealing with treatment upsets (e.g. overflows) because surface impoundments used to store wastewater overflows may be maintained without a RCRA permit.
  - Avoided costs associated with segregating listed wastewaters from non-hazardous wastewaters to avoid defining the entire quantity of wastewater as a hazardous waste;
  - The use of less expensive Class V underground injection wells rather than Class I injection wells.

- Public Relations Benefits: HWIR may allow generators of exempt wastes to realize public relations benefits associated with reducing the amount of their waste that is classified as hazardous. The industry case studies indicate that hazardous waste generators are concerned about public perceptions of their environmental performance.[43] By re-designating exempt wastes as non-hazardous, HWIR may enable generators to report a reduction in the quantity of hazardous waste they generate. Although actual quantities of waste generated may not change at all, positive publicity associated a shift from the hazardous to non-hazardous may improve the public's perception of these generators' commitment to environmental protection.

- Incentives for Waste Minimization: The prior analysis focuses on wastes that are eligible for HWIR exemption based on current industrial processes and treatment practices. However, by providing a means to avoid certain Subtitle C requirements, HWIR may also create incentives for waste generators and managers to pursue exemptions for wastestreams that are not currently eligible for exemption. Generators and managers may be able to implement waste minimization activities, such as process changes, increased recycling, or other methods that reduce constituent concentrations in wastestreams to meet the HWIR exemption levels. Cost savings will depend on whether the costs of implementing waste minimization techniques are less than the cost savings associated with gaining HWIR exemptions discussed above.

- Benefits of the LDR "Minimize Threat" Provision: As described in the 1999 HWIR notice, certain HWIR "exemption levels" may be used as "minimize threat" levels for determining the amount of treatment required for hazardous wastes under the RCRA Land Disposal Restrictions ("LDRs"). The risk-based HWIR exemption levels may replace the current technology-based LDR standards, where the existing standards would otherwise require treatment below the level at which wastes pose threats to human health or the environment.

[43] For more information on this benefit category, see: *HWIR Industry Case Studies,* 1998.

Consequently, the minimize threat provision may benefit generators and managers of hazardous waste by allowing some wastes to be treated to a lesser extent than currently required under the LDRs. Generators and managers of wastes that are not eligible for HWIR exemption as-generated may realize treatment cost savings by treating to meet the minimize threat levels rather than the current LDR standards. The minimize threat provision in HWIR may therefore create treatment cost savings in addition to the cost savings generated by the HWIR exemption. However, the amount of cost savings will depend on several factors, including whether alternative waste treatments exist that can meet the minimize threat levels at lower cost than currently applied treatments, and whether the presence of other constituents in the waste allows the use of such alternative treatments. Since incineration is the most common BDAT treatment for wastes in the HWIR Economic Model, it is unlikely that lower-cost, alternative treatments exist that also meet minimize threat levels in the short-term. In the long-term, however, the revised standards may provide incentives for developing innovative treatments that are capable of meeting the new land disposal levels at a lower cost than current treatments.

One of the underlying databases to the HWIR Economic Model consists of the LDR treatment standards (see 40 CFR 268.40). The model uses this LDR database according to its decision logic, to determine whether treated industrial RCRA hazardous wastes may be eligible for HWIR exemption from RCRA's Subtitle C hazardous waste disposal requirements. The constituent concentration levels specified in the LDR standards, are based on hazardous waste treatment technology statistical performance profiles (i.e. treated waste constituent concentration probability distributions). USEPA developed the LDR standards based on statistical data describing the actual concentration levels achieved, by applying the following algorithm to the actual concentration data:

LDR standard = (BDAT level achieved) x (% recovery) x (2.8)

Where: BDAT= best demonstrated available [hazardous waste treatment] technology.
% recovery = minimum percent recovery factor (ranged from 50% to 90%).
2.8 multiplier = statistical adjustment factor.

For example, a BDAT level achieved of 5.0 ppm, would result in a LDR standard of between 7.0ppm and 12.6ppm (i.e. 5.0ppm x 50% x 2.8, to 5.0ppm x 90% x 2.8). Consequently, application of LDR treatment technologies to hazardous industrial wastestreams, results in achieving residual concentrations in the treated waste, that are significantly below the LDR treatment standard (i.e. concentration levels).

The HWIR Economic Model will enable USEPA to assess the potential additional industry waste treatment and disposal cost savings, based on the assumption that hazardous waste treatment technologies actually achieve in some cases, constituent concentration levels which are lower than the levels specified by the LDR standards contained within the existing HWIR Economic Model (i.e. lower by a 0.7143 multiplier factor determined from the above algorithm of 1/[(2.8)x(50%)] = 0.7143). The HWIR Economic Model may accommodate a global change (e.g. reduction by the LDR multiplier factor of 0.7143, and/or other numerical factors) to the LDR level database contained within the model, as well as targeted changes in LDR levels assigned in the model to particular subsets of RCRA wastecodes.

Conclusions and Implications

The primary expected economic impact from the HWIR "exemption level" framework, is a reduction in industry annual waste treatment and disposal costs. Additional potential cost savings may be associated with other avoided costs, such as future capital investments in on-site treatment facilities in industries, state taxes, and RCRA Subtitle C administration costs (e.g. recordkeeping), but are not quantified in the HWIR Economic Model. The HWIR exemption may also provide further indirect benefits such as improved public relations and incentives for waste minimization activities.

The minimize threat provision may generate treatment cost savings by replacing current technology-based Land Disposal Restrictions standards with risk-based HWIR exemption levels. In cases where the HWIR exemption level is above the current LDR standard, the exemption level will replace the current standard. Thus, the Land Disposal Restriction would no longer require that a waste be treated below the level at which it poses risks to human health or the environment. This reduced treatment requirement will allow waste generators and managers to avoid unnecessary treatment costs.

The resource-saving benefits of HWIR will increase over time as the USEPA develops risk-based exemption levels for an increasing number of hazardous waste constituents. As exemption levels are generated for additional HWIR constituents, more listed wastes are likely to become eligible for the HWIR exemption, and more wastes are likely to benefit from the reduced waste treatment requirements established by the HWIR "minimize threat" provision.

IV.G. INDUSTRY IMPACTS

The USEPA formulated the underlying industrial waste database, internal computer programming logic, and computer output tables of the 1999 HWIR Economic Model, to assess the potential effects of future HWIR exemption levels, and of replacing the LDRs standards with HWIR exemption levels (i.e. the LDR "minimize threat" provision), on the industry categories that are likely to benefit from these two regulatory features. Potentially affected industry sectors are ones which generate industrial process wastestreams which have been "listed" by the USEPA as "hazardous wastes" under Subtitle C of RCRA. The HWIR Economic Model will enable assessment of the impacts of both the HWIR exemption level and the LDR minimize threat provisions, at the industrial sector level along the following dimensions:

- Identities (i.e. SIC and NAICS codes) of industrial sectors potentially affected by HWIR.
- Annual quantities of industrial process wastes eligible for HWIR exemption by industry sector.
- Numbers of wastestreams eligible for HWIR exemption by industry sector.
- Impacts differentiated according to "large" and "small" quantity wastestreams size classes.
- Numbers of industrial facilities (i.e. waste generators) eligible for HWIR exemption by industry sector.
- Average annual HWIR implementation cost to each industrial sector with eligible wastes.
- Average annual cost savings which may be realized by each industrial sector with eligible wastes.

In addition to the Economic Model, OSW conducted a separate study in 1997-1998 to collect insights, perceptions, and opinions from a sample of facilities within industry sectors generating industrial process wastes which may be potentially eligible for HWIR exemption, based on the findings of OSW's economic analysis conducted for the 1995 HWIR proposal. This separate study involved industry case studies (i.e. site visit and telephone interviews) on how baseline waste management practices in these industrial sectors may change under HWIR exemptions, as well as on other HWIR-related topics and concerns.

Eligible Quantities by Industrial Category

The RCRA-listed, industrial process hazardous waste universe potentially affected by HWIR exemptions includes facilities in over 300 major industry groups. "Major industry groups" refer to four-digit Standard Industrial Classification (SIC) codes used to classify facilities established in: *Standard Industrial Classification Manual,* Executive Office of the President, Office of Management and Budget, 1987. Because of the fact that the industrial process waste database underlying the HWIR Economic Model was developed in 1996-1997 using information from the USEPA's RCRA Hazardous Waste 1993 Biennial Reporting System (BRS), SIC codes are used to identify industry sectors, rather than the new NAICS codes implemented by Federal agencies in January 1999 to replace SIC codes.

Of the estimated 96.5 million tons of RCRA listed industrial process wastes which are potentially eligible for and affected by future HWIR exemption levels, 81% is generated by SIC 28 (chemicals & allied products manufacturing sectors), 3% by SIC 29 (petroleum & coal products manufacturing sectors), and 17% miscellaneous other industry sector primarily located within SIC codes 20-39 (i.e. manufacturing industry sectors). The Economic model will provide more detail on total eligible quantities, facilities, wastestreams, implementation costs, and waste treatment/disposal cost savings, by major industrial category at the four-digit SIC level. The output from the model also enables description of any interesting trends among industry sectors, such as:

- Whether certain industrial waste types are more likely to be eligible for some industries.
- Whether dominant HWIR-beneficiary industries may change relative ranking, under the "generic" compared to the "landfill only" HWIR options, and under different sets of HWIR "exemption levels".
- How eligible wastes are distributed across industries.
- Distribution of potential cost savings by industry category.
- Why certain industry sectors may dominate potential waste treatment/disposal cost savings.
- Whether predicted cost savings may be realized by a few or many wastestreams or facilities within a given industry.
- Whether predicted cost savings are attributable to certain types of HWIR-exempted wastes.

Assessment of Other Potential Economic Impacts

In addition to providing cost savings associated with avoided Subtitle C requirements, HWIR exemptions may influence industry behavior in other ways. Implementation cost burdens, for example, may encourage industry groups to seek innovative ways of sharing or reducing variable costs associated with waste analyses. In addition, generators may devise new management strategies due to the possibility of avoiding required, future investments associated with managing hazardous waste (e.g. investments to upgrade on-site treatment units), provided by HWIR.

Implementation Costs: The HWIR Economic Model enables analysis of implementation costs by industry sector, to reveal the percent of generators in the top five or ten industry sectors, which do not accrue cost savings in excess of implementation costs. In such cases, generators are unlikely to seek HWIR exemptions for these wastes. Among the top five or ten industry sectors by potential cost savings, the model also enables examination of patterns among the minimum, maximum, and median implementation costs.

Waste Management: Case studies of industries affected by the 1995 proposed HWIR suggest that generators and managers of waste take a variety of factors into consideration when evaluating potential HWIR impacts on their facility and industry.

Waste Treatment: Depending on the availability of waste treatment data, the framework may enable examination of the sensitivity of HWIR-eligible industrial waste quantities and expected annual cost savings, to changes in the assumptions used in the HWIR Economic Model about the efficacy of waste treatment technologies. Currently, the model assumes that BDAT treatments are applied under the LDRs to all wastes not eligible at the point of generation, and that post-treatment concentrations equal UTS concentration-based standards. To the extent that actual treatment practices may differ from these, eligible wastes may be quite different for certain industries.

Waste Minimization: Specific industries may have unique incentives for conducting waste minimization, i.e. possessing significant quantities of waste nearly eligible to become exempt based on the analysis of limiting constituents. These are industries that could benefit significantly from investments in process changes or reducing waste toxicities. Alternatively, some industries may face few opportunities for additional HWIR benefits.

Sector-Specific Impacts: Assessing the potential effects of HWIR and the influence of implementation costs on specific industries, as well as potential shifts in baseline industry practices due to HWIR, constitutes industry sector impacts. Based on modeled impacts, major policy insights may include predicting:

- Whether certain industry sectors and types of industrial facilities (e.g. very large hazardous waste generators) may benefit disproportionately from HWIR.
- Which particular industry sectors and facilities may be most affected by HWIR implementation requirements.
- Whether HWIR may present specific industries with unique waste minimization incentives.
- Which industry sectors may benefit most overall from HWIR's deregulatory components.

IV.H. SELECTION OF CANDIDATE CHEMICALS FOR ASSIGNMENT OF HWIR EXEMPTION LEVELS

The HWIR Economics Model could potentially help USEPA identify prospective constituents for exemption level development under HWIR. In particular, the model can provide data about the prevalence of constituents in wastestreams (i.e. the percentage of wastestreams in which a constituent appears), the total quantity of wastestreams containing a particular constituent, and the total mass of a constituent across wastestreams. These data could assist USEPA in determining which exemption levels may be most useful to develop to impact the largest number of wastestreams or greatest quantity of waste under HWIR.

The HWIR Economics Model could also potentially assist USEPA in determining which additional constituent exemption levels might lead to significant cost savings under HWIR. To assess potential cost savings associated with certain constituents, the model is designed to identify those constituents that often "limit" a wastestream from gaining exemption under HWIR (e.g. identify the only constituent that does not have and meet an established exemption level in a particular wastestream).