GENERATION AND MANAGEMENT OF CESQG WASTE

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EXECUTIVE SUMMARY

This report summarizes existing data on the waste generation and management practices of conditionally-exempt small quantity generators (CESQGs) to help EPA satisfy the RCRA Section 4010(c) mandate for non-municipal facilities that may receive CESQG waste.[1] The data included in this report are summarized from seven national, state, and local studies on CESQGs. These data sources are described in greater detail in Exhibit A-1 of Appendix A. One of these sources, the *National Small Quantity Hazardous Waste Generator Survey* (National SQG Survey), provides a comprehensive overview of CESQG waste generation and management practices nationwide. This survey was conducted from 1983 to 1984. Findings from the *National SQG Survey* are summarized below:

- **Number of CESQGs**. The total number of CESQGs in both manufacturing and non-manufacturing sectors nationwide is approximately 455,000.

- **CESQG Waste Volume**. The total waste volume generated by all CESQGs nationwide is approximately 201,600 tons per year (tons/yr).

The remaining findings of this survey are based on detailed data collected from establishments in 125 targeted SIC codes. These industries were targeted because they were identified as most likely to be CESQGs. The 125 SIC codes were grouped into 22 industry groups for comparison purposes.

- **Major CESQG Waste Generating Industries**. For the 22 industry groups, approximately 80 percent of establishments are in the non-manufacturing sector and these establishments generate approximately 88 percent of the CESQG waste volume. The remaining 20 percent of establishments are in the manufacturing sector, generating approximately 12 percent of the CESQG waste volume. The vehicle maintenance industry is the largest industry both in terms of number of generators (approximately 54 percent of all generators) and waste volume (approximately 71 percent of waste volume) for the 22 industries surveyed. Other major non-manufacturing industries include laundries, construction, and pesticide application services and end users. Key manufacturing industries include metals manufacturing and printing and ceramics.

- **Major CESQG Waste Types**. The major CESQG waste types for the 22 industry groups surveyed are used lead-acid batteries, spent solvents and still bottoms, perchloroethylene, and photographic wastes.

- **CESQG Waste Management Practices**. For the 22 industry groups surveyed, approximately 80 percent of CESQG waste is managed off-site, with the remainder managed on-site. The predominant off-site management methods include:

  -- Recycling (73 percent of waste managed off-site or 69,900 tons/yr);

  -- Disposal at a non-hazardous solid waste landfill[2] (Ten percent of waste managed off-site, or 9,300 tons/yr), either by direct haul or mixture with the solid waste stream at the point of generation; and

  -- Disposal at a permitted Subtitle C landfill (two percent of the waste managed off-site, or 2,000 tons/yr).

  The predominant on-site management methods for the 22 industries surveyed include:

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[1] Code of Federal Regulations (CFR), Title 40, Section 261.5 defines CESQGs as generators of less than 100 kilograms per month (kg/mo) of hazardous waste or 1 kg/mo of acutely hazardous waste.

[2] The *National Small Quantity Hazardous Waste Generator Survey* does not distinguish between a municipal or non-municipal (e.g., industrial, construction and demolition landfill).

-- Disposal in the sewer and/or septic system (56 percent of the waste managed on-site, or 14,600 tons/yr); and

-- Disposal in a non-hazardous solid waste landfill (two percent of the waste managed on-site, or 509 tons/year).

Although EPA believes that the *National SQG Survey* provides a relatively comprehensive and national picture of CESQG waste generation and management practices, the Agency feels that the findings should be viewed in context; the data for the survey were collected during 1983 and 1984, nearly a decade ago. EPA believes that the current situation regarding CESQG waste generation and management practices is substantially different from when these data were collected. Significant changes have taken place over the past few years, for example:

- New wastes have entered and exited the hazardous waste system;
- The methodology for identifying characteristic wastes has changed;
- Superfund liability concerns have become an important factor for industry to consider when determining waste management options; and
- New regulatory activities, such as reporting under the Toxics Release Inventory, have been catalysts for industry to change manufacturing processes and other practices to reduce waste volumes and toxicity.

Other data sources reviewed in this report present findings that are both similar and dissimilar from the *National SQG Survey*. The findings of these data sources should also be viewed in context. For example, some sources are narrow in scope (i.e., state and local data), making comparisons difficult. In addition, several sources conducted surveys on a limited number of industries or on one sector (e.g., manufacturing sector).

One data source reviewed in this report, *Hazardous Waste From Small Quantity Generators* (SQG book), provides further information on state requirements for CESQGs. This source finds that 34 states[3] had one or more requirements for CESQGs that were more stringent than Federal regulations for CESQGs. Specifically, 22 states require all or some CESQGs to manage their hazardous waste at a permitted Subtitle C facility, thus going beyond Federal regulations and prohibiting disposal at a municipal or industrial solid waste facility.[4]

[3] For the purpose of this report "states" includes the 50 states and the District of Columbia.

[4] Among other options, 40 CFR 261.5(g) requires CESQGs to manage their hazardous waste in an on-site or off-site management facility that is a permitted or interim status Subtitle C Hazardous waste management facility, or is a state permitted, licensed, or registered municipal or industrial solid waste management facility.

SECTION I. INTRODUCTION

BACKGROUND

In 1980, EPA promulgated regulations pursuant to RCRA that, among other things, delineated responsibilities for hazardous waste generators, transporters, and management facilities (treatment, storage, and disposal facilities, or TSDFs). Additionally, the regulations established a conditional exclusion from full regulation for generators that generated less than 1,000 kg/mo of hazardous waste .

In the 1984 amendments to RCRA (the Hazardous and Solid Waste Amendments (HSWA)), Congress added specific provisions pertaining to generators of less than 1,000 kg/mo, including lowering the exclusion level to 100 kg/mo. This action created three classes of generators: (1) large quantity generators, generators of greater than 1,000 kg/mo; (2) small quantity generators, generators of 100 to 1,000 kg/mo; and (3) generators of less than 100 kg/mo, which at the time were referred to as very small quantity generators. Congress gave EPA the discretion as to whether to promulgate new requirements for the very small quantity generators.

EPA has since defined generators of less than 100 kg/m as conditionally-exempt small quantity generators, or CESQGs. This conditional exemption does not require CESQGs to comply with several regulations specified for generators of more than 100 kg/mo, such as requirements to obtain an EPA identification number, use a manifest when shipping hazardous waste, report to EPA on a biannual basis, or send their hazardous waste to a permitted or interim status Subtitle C facility. CESQGs, however, are responsible for the proper management of their hazardous waste, which, among other things, includes the options to manage their hazardous waste in a state permitted, licensed, or registered municipal or industrial solid waste management facility, or in a permitted or interim status Subtitle C management facility.

Section 4010(c) of RCRA (as amended by HSWA in 1984) requires EPA to promulgate new regulations for all solid waste (i.e., non-hazardous) facilities that may receive hazardous household wastes or hazardous wastes from conditionally-exempt small quantity generators. In October 1991, EPA promulgated revised criteria pursuant to Section 4010(c) for municipal solid waste landfills (codified at 40 CFR Part 258). These revised criteria fulfilled EPA's obligation with respect to one waste category, household hazardous wastes. Municipal solid waste landfills, however, may also accept CESQG waste; and to the extent that they do, EPA's obligation with respect to this class of waste has also been fulfilled. To complete fulfillment of the statutory mandate, EPA is currently reviewing regulatory options to revise criteria for non-municipal facilities that may receive CESQG waste.

This report summarizes existing data on CESQG waste generation and management practices to assist EPA in analyzing regulatory options. In addition, Exhibit C-1 in Appendix C presents the results of a brief search for available pollution prevention opportunities for some of the major CESQG waste generating industries.

METHODOLOGY AND DATA SOURCES

This report identifies and analyzes the findings and results of seven studies that address CESQG waste generation and management practices. A more detailed discussion of each study, including the study's data source, scope, year of completion, methodology, and response rate, if applicable, can be found

in Exhibit A-1 of Appendix A. The studies are summarized as follows:

(1) ***National Small Quantity Hazardous Waste Generator Survey*** **(National SQG Survey)**. This is a survey of 22 manufacturing and non-manufacturing industries conducted during 1983 and 1984 for EPA's Office of Solid Waste. The survey targeted those industries whose firms were thought to be significant generators of less than 1,000 kg/mo of hazardous waste. The survey distinguishes CESQGs from SQGs.

(2) ***Screening Survey of Industrial Subtitle D Establishments*** **(Telephone Screening Survey (TSS))**. During 1987, EPA conducted a survey of 17 manufacturing industries that generate significant quantities of non-hazardous waste and dispose of this waste on-site in land-based units (i.e., surface impoundments, landfills, waste piles, and land application units). Among those firms that disposed non-hazardous waste on-site in land-based units, the survey sought information on whether the firms also generated CESQG waste and whether they managed this waste in on-site, land-based units as well.

(3) ***Hazardous Waste From Small Quantity Generators*** **(SQG book).** This book, published in 1990, is primarily a guide for businesses and governments on the proper management of hazardous waste from small quantity generators. The book, however, is useful for this report because it gives an estimate of the number of CESQG establishments and details state requirements for CESQGs as of 1990.

(4) ***Moderate Risk Waste: A Progress Report*** **(Washington CESQG Report)**. This report, prepared in December 1990 by the State of Washington, details the State's progress in managing moderate risk waste, which the state defines to include CESQG waste.

(5) ***Washington 1988 Hazardous Waste Annual Report Summary*** **(Washington HW Summary)**. The State of Washington requires CESQGs, as well as all other hazardous waste generators, to report annually on their waste generation and management practices. This summary provides data for those CESQGs that submitted reports in 1988.

(6) ***Survey of Conditionally Exempt Small Quantity Generators of Hazardous Waste in Montgomery County, Maryland*** **(Montgomery County Survey)**. In 1993, Montgomery County, Maryland surveyed firms in seven industries that were thought to be major CESQG waste generating industries. This report details the waste generation and management practices of CESQGs responding to the survey.

(7) ***Hazardous Waste From CESQGs in the Municipal Waste Stream: A Literature Review*** **(Literature Review)**. Prepared for EPA in September 1993, this is a literature review of several state and local studies that have characterized CESQG waste generation and management practices, as well as requirements for CESQGs in several states and municipalities.

OUTLINE OF THE REMAINDER OF THE REPORT

The remainder of this report is organized into the following five sections:

- **Section II** summarizes the major findings of the national studies of CESQG waste generation and management practices;
- **Section III** summarizes the major findings of state and local studies of CESQG waste generation and management practices;
- **Section IV** discusses Federal and state requirements for CESQGs;

- **Section V** briefly discusses methods required by four states to screen out CESQG waste at off-site non-hazardous waste management facilities; and

- **Section VI** presents conclusions for this report.

In addition, this report includes three appendices:

- **Appendix A** provides summary data tables for the information presented in Sections II and III;

- **Appendix B** provides a summary data table for Federal and State requirements for CESQGs, discussed in Section IV; and

- **Appendix C** presents the results of a brief search for available pollution prevention opportunities for some of the major CESQG waste generating industries.

SECTION II. CHARACTERIZATION OF CESQGs: MAJOR FINDINGS FROM NATIONAL STUDIES

This section summarizes the major findings from three national studies regarding CESQG waste generation and management practices. These three studies are:

- ***National Small Quantity Hazardous Waste Generator Survey*** **(National SQG Survey);**
- ***Screening Survey of Industrial Subtitle D Establishments*** **(TSS); and**
- ***Hazardous Waste From Small Quantity Generators*** **(SQG book).**

The scope and methodology, as well as other information, for each of these three studies are presented in Exhibit A-1 of Appendix A. EPA believes that of these three data sources, the *National SQG Survey* presents the most comprehensive information on CESQG waste generation and management practices nationwide. However, the Agency believes that the findings of this survey should be viewed with caution, since the data for this survey were collected in 1983-1984, nearly a decade ago. Over the past few years several significant changes have taken place that have affected CESQG waste generation and management practices, for example:

- New waste types are generated while others may no longer be generated;
- The methodology for identifying characteristic wastes has changed;
- Superfund liability concerns have become an important factor for industry to consider when determining waste management options; and
- New regulatory activities (e.g., reporting under the Toxics Release Inventory) have been catalysts for industry to change manufacturing processes and other practices to reduce waste volumes and toxicity.

Other data limitations of the *National SQG Survey* and the other two national sources are discussed below in conjunction with a summary of the sources' major findings.

A. NUMBER OF CESQGS AND WASTE VOLUME

Exhibit 1 summarizes the findings from the three national studies regarding the number of CESQG establishments nationwide and the total volume of CESQG waste.

Number of CESQGs

As Exhibit 1 indicates, the number of all CESQGs nationwide is estimated to range from 455,000 to 700,000. The *National SQG Survey* estimates that there are 455,000 CESQG establishments nationwide. This data source bases this estimate on an extrapolation of data collected from a survey of 22 manufacturing and non-manufacturing industries thought to be significant generators of hazardous waste in quantities of less than 1,000 kg/mo. The data for this survey were collected in 1983-1984. The second estimate of the total number of CESQGs nationwide, 700,000, is found in the *SQG book*. The *SQG book* bases this estimate on an extrapolation of data provided by two sources: (1) marketing figures from waste management firms; and (2) CESQG data from five states and 11 counties. One limitation with the *SQG book's* estimate of 700,000 is that the data were not collected from a scientific national survey, as is the

EXHIBIT 1
Number of CESQGs and CESQG Waste Volume[5]
(national studies)

Title of National Study	Scope of Study	Number of CESQGs	CESQG Waste Volume (tons/yr)
National Small Quantity Hazardous Waste Generator Survey	All Industries	455,000	201,600
Hazardous Waste From Small Quantity Generators	All Industries	700,000	--
Screening Survey of Industrial Subtitle D Establishments	17 MFR[6] Industries	3,742	--

case with the *National SQG Survey*. Further, the five states and 11 counties are not identified in the book, making it difficult to determine whether these studies provided an appropriate sample from which to extrapolate national estimates, or to identify the age of the data collected for these studies.

The third national study, the *TSS*, estimates that there are 3,742 CESQG establishments nationwide. This estimate is significantly different than the other two national estimates for the following reasons:

- Whereas the other two data sources estimate the total number of CESQGs in both manufacturing and non-manufacturing sectors, the *TSS* estimates the total number of CESQG establishments in 17 manufacturing industries only; and

- Further, these 3,742 establishments are the number of establishments in 17 manufacturing industries that in addition to generating and managing non-hazardous waste in on-site, land-based units, also generate CESQG waste. (Exhibit A-2 in Appendix A diagrams the sequence of questions used in the *TSS*.)

This source is significant, however, since an estimated 605 of the 3,742 establishments also dispose of their CESQG waste in on-site, land-based units. These estimates should also be viewed with caution since the *TSS* was conducted in 1987. Since then some of these establishments may have ceased disposal of CESQG waste in on-site, land-based units due to state regulatory changes or increased liability concerns. Nonetheless, to the extent that establishments continue to dispose of their CESQG waste in on-site, land-based units, any revisions to criteria under Section 4010(c) of RCRA that EPA may consider for facilities managing CESQG waste may impact how these establishments manage their CESQG waste.

CESQG Waste Volume

As Exhibit 1 indicates, only one national study, the *National SQG Survey* estimates total CESQG waste volume nationwide, 201,600 tons per year (tons/yr). At the time that the data for this study were collected, 1983-1984, this total CESQG waste volume represented only 0.07 percent of the total amount of hazardous waste generated

[5] The findings in this exhibit are taken directly from the associated study or have been calculated using other results included in the study.

[6] MFR denotes "manufacturing" and N-MFR denotes "non-manufacturing."

by all generators (conditionally-exempt, small quantity, and large quantity), estimated at approximately 290,000,000 tons/yr.

More recent state and local studies suggest that these national estimates for the number of CESQG establishments and total CESQG waste volume, however, appear to be low. For example, according to the Washington Department of Ecology, Washington State alone had approximately 43,000 CESQGs generating 53,200 tons/yr of hazardous waste in 1990. This waste volume amount represents nearly one-third of the total national waste volume estimate. State and local studies are discussed in greater detail in Section III.

B. MAJOR CESQG WASTE GENERATING INDUSTRIES AND WASTE TYPES

Exhibit 2 lists the major CESQG waste generating industries and CESQG waste types identified by two national sources; the *SQG book* did not provide estimates for these data elements.

EXHIBIT 2
Major CESQG Waste Generating Industries and Waste Types
(national studies)

Title of National Study	Scope of Study	Major CESQG Generating Industries	Major CESQG Waste Types[7]
National SQG Survey	(22 MFR, N-MFR* Industries)	♦ vehicle maintenance ♦ metals manufacturing ♦ laundries ♦ printing/ceramics ♦ other services ♦ pesticide users/appliers ♦ construction	♦ lead-acid batteries (61%) ♦ spent solvents/still bottoms (18%) ♦ dry cleaning filter residues (5%) ♦ photographic wastes (4%) ♦ formaldehyde (3%) ♦ acids and akalides (2%)
TSS	(17 MFR Industries)	♦ stone, clay, glass, and concrete ♦ food and kindred products ♦ primary steel and iron ♦ textile manufacturing ♦ pulp and paper	Not Provided in Report

* MFR denotes "manufacturing" and N-MFR denotes "non-manufacturing."

Major CESQG Waste Generating Industries

As Exhibit 2 indicates, the *National SQG Survey* identifies the vehicle maintenance industry as the largest CESQG industry (from the 22 industry groups surveyed) both in terms of number of CESQGs (54 percent) and waste volume (71 percent). This data source finds that the following industries are also major CESQG waste generating industries:

- **Metals Manufacturing** generates the second highest amount of CESQG waste for the industries surveyed, approximately 6.1 percent, and nearly one half of the CESQG waste volume in the manufacturing sector alone;

- **Laundries** generate approximately 4.8 percent of total CESQG waste volume for the industries surveyed;

[7] Percentages in parentheses shows the percent of total waste volume for the waste types as reported in the associated study or determined through calculations using other findings reported in the study.

- **Printing/Ceramics** generates nearly 4.8 percent of total CESQG waste volume for the industries surveyed, and nearly 39 percent of CESQG waste in the manufacturing sector alone;

- **Pesticide End Users and Application Services** generate approximately 2.1 percent of all CESQG waste volume for the industries surveyed;

- **Construction** generates 1.9 percent of CESQG waste for the industries surveyed; and

- **Photography** generates approximately 1.8 percent of total CESQG waste for the industries surveyed.

Exhibit 3 compares these industries both in terms of number of generators and waste volume. This exhibit indicates that according to the *National SQG Survey*, non-manufacturing industries dominate both in terms of number of CESQG establishments and waste volume. More recent state and local studies (discussed in Section III) also find that major CESQG industries are predominantly in the non-manufacturing sector. Three of these studies find that the vehicle maintenance industry is the largest or second largest CESQG industry. Comparing state and local findings with those of the *National SQG Survey* should be done with caution, however, since these studies may or may not include used motor oil or used lead-acid batteries as a waste type for the vehicle maintenance industry, thus affecting the relative significance of this industry. The *National SQG Survey*, for example, did not include used motor oil as a waste type, while some state and local studies did.

The other national data source reviewed was the *TSS*. Again, it should be noted that this study surveyed 17 manufacturing industries only, and only identified establishments as CESQGs if, in addition to disposing non-hazardous waste in on-site, land-based units, they also generated CESQG waste. This survey found that 605 of the 3,742 CESQGs in these 17 manufacturing industries disposed of their waste in on-site, land-based units. The following five industries were identified as having a significant number of establishments that in addition to generating CESQG waste, also disposed of this waste in on-site, land-based units:

- Stone, Clay, Glass, and Concrete (26 percent of CESQG establishments that dispose of CESQG waste in on-site, land-based units);

- Food and Kindred Products (22 percent);

- Primary Iron and Steel (eight percent):

- Textile Manufacturing (eight percent); and

- Pulp and Paper (seven percent).

CESQG waste volumes are not reported in this study.

Comparing the results of the *TSS* to the *National SQG Survey* is problematic, considering that the *TSS* surveyed manufacturing industries only, while the *National SQG Survey* looked at both manufacturing and non-manufacturing industries. The only comparison between the two studies that can be made is for the textile manufacturing and pulp and paper industries. The *National SQG Survey* estimates that each of these two industries generates approximately 0.05 percent of the total CESQG waste volume. As a result of this waste generation amount, the *National SQG Survey* found both industries to be relatively small

Contains Data for

Postscript Only.

generators of CESQG waste. None of the state and local studies identified any of the industries listed in the *TSS* as major CESQG waste generating industries.

CESQG Waste Types

As Exhibit 2 indicates, only one national data source, the *National SQG Survey*, identified major CESQG waste types. This major waste types are presented in Exhibit 4.

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With the exception of spent solvents/still bottoms and acids and alkalides, these waste types are generally specific to one industry (formaldehyde is a significant waste type for the funeral service and crematory industry). Spent solvents/still bottoms and acids and alkalides, however, are significant waste types in several industries. Many state and local studies (see Section III) identified used motor oil as the largest CESQG waste type. The *National SQG Survey*, however, did not include this waste type, which probably accounts for the discrepancy. Several state and local studies found that spent solvents/still bottoms, used lead-acid batteries, and photographic wastes were major CESQG waste types. Again, comparing state and local studies to the *National SQG Survey* should be done with caution. Some state and local studies, for example, used *National SQG Survey* results to target their surveys, thus one might expect the results to be similar.

C. CESQG WASTE MANAGEMENT PRACTICES

Exhibit 5 summarizes the results of the *National SQG Survey* and the *TSS* regarding CESQG waste management practices.

EXHIBIT 5
CESQG Waste Management Practices[8]
(national studies)

Title of National Study	Scope of Study	Method of Management	
		Off-Site	**On-Site**
National Small Quantity Hazardous Waste Generator Survey	22 MFR and NMFR industries	80% of CESQG waste for the industries surveyed (95,226 tons/yr)	20% of CESQG waste for the industries surveyed (26,176 tons/yr)
		Recycling (73%) Unknown (13%) Solid Waste Landfill[9] (10%) Permitted Subtitle C Landfill (2%)	Sewer (46%) Septic System (10%) Solid Waste Incineration (3%) Solid Waste Landfill (2%).
Screening Survey of Industrial Subtitle D Establishments	17 MFR industries	84% of CESQG establishments in industries surveyed	16% of CESQG establishments in industries surveyed
		Subtitle C Facility Incineration Energy Recovery Tanks Recycling	Landfills Surface Impoundments Land Application Waste Pile

General CESQG Waste Management Practices

For the 22 industries surveyed, the *National SQG Survey* found that approximately 80 percent of the CESQG waste is managed off-site, while approximately 20 percent is managed on-site. The predominant off-site management methods for the 22 industries surveyed are:

- Recycling (73 percent of waste managed off-site or 69,900 tons/yr);

[8] The findings in this exhibit are found in the associated study or calculated using other results provided in the study. The waste amounts managed, as reported by the *National SQG Survey*, do not add up to 201,600 tons, since the managed amounts are based on data collected from the 22 surveyed industries, while the 201,600 figure is a national estimate extrapolated from the survey data.

[9] The study does not distinguish between municipal and non-municipal landfills.

- Disposal at a non-hazardous solid waste landfill[10] (ten percent of waste managed off-site, or 9,300 tons/yr), either by direct haul or mixture with the solid waste stream at the point of generation; and

- Disposal at a permitted Subtitle C landfill (two percent of the waste managed off-site, or 2,000 tons/yr).

The predominant on-site management methods for the 22 industries surveyed are:

- Disposal in the sewer and/or septic system (56 percent of the waste managed on-site, or 14,600 tons/yr); and

- Disposal in a non-hazardous solid waste landfill (two percent of the waste managed on-site, or 509 tons/year).

With regard to the data from the *National SQG Survey* four significant data limitations apply:

- The data on waste management methods is for only the 22 industries surveyed. Together these industries represented approximately 60 percent of total CESQG waste nationwide. No extrapolations of waste management data to a national level were given.

- A substantial portion of the CESQG waste from some industries is not allocated to any waste management method and no explanation for these data gaps is offered.

- The survey reports that approximately 13 percent of waste managed off-site by the 22 industries is managed in an "unknown" facility. "Unknown" is not defined.

- For off-site solid waste landfills, the study does not differentiate between municipal and non-municipal (e.g., industrial or construction and demolition landfill). This is an important distinction considering that EPA has revised criteria for municipal facilities, requiring these facilities to meet more stringent design and operating criteria than non-municipal facilities.

The *National SQG Survey* estimates that 1,956 generators in eight industries dispose of their CESQG waste at on-site solid waste landfills (509 tons/yr). These industries and the amount of waste disposed are listed in Exhibit A-3 of Appendix A. The estimates for disposal in on-site solid waste landfills for these eight industries, however, may be unreliable based on the fact that the study does not define the term "on-site solid waste landfill," and it seems unlikely that some of the industries cited (i.e., laundries, and pesticide end users) would have sufficient industrial solid waste to warrant an on-site landfill.

The other national study identified in Exhibit 5, the *TSS*, estimates that 605 (16 percent) of 3,742 CESQG establishments in 17 manufacturing industries dispose of their waste in an on-site, land-based unit that also receives non-hazardous waste. (Exhibit A-4 in Appendix A presents the results of this study.) The top five industries in terms of the total number of CESQG establishments that dispose CESQG waste in on-site, land-based units are identified in Exhibit 6. Again, the *TSS* does not provide waste volumes, only number of establishments. Also, the data for this survey were collected in 1987. Since then CESQGs may have ceased disposal of CESQG waste in on-site, land-based units due to changes in state requirements or increased liability concerns.

The only industries that overlap between the *TSS* and the *National SQG Survey* are textile manufacturing and pulp and paper. The *National SQG Survey* estimates that 14 generators in the **textile manufacturing** industry dispose of their CESQG waste in an on-site landfill. Although the *TSS* estimates that 50 generators in this industry dispose of their CESQG waste in an on-site, land-based unit, none of the generators use a landfill. Rather the study estimates that

[10] The *National Small Quantity Hazardous Waste Generator Survey* does not distinguish between a municipal or non-municipal (e.g., industrial, construction and demolition landfill).

all 50 use a surface impoundment. Within the **pulp and paper** industry, the *National SQG Survey*, estimates that no generators dispose of their waste in an on-site solid waste landfill. The *TSS*, in contrast, estimates that six of the 43 CESQGs that dispose CESQG waste in an on-site, land-based unit manage this waste in a landfill. Again, these discrepancies are indicative of the difficulty in comparing these two national data sources. As discussed in Exhibit A-1 of Appendix A, each study had a different methodology and scope, which may be the underlying factors leading to these discrepancies.

Waste Management Practices in the Major CESQG Waste Generating Industries

The *National SQG Survey* provides information on the management practices of the major CESQG waste generating industries identified above. Exhibit 7 graphically shows the CESQG waste management practices of these industries.

Exhibit 7 illustrates that all industries send some portion of their CESQG waste to an off-site solid waste landfill (e.g., 49.5 percent of CESQG waste generated by laundries is sent to an off-site solid waste landfill, the largest amount of the seven industries). Again, the *National SQG Survey* does not distinguish between a municipal or a non-municipal solid waste landfill. With regard to disposal of CESQG waste in an on-site solid waste landfill, three industries (vehicle maintenance, printing/ceramics, and photography) do not use this management method, while the other four do. The construction industry, for, example, manages approximately 10.3 percent of its CESQG waste (263 tons/yr) in an on-site solid waste landfill. These estimates should be viewed with caution since the study does not define "on-site solid waste landfill."

generators of CESQG waste. None of the state and local studies identified any of the industries listed in the *TSS* as major CESQG waste generating industries.

CESQG Waste Types

As Exhibit 2 indicates, only one national data source, the *National SQG Survey*, identified major CESQG waste types. This major waste types are presented in Exhibit 4.

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With the exception of spent solvents/still bottoms and acids and alkalides, these waste types are generally specific to one industry (formaldehyde is a significant waste type for the funeral service and crematory industry). Spent solvents/still bottoms and acids and alkalides, however, are significant waste types in several industries. Many state and local studies (see Section III) identified used motor oil as the largest CESQG waste type. The *National SQG Survey*, however, did not include this waste type, which probably accounts for the discrepancy. Several state and local studies found that spent solvents/still bottoms, used lead-acid batteries, and photographic wastes were major CESQG waste types. Again, comparing state and local studies to the *National SQG Survey* should be done with caution. Some state and local studies, for example, used *National SQG Survey* results to target their surveys, thus one might expect the results to be similar.

C. CESQG WASTE MANAGEMENT PRACTICES

Exhibit 5 summarizes the results of the *National SQG Survey* and the *TSS* regarding CESQG waste management practices.

EXHIBIT 5
CESQG Waste Management Practices[8]
(national studies)

Title of National Study	Scope of Study	Method of Management	
		Off-Site	**On-Site**
National Small Quantity Hazardous Waste Generator Survey	22 MFR and NMFR industries	80% of CESQG waste for the industries surveyed (95,226 tons/yr)	20% of CESQG waste for the industries surveyed (26,176 tons/yr)
		Recycling (73%) Unknown (13%) Solid Waste Landfill[9] (10%) Permitted Subtitle C Landfill (2%)	Sewer (46%) Septic System (10%) Solid Waste Incineration (3%) Solid Waste Landfill (2%).
Screening Survey of Industrial Subtitle D Establishments	17 MFR industries	84% of CESQG establishments in industries surveyed	16% of CESQG establishments in industries surveyed
		Subtitle C Facility Incineration Energy Recovery Tanks Recycling	Landfills Surface Impoundments Land Application Waste Pile

General CESQG Waste Management Practices

For the 22 industries surveyed, the *National SQG Survey* found that approximately 80 percent of the CESQG waste is managed off-site, while approximately 20 percent is managed on-site. The predominant off-site management methods for the 22 industries surveyed are:

- Recycling (73 percent of waste managed off-site or 69,900 tons/yr);

[8] The findings in this exhibit are found in the associated study or calculated using other results provided in the study. The waste amounts managed, as reported by the *National SQG Survey*, do not add up to 201,600 tons, since the managed amounts are based on data collected from the 22 surveyed industries, while the 201,600 figure is a national estimate extrapolated from the survey data.

[9] The study does not distinguish between municipal and non-municipal landfills.

- Disposal at a non-hazardous solid waste landfill[10] (ten percent of waste managed off-site, or 9,300 tons/yr), either by direct haul or mixture with the solid waste stream at the point of generation; and

- Disposal at a permitted Subtitle C landfill (two percent of the waste managed off-site, or 2,000 tons/yr).

The predominant on-site management methods for the 22 industries surveyed are:

- Disposal in the sewer and/or septic system (56 percent of the waste managed on-site, or 14,600 tons/yr); and

- Disposal in a non-hazardous solid waste landfill (two percent of the waste managed on-site, or 509 tons/year).

With regard to the data from the *National SQG Survey* four significant data limitations apply:

- The data on waste management methods is for only the 22 industries surveyed. Together these industries represented approximately 60 percent of total CESQG waste nationwide. No extrapolations of waste management data to a national level were given.

- A substantial portion of the CESQG waste from some industries is not allocated to any waste management method and no explanation for these data gaps is offered.

- The survey reports that approximately 13 percent of waste managed off-site by the 22 industries is managed in an "unknown" facility. "Unknown" is not defined.

- For off-site solid waste landfills, the study does not differentiate between municipal and non-municipal (e.g., industrial or construction and demolition landfill). This is an important distinction considering that EPA has revised criteria for municipal facilities, requiring these facilities to meet more stringent design and operating criteria than non-municipal facilities.

The *National SQG Survey* estimates that 1,956 generators in eight industries dispose of their CESQG waste at on-site solid waste landfills (509 tons/yr). These industries and the amount of waste disposed are listed in Exhibit A-3 of Appendix A. The estimates for disposal in on-site solid waste landfills for these eight industries, however, may be unreliable based on the fact that the study does not define the term "on-site solid waste landfill," and it seems unlikely that some of the industries cited (i.e., laundries, and pesticide end users) would have sufficient industrial solid waste to warrant an on-site landfill.

The other national study identified in Exhibit 5, the *TSS*, estimates that 605 (16 percent) of 3,742 CESQG establishments in 17 manufacturing industries dispose of their waste in an on-site, land-based unit that also receives non-hazardous waste. (Exhibit A-4 in Appendix A presents the results of this study.) The top five industries in terms of the total number of CESQG establishments that dispose CESQG waste in on-site, land-based units are identified in Exhibit 6. Again, the *TSS* does not provide waste volumes, only number of establishments. Also, the data for this survey were collected in 1987. Since then CESQGs may have ceased disposal of CESQG waste in on-site, land-based units due to changes in state requirements or increased liability concerns.

The only industries that overlap between the *TSS* and the *National SQG Survey* are textile manufacturing and pulp and paper. The *National SQG Survey* estimates that 14 generators in the **textile manufacturing** industry dispose of their CESQG waste in an on-site landfill. Although the *TSS* estimates that 50 generators in this industry dispose of their CESQG waste in an on-site, land-based unit, none of the generators use a landfill. Rather the study estimates that

[10] The *National Small Quantity Hazardous Waste Generator Survey* does not distinguish between a municipal or non-municipal (e.g., industrial, construction and demolition landfill).

all 50 use a surface impoundment. Within the **pulp and paper** industry, the *National SQG Survey*, estimates that no generators dispose of their waste in an on-site solid waste landfill. The *TSS*, in contrast, estimates that six of the 43 CESQGs that dispose CESQG waste in an on-site, land-based unit manage this waste in a landfill. Again, these discrepancies are indicative of the difficulty in comparing these two national data sources. As discussed in Exhibit A-1 of Appendix A, each study had a different methodology and scope, which may be the underlying factors leading to these discrepancies.

Waste Management Practices in the Major CESQG Waste Generating Industries

The *National SQG Survey* provides information on the management practices of the major CESQG waste generating industries identified above. Exhibit 7 graphically shows the CESQG waste management practices of these industries.

Exhibit 7 illustrates that all industries send some portion of their CESQG waste to an off-site solid waste landfill (e.g., 49.5 percent of CESQG waste generated by laundries is sent to an off-site solid waste landfill, the largest amount of the seven industries). Again, the *National SQG Survey* does not distinguish between a municipal or a non-municipal solid waste landfill. With regard to disposal of CESQG waste in an on-site solid waste landfill, three industries (vehicle maintenance, printing/ceramics, and photography) do not use this management method, while the other four do. The construction industry, for, example, manages approximately 10.3 percent of its CESQG waste (263 tons/yr) in an on-site solid waste landfill. These estimates should be viewed with caution since the study does not define "on-site solid waste landfill."

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SECTION III. CHARACTERIZATION OF CESQGs: MAJOR FINDINGS FROM STATE AND LOCAL STUDIES

This section summarizes the major findings from four state and local studies regarding CESQG waste generation and management practices. These studies are:

- ***Moderate Risk Waste: A Progress Report*** **(Washington CESQG Report)**;
- ***Washington 1988 Hazardous Waste Annual Report Summary*** **(Washington HW Summary)**;
- ***Survey of Conditionally Exempt Small Quantity Generators of Hazardous Waste in Montgomery County, Maryland*** **(Montgomery County Survey)**;
- ***Hazardous Waste From CESQGs in the Municipal Solid Waste Stream: A Literature Review*** **(Literature Review)**. This source includes several state and local studies. These studies are identifies in the relevant sections below.

The scope and methodology, as well as other information, for each of these studies is presented in Exhibit A-1 of Appendix A.

A. NUMBER OF CESQGS AND WASTE VOLUME

Exhibit 8 lists the number of CESQGs and CESQG waste volume found in several state and local studies.

Number of CESQGs

Seven studies listed in Exhibit 8 identify the number of CESQG establishments in the areas covered by the study. The studies listed in Exhibit 8 present a wide range of estimates for the number of CESQGs (from a low of 2,318 establishments in New Hampshire to a high of 43,000 establishments in Washington).[11] This wide range of estimates demonstrates the difficulty in extrapolating to national estimates based on state and local studies. State estimates of the number of CESQG establishments may be dependent upon various factors, such as how the state defines and counts CESQGs.

CESQG Waste Volume

One state and three local studies provide information on the volumes of CESQG waste in the areas covered by the study. Only Washington State provides an estimate of CESQG waste volume statewide, thus comparisons can not be made. Three local studies present varying results for CESQG waste volume, which may be attributed to varying demographics (rural versus urban), populations, and economic structure (manufacturing versus non-manufacturing industries). Again, the findings of these studies point out the difficulties in extrapolating to a national level.

Notwithstanding, the data limitations of these studies, the *Washington CESQG Report* indicates that the national estimates of the number of CESQGs (455,000) and CESQG waste volume (approximately 200,000 tons/yr) may be underestimates.[12]

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[11] Although the *Washington CESQG Report* indicates that there are 240,000 CESQG establishments statewide, this estimate has since been revised downward to 43,000. The amount of waste generated, however, remains the same, 53,000 tons/yr. (Telephone conversation with Mr. William Green, Washington Department of Ecology, May 4, 1994.)

[12] The National SQG Survey did not include used motor oil at all.

EXHIBIT 8
Number of CESQGs and CESQG Waste Volume[13]
(state and local studies)

Title of State or Local Study	Scope of Study	Number of CESQGs	CESQG Waste Volume (tons/yr)
Moderate Risk Waste: A Progress Report (State of Washington)	State (All Industries)	43,000	53,200
Hazardous Waste From CESQGs in the Municipal Waste Stream: A Literature Review			
State of Maine	State (All Industries)	5,000-10,000	
State of Massachusetts	State (All Industries)	13,500	
State of New Hampshire	State (All Industries)	2,318	
State of Vermont	State (All Industries)	2,500-12,000	
Central Vermont Solid Waste Management District	Counties (All Industries)	658	739
Thurston County, Washington	County (All Industries)		864
Survey of Conditionally Exempt Small Quantity Generators of Hazardous Waste in Montgomery County, Maryland	County (All Industries)	800-2,000	255-484

Moreover, Thurston County's report helps to understand the significance of including or excluding used motor oil, oil filters, and/or lead-acid batteries. For example, Thurston County calculated a total waste volume of 864 tons/yr when the waste stream included motor oil, oil filters, and lead-acid batteries for all industries. Excluding these components from the waste stream for all industries, however, significantly decreased CESQG waste volume to 115 tons/yr. Based on these results, it is apparent that had the *National SQG Survey* included waste oil, CESQG waste volumes may have been higher than reported.

B. MAJOR CESQG WASTE GENERATING INDUSTRIES AND WASTE TYPES

Exhibit 9 lists the major CESQG waste generating industries and waste types from state and local studies.

EXHIBIT 9
Major CESQG Waste Generating Industries and Waste Types
(state and local studies)

[13] The findings in this exhibit are taken directly from the associated study or have been calculated using other results included in the study.

Title of State or Local Study	Scope of Study	Major CESQG Generating Industries	Major CESQG Waste Types[14]
Moderate Risk Waste: A Progress Report (State of Washington)	State (All Industries)	Not Provided in Report	♦ oil (53%) ♦ paints and solvents (14%) ♦ batteries (14%) ♦ antifreeze (6%)
Washington 1988 Hazardous Waste Annual Report Summary	State (All Industries)	♦ business services ♦ human services ♦ wholesale and retail trade ♦ public administration	Not provided in Report
Hazardous Waste From CESQGs in the Municipal Waste Stream: A Literature Review			
State of Oregon	State (All Industries)	Uses National Figures	♦ lead-acid batteries (61%) ♦ spent solvents/still bottoms (23%) ♦ photographic waste (4%)
2 Counties in Vermont	Counties (All Industries)	♦ auto repair ♦ trucking ♦ firms with own truck fleet	♦ used motor oil (66%) ♦ solvents (16%) ♦ lead-acid batteries (7%) ♦ photographic wastes (4%) ♦ antifreeze (2%)
Central Vermont Solid Waste Management District	Counties (All Industries)	Not Provided in Report	♦ used motor oil (54%) ♦ solvents and degreasers (27%)

[14] Percentages in parentheses shows the percent of total waste volume for the waste types as reported in the associated study or determined through calculations using other findings reported in the study.

EXHIBIT 9 (continued)
Major CESQG Waste Generating Industries and Waste Types
(state and local studies)

Title of Study	Scope of Study	Major CESQG Generating Industries	Major CESQG Waste Types
Hazardous Waste From CESQGs in the Municipal Waste Stream: A Literature Review (continued)			
Thurston County, Washington	County (All Industries)	♦ auto repair ♦ auto dealer ♦ transportation ♦ miscellaneous wholesale ♦ miscellaneous business	♦ spent solvents ♦ used motor oil ♦ lead-acid batteries ♦ photographic waste ♦ antifreeze
Olmstead County, Minnesota	County (All Industries)	Not Provided in Study	♦ motor oil, antifreeze, brake/transmission fluids ♦ lead-acid batteries ♦ diesel, gas, kerosene ♦ spent solvents/still bottoms ♦ paint removers ♦ oil-based paints
Survey of Conditionally Exempt Small Quantity Generators of Hazardous Waste in Montgomery County, Maryland	County (7 MFR, N-MFR Industries)	♦ dry cleaners ♦ auto services ♦ printing and publishing ♦ photography ♦ landscapers/pesticides control ♦ general building contractors ♦ woodworking/painters	♦ perchloroethylene (31%) ♦ antifreeze (23%) ♦ solvents (17%) ♦ photography wastes (10%) ♦ inks/paints (7%) ♦ motor oil (7%)

Major CESQG Waste Generating Industries

As shown in Exhibit 9, state and local studies identify various types of industries as major CESQG waste generating industries. A limitation in comparing the major generating industries across studies is the basis for which a study determines the major industries. For example, the *Washington HW Summary*, which finds business and human services, wholesale and retail trade, and public administration as major CESQG generating industries, is based on those establishments that submitted the required annual report. Of the approximate 43,000 CESQGs in the State, only 143 submitted the annual report in 1988. This small sample size precludes the use of this study to determine major CESQG industries. Additionally, Montgomery County, Maryland only surveyed firms in seven industries that were thought to be the largest contributors of CESQG waste. With regard to the major CESQG waste generating industries identified in Section II, the state and local studies listed in Exhibit 9 show the following:

♦ **Vehicle Maintenance.** Thurston County, Washington reports that the vehicle maintenance industry generates 56 percent of CESQG waste in the county if used motor oil, oil filters, and lead-acid batteries are included and 31 percent when these three waste types are excluded. In both instances, vehicle maintenance is the largest generating industry in the county. In addition, the *Montgomery County Survey*, which excluded used motor oil and lead-acid batteries for the vehicle maintenance industry, reports that this industry still generates nearly one-fourth of total waste volume for the businesses surveyed, second only to laundries. Two county studies in Vermont found vehicle

maintenance to be a major CESQG industry, however, neither offered an estimate of the relative size of the industry.

- **Laundries**. Only the *Montgomery County Survey* identified this industry as a major CESQG waste generating industry. In Montgomery County, Maryland laundries generate the most CESQG waste of the industries surveyed, 31 percent.

- **Printing/Ceramics**.[15] Again, only the *Montgomery County Survey* identified this industry as a major CESQG waste generating industry. Montgomery County, Maryland finds that printing and publishing, without ceramics, generates approximately 19 percent of CESQG waste for the industries surveyed.

- **Pesticide End Users and Application Services**. Montgomery County, Maryland surveyed businesses that use pesticides and other chemicals in the treatment of lawns and homes and found that these businesses generate 7.1 percent of CESQG waste volume for the industries surveyed. No other study identified these industries as major CESQG waste generating industries.

- **Construction**. In Montgomery County, Maryland and Thurston County, Washington this industry generates 6.4 and 2.6 percent of the CESQG waste volume, respectively.

- **Photography**. In Montgomery County, Maryland this industry generates approximately 7.3 percent of the total CESQG waste for the industries surveyed. No other study identified this industry as a major CESQG waste generating industry.

Thus, two or more state and local studies listed in Exhibit 9 concur with the results of the *National SQG Survey* (discussed in Section II) for two industries only (vehicle maintenance and construction).

CESQG Waste Types

Exhibit 9 lists several studies that identify major CESQG waste types and the relative significance of the waste types to the study's total CESQG waste volume. A significant factor limiting the comparison of these studies is how used motor oil and lead-acid batteries are classified. Current RCRA regulations exclude these waste types from regulations in the hands of the generator provided that the waste types are to be recycled or reused. As a result, some of the studies excluded these waste types from the vehicle maintenance industry, which reclaims these materials. This reduced the relative significance of these waste types in these studies. On the other hand, some studies included both waste types in the vehicle maintenance industry, which greatly increased their relative significance. All studies, however, included these waste types in other industries. As noted below, non-vehicle maintenance industries (photography, woodworking/painting, and general building contracting) generate significant quantities of used motor oil and lead-acid batteries.

These studies find that the following waste types are major CESQG waste types:

- **Used Motor Oil**. Six of the studies listed in Exhibit 9 identify used motor oil as a major CESQG waste type. The percentage of total waste volume attributed to this single waste type varies from 66 percent in one of the two county studies in Vermont to seven percent in Montgomery County, Maryland. This wide variance is attributed to the fact that some studies include used motor oil as part of the CESQG waste stream for the vehicle maintenance industry, while other studies do not. The two counties in Vermont, for example, included used motor oil for vehicle maintenance industry, while the *Montgomery County Survey* did not. Most importantly, however, used motor oil is a significant CESQG waste type for many industries outside of vehicle maintenance. For

[15] Both the *Montgomery County Survey* and the *National SQG Survey* included these two separate industries as a single industry group.

example, the *Montgomery County Survey* found that used motor oil is a significant waste type in the photography, woodworking/painting, general building contracting, and landscaping/pest control industries.

- **Used-Lead Acid Batteries**. Five of the studies found this waste to be a major waste type, ranging from 61 percent to seven percent of the total CESQG waste volume estimated in the studies. Again, this wide variance is due to the fact that some studies included this waste type for the vehicle maintenance industry (State of Oregon), while other studies did not (*Washington CESQG Report* and the two county study in Vermont). Outside of the vehicle maintenance industry, the *Montgomery County Survey* finds that used-lead acid batteries are a significant waste type for the general building contracting industry.

- **Antifreeze**. As is the case with used motor oil and lead-acid batteries, the relative importance of this waste type varies depending on whether the study includes it as part of the waste stream for the vehicle maintenance industry. In the *Washington CESQG Report*, the State does not include antifreeze in the vehicle maintenance industry but reports that this waste type is six percent of the total CESQG waste volume. The *Montgomery County Survey*, however, includes antifreeze in the vehicle maintenance industry and reports that this waste type is 23 percent of the total CESQG waste volume.

- **Spent Solvents and Still Bottoms.** All of the studies that listed waste types in Exhibit 9 identified spent solvents and still bottoms as a significant waste type, representing a fairly consistent portion of the total CESQG waste stream across all studies (ranging from one-seventh to one-fourth of the total CESQG waste volume estimated in the studies). More importantly, the *Montgomery County Survey* finds that this waste type is significant in several industries surveyed.

- **Perchloroethylene**. Only one of the studies listed in Exhibit 9 identifies perchloroethylene as a major CESQG waste type, 31 percent of the total CESQG waste volume for the industries surveyed in Montgomery County, Maryland All of this waste is generated by laundries.

- **Photographic Wastes**. Four of the studies listed in Exhibit 9 find wastes from the photography industry to be major CESQG waste types, ranging from ten percent of the total CESQG waste volume in Montgomery County to four percent in the other studies. As is the case with perchloroethylene, only one industry generates these wastes, the photography industry.

C. CESQG WASTE MANAGEMENT PRACTICES

Exhibit 10 lists CESQG waste management practices identified by two state and one local study.

General CESQG Waste Management Practices

As Exhibit 10 indicates, one state and one local study both conclude that the majority of CESQG waste from the industries included in the studies is managed **off-site** (84 percent in the *Montgomery County Survey*, and 88 percent in the *Washington CESQG Report*, assuming that all CESQG waste stored on-site is ultimately sent to an off-site management facility). The major off-site management methods are recycling, disposal in a permitted Subtitle C landfill, and disposal in a solid waste landfill, either by direct haul to the facility or mixture with solid waste at the site of generation.

EXHIBIT 10

CESQG Waste Management Practices[16]

Title of State and Local Study	Scope of Study	Method of Management	
		OFF-SITE	**ON-SITE**
Hazardous Waste From CESQGs in the Municipal Waste Stream: A Literature Review State of Oregon	State (all industries)	Percentages not given	Percentages not given
		Recycling Disposal in solid waste landfill Disposal in permitted Subtitle C landfill	Disposal in sewer, septic system, and dry wells Treatment on-site Evaporation Burning
Moderate Risk Waste: A Progress Report (State of Washington)	State (all industries)	88% of State CESQG waste	12% of State CESQG waste
		On-site Storage (50%)[17] Recycling (21%) Collection and treatment (7%) Disposal in solid waste landfill (2%)	Disposal in sewer (7%) Dumping on ground (5%)
Survey of Conditionally Exempt Small Quantity Generators of Hazardous Waste in Montgomery County, Maryland	County (seven industries surveyed)	84% of waste from industries surveyed	16% of waste from industries surveyed
		Disposal in a Subtitle C landfill (36%) Recycling (33%) Disposal in a solid waste landfill (13%)	Disposal in sewer (13%) Evaporation (3%)

The *Montgomery County Survey* and the *Washington CESQG Report* estimate that 13 and two percent of CESQG waste from the industries surveyed, respectively, is disposed at an off-site solid waste landfill. None of the studies listed in Exhibit 10, however, differentiates between a municipal and non-municipal solid waste landfill.

The *Montgomery County Survey* and the *Washington CESQG Report* estimate that 16 and 12 percent of CESQG waste is managed on-site, respectively. None of the three studies listed in Exhibit 10 indicate that any CESQG waste is disposed in an on-site landfill. This is in contrast to the *National SQG Survey*, which found that at least some CESQG establishments in eight industries managed CESQG waste in an on-site

[16] The findings in this exhibit are taken from the associated study or calculated using other results provided in the study.

[17] This assumes that all waste stored on-site is eventually shipped off-site for management.

landfill. This is a possible indication of changes in waste management practices since 1985, the year in which the *National SQG Survey* was published.

CESQG Waste Management Practices in the Major Generating Industries

With regard to the use of on-site and off-site landfills to manage waste from the major CESQG waste generating industries, identified previously, state and local studies indicate the following:

- **Vehicle Maintenance**. The *Montgomery County Survey* finds that none of the waste from this industry is managed at either an on-site or off-site solid waste landfill. The waste is recycled, put into the sewer system, or sent to a permitted Subtitle C facility. Thurston County, Washington found that two percent of the waste from this industry is "mismanaged." [18]

- **Laundries**. The *Montgomery County Survey* is the only state or local study to identify the waste management practice of this industry. The county finds that all CESQG waste generated by this industry is recycled or managed at an off-site Subtitle C landfill.

- **Printing/Ceramics**. The *Montgomery County Survey* finds that 13 percent of the waste from this industry is managed at an off-site landfill, while none is managed in an on-site solid waste landfill.

- **Pesticide Application Services and End Users**. The *Montgomery County Survey* finds that business using pesticides and chemicals on lawns or in homes manage more than one-third of their waste in off-site solid waste landfills and none in an on-site solid waste landfill.

- **Construction**. The *Montgomery County Survey* finds that 18 percent of the CESQG waste from this industry is managed in an off-site solid waste landfill, while none is managed in an on-site landfill. Counting used motor oil, oil filters, and lead-acid batteries, Thurston County, Washington finds that only two percent of the waste from this industry is "mismanaged." Excluding these three waste types, however, Thurston County finds that all of the remaining CESQG waste is "mismanaged."[18]

- **Photography**. The *Montgomery County Survey* finds that none of the CESQG waste is managed in either an on-site solid or an off-site waste landfill. Thurston County, Washington finds that 75 percent of the waste from this industry is "mismanaged."[18]

The state and local studies did not discuss waste management practices for the metals manufacturing industry.

Although no direct comparisons with the *National SQG Survey* are presented in this section, such comparisons should be made with caution for two reasons: (1) the data for the *National SQG Survey* were collected approximately ten years prior to the data for the reports from Montgomery County, Maryland and Thurston County, Washington, as a result, CESQG waste management practices may have changed in the interim, and (2) it is difficult to compare the results of a comprehensive, national survey with surveys from only two specific counties.

[18] Thurston County, Washington defines "mismanaged" as "not recycled, reused, or sent to a permitted Subtitle C facility." Other examples of mismanagement are not given.

SECTION IV. FEDERAL AND STATE REQUIREMENTS FOR CESQGs

A. FEDERAL REQUIREMENTS

Federal regulations delineate three categories of hazardous waste generators based on the amount of kilograms of hazardous waste generated per month (kg/mo): generators of waste greater than 1,000 kg/mo are large quantity generators (LQGs), generators of 100 kg/mo to 1,000 kg/mo are small quantity generators (SQGs), and generators of less than 100 kg/mo are conditionally exempt small quantity generators, or CESQGs.[19] CESQGs are exempt from several requirements with which larger generators must comply. For example, unlike larger generators, CESQGs do not need to:

- Obtain an EPA identification number;
- Use a manifest when shipping hazardous waste;
- Report to EPA on a biannual basis; or
- Send their hazardous waste to a permitted or interim status Subtitle C waste management facility.

CESQGs, however, are required to comply with the following requirements of 40 CFR 261.5(g):

- They must determine whether their waste is hazardous according to 40 CFR 262.11;
- They may accumulate hazardous waste on-site indefinitely provided that the total amount of waste accumulated does not exceed 1,000 kg at any one time; and
- They must manage their hazardous waste either in an on-site or off-site waste management facility that is permitted or in interim status under the Subtitle C hazardous waste management facility standards; is a state permitted, licensed, or registered municipal or industrial solid waste facility; or is a facility that beneficially uses, reuses, or legitimately recycles or reclaims waste, or treats waste prior to beneficial use, reuse, or legitimate recycling or reclamation.

B. STATE REQUIREMENTS

At a minimum, state requirements for CESQGs must be at least as stringent as Federal requirements. States, however, may establish more stringent requirements for CESQGs within their jurisdiction. For example, 34 states have one or more requirements for CESQGs that are more stringent than Federal requirements, see Exhibit 11. Moreover, these requirements vary from state to state. Appendix B, Exhibit B-1 lists the CESQG requirements for all 50 states and the District of Columbia. Significant findings are described below.[20]

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[19] 40 CFR 261.5 also classifies generators as conditionally-exempt if they generate less than 1 kg/mo of certain acutely hazardous wastes listed in 40 CFR 261.31, 261.32, and 261.33(e). This section does not discuss Federal and state requirements for CESQGs of acutely hazardous waste. It should be noted, that in some cases (e.g., on-site accumulation), requirements for these generators are different from those for generators of non-acute hazardous waste.

[20] Information on state CESQG requirements discussed in this section and listed in Exhibit B-1 of Appendix B is adapted from Hazardous Waste From Small Quantity Generators, Seymour I. Schwartz and Wendy B. Pratt, Island Press, c. 1990; and *Hazardous Waste From Conditionally Exempt Small Quantity Generators in the Municipal Solid Waste Stream: A Literature Review*, U.S. EPA., September 1993.

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Postscript Only.

State CESQG Generator Size Categories

As noted previously, Federal regulations characterize hazardous waste generators of less than 100 kg/mo as conditionally-exempt. Most states use the same exclusion level (100 kg/mo); however, the following three states use a lower exclusion level:[21]

- The **District of Columbia's** exclusion level is 50 kg/mo. Thus, a generator is considered conditionally-exempt only if they generate less than 50 kg/mo of hazardous waste. Moreover, the District has some requirements for these generators that are more stringent than Federal requirements (see Exhibit B-1, Appendix B and discussion below). Generators of greater than 50 kg/mo are fully regulated. Thus, all generators of 50 kg/mo or more must comply with requirements that are the same as Federal requirements for LQGs.

- **Kansas** has established an exclusion level of 25 kg/mo. Thus, a generator is considered conditionally-exempt only if they generate less than 25 kg/mo of hazardous waste. Moreover, Kansas has some requirements for these generators that are more stringent than Federal requirements (see Exhibit B-1, Appendix B and discussion below). Under Kansas law, generators of 25 to 100 kg/mo must comply with requirements that are equal to those for Federally-defined SQGs.

- **Rhode Island** fully regulates all hazardous waste generators and does not provide any conditional exemptions. Thus, generators of less than 100 kg/mo must meet state requirements that equal Federal requirements for LQGs.

State Hazardous Waste Identification Number

Unlike the Federal government, seven states (California, Illinois, Louisiana, Maine, Minnesota, Rhode Island, and West Virginia) require all generators of less than 100 kg/mo to obtain a state hazardous waste identification number. Texas requires only industrial (i.e., manufacturing) CESQGs to obtain an identification number. Also, the District of Columbia and Kansas require generators of waste amounts ranging from 50 kg/mo to 100 kg/mo and 25 kg/mo to 100 kg/mo, respectively, to obtain identification numbers. Generators of less than 50 kg/mo in the District of Columbia and 25 kg/mo in the State of Kansas, because they are conditionally-exempt in these states, are not required to obtain an identification number, as is the case under Federal regulations for CESQGs.

State Storage Time Limits and On-site Waste Accumulation Limits

The storage time limit is the maximum amount of time a generator can hold hazardous waste on-site without a storage permit. Federal regulations allow CESQGs to store waste on-site indefinitely, provided that the maximum amount stored does not exceed 1,000 kg in one calendar month. Once the 1,000 kg/mo limit is exceeded, all waste accumulated is subject to Federal requirements for small quantity generators (i.e., 40 CFR Part 262.34), which include a maximum storage time limit of 180 days, a maximum on-site accumulation limit of 6,000 kg/mo, and other storage requirements. Unlike Federal requirements for CESQGS, some states have a limited storage time and/or a lower maximum storage limit. For example, five states (California, District of Columbia, Louisiana, Mississippi, and Rhode Island) restrict storage time for all CESQGs. California, Louisiana, and Mississippi each require a maximum storage period of 365 days. Rhode Island restricts the storage period for all CESQGs to a maximum of 90 days. In addition, the District of Columbia restricts the storage time to a maximum of 180 days for generators of less than 50 kg/mo and 90 days for generators between 50 kg/mo and 100 kg/mo.

With regard to maximum on-site quantity limits, 11 states (California, Colorado, District of Columbia, Maine, Maryland, Massachusetts, Nebraska, New Hampshire, New Jersey, Rhode Island, and Washington) have a

[21] Because these three states use a lower exclusion level than Federal regulations, some generators of less than 100 kg/mo are regulated and not conditionally-exempt.

maximum on-site quantity limit of less than 1,000 kg/mo for all CESQGs. Both Rhode Island and the District of Columbia, because they fully regulate all generators and generators of 50 to 100 kg/mo, respectively, require these generators to comply with Federal accumulation requirements for LQGs. For generators of less than 50 kg/mo, the District of Columbia's accumulation limit is 300 kg.

State Licenses Required for Hauling Wastes and Generator Self-Transport Limits

Eleven states (Arkansas, District of Columbia, Louisiana, Maine, Minnesota, New Hampshire, Ohio, Rhode Island, Texas, West Virginia, and Wisconsin) require all generators of less than 100 kg/mo to use a licensed commercial hazardous waste hauler or to obtain a license if they self-transport the waste themselves. In addition, Michigan and New Jersey require CESQGs to use a licensed hauler or obtain a license only for the transport or self-transport of liquid industrial waste and waste oil, respectively. Also, Kansas requires the use of a licensed hauler or a license for self-haul if the generator generates between 25 and 100 kg/mo; generators of less than 25 kg/mo need not use a licensed hauler or obtain a license for self-transport. In Massachusetts, CESQGs who wish to self-transport their waste need only to register with the State.

Unlike Federal regulations, 12 states (California, Colorado, Florida, Kentucky, Maryland, Massachusetts, Missouri, Nebraska, New Jersey, New York, South Carolina, and Washington) have limits on the amount of waste that CESQGs may self transport. Self-transport limits range from 23 kg in California to 999 kg in Colorado.

State CESQG Manifest Requirements

Under Federal regulations, CESQGs are exempt from using a manifest. Seven states (California, Louisiana, Maine, Minnesota, New Hampshire, Pennsylvania, and Rhode Island), however, require all generators of less than 100 kg/mo to use a manifest. Michigan requires a manifest only for liquid industrial waste and Texas requires only industrial (i.e., manufacturing) CESQGs to use a manifest. In addition, generators of 50 to 100 kg/mo and 25 to 100 kg/mo in the District of Columbia and Kansas, respectively, are also required to use a manifest.

States Mandating CESQG Waste Management in a Permitted Subtitle C TSDF Only

Federal regulations allow generators of less than 100 kg/mo to manage their hazardous waste in a Subtitle C treatment, storage, and disposal facility (TSDF); or in a municipal or industrial solid waste facility, or a recycler. Seventeen states (California, Colorado, Connecticut, Illinois, Kentucky, Louisiana, Maine, Massachusetts, Minnesota, New Hampshire, New Mexico, North Carolina, Ohio, Pennsylvania, Rhode Island, West Virginia, and Wisconsin), however, require these generators to manage their hazardous waste in a permitted Subtitle C TSDF, thus prohibiting disposal in a municipal or industrial waste landfill or other municipal, industrial facility. In addition, the District of Columbia and Kansas require generators generating between 50 and 100 kg/mo and 25 and 100 kg/mo, respectively, to manage their waste in a permitted Subtitle C TSDF. (Generators of less than 50 kg/mo in the District of Columbia and 25 kg/mo in Kansas may dispose of their waste in a municipal or industrial waste facility.) Also, three states (Michigan, New Jersey, and North Dakota) require CESQGs to manage liquid industrial and ignitable wastes in a permitted Subtitle C TSDF.

State CESQG Reporting Requirements

Federal regulations do not require CESQGs to submit annual or biannual reports. Six states (Arizona, California, Louisiana, Minnesota, Rhode Island, and Washington), however, have reporting requirements for all generators of less than 100 kg/mo. California and Rhode Island require CESQGs to report every two years. Arizona, Louisiana, Minnesota, and Washington have annual reporting requirements. In addition, Arkansas requires only those CESQGs with a state identification number to report annually, and Texas requires CESQGs to submit monthly reports and a copy of the manifest only if waste is sent out of the State. The District of Columbia requires generators of 50 to 100 kg/mo to submit reports annually, while Kansas requires generators of 25 to 100 kg/mo to submit reports biennially. Generators of less than 50 kg/mo in the District of Columbia and 25 kg/mo in the State of Kansas are not required to report, as is the case under Federal regulations.

SECTION V. SCREENING MECHANISMS

As discussed in Sections II and III, several studies on CESQGs find that a portion of CESQG waste is disposed at off-site solid waste landfills. These studies, however, do not indicate whether the type of landfill receiving this CESQG waste is a municipal, industrial, or construction and demolition (C&D) debris landfill. This distinction is important in order to understand the potential risks and issues associated with CESQG waste management practices. While municipal solid waste landfills must meet newly promulgated revised criteria under 40 CFR Part 258, all other types of solid waste disposal facilities or practices remain subject to the less stringent, "minimum" criteria under 40 CFR Part 257 as well as applicable individual state requirements.

This section focuses on the procedures that four states require to screen out (i.e., exclude) CESQG waste from C&D landfills, which is one type of disposal option available to CESQGs.[22] There are approximately 1,800 C&D landfills operating nationwide.[23] Seven states have promulgated regulations requiring C&D landfills to meet the criteria for municipal solid waste landfills. Forty-three states, however, have promulgated separate, less stringent regulations for C&D landfills.[24] In some instances, these regulations prescribe mechanisms for C&D landfills to screen out incoming hazardous waste. This section presents the results of a review of the separate C&D regulations of four states (Arkansas, Connecticut, Delaware, and Florida) chosen at random, to determine the types of screening mechanisms prescribed.

Arkansas

Arkansas has established four classes of solid waste landfills, two of which may receive C&D wastes, Class III and Class IV. Both landfill classes may receive CESQG waste (defined as "special materials") for disposal only with the written approval of the State. The only mechanism for screening out prohibited wastes is the requirement that Class III and Class IV landfills operate in accordance with approved plans (which may or may not include screening mechanisms depending on approval from the State), including the requirement that unloading at the site must be supervised. (Arkansas Solid Waste Management Code, Chapter 4.)

Connecticut

C&D landfills in the State of Connecticut are regulated as "special waste" landfills. Connecticut prohibits disposal of hazardous wastes (including CESQG waste) in these landfills. The regulations do not include specific screening mechanisms. Operators of special waste landfills, however, are required to submit to the State operating procedures that include specific personnel training in the unique characteristics and handling requirements of special wastes to be disposed at the landfill. Additionally, for each specific waste disposed at the landfill, the State requires the operator to submit a report on the physical, chemical, and leachate potential characteristics. (Connecticut Solid Waste Management Regulations, Title 22a, Chapter 209.)

Delaware

C&D landfills in Delaware are regulated as "dry waste" landfills, with dry wastes defined as those wastes with reduced potential for environmental degradation and leachate production. The Delaware Solid Waste Authority's solid waste licensing and disposal regulations prohibit disposal of hazardous waste in any solid waste management

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[22] States may require screening mechanisms for off-site commercial industrial landfills and on-site industrial non-hazardous waste management facilities, as well; however, these procedures are not discussed in this section.

[23] "Construction Waste & Demolition Debris Recycling . . . A Primer," Gershman, Brickner & Bratton, Inc., October, 1993.

[24] Ibid.

facility, including a dry waste landfill. Under the Authority's operating procedures for solid waste facilities, the Authority reserves the right to require unloading of the contents of the vehicle hauling the waste for inspection. If hazardous wastes are found, the Authority reserves the right to sanction the hauler of the waste. (Delaware Solid Waste Disposal Regulations and Delaware Solid Waste Authority - Solid Waste Licensing and Disposal Regulations.)

Florida

Florida's regulations for C&D landfills are the only regulations of the four states reviewed that detail specific screening mechanisms. In Florida, C&D landfills may operate under one of two permits, a solid waste facility permit or a general permit. Operators under both permits may not accept hazardous waste, including CESQG waste, for disposal. Florida's regulations describe screening procedures for facilities operating under a solid waste permit as follows: (1) at least one trained operator must be at the landfill during all hours of operation; (2) at least one spotter must be at each working face at all times when the landfill receives waste to detect unauthorized wastes; (3) an operational plan must detail the control of waste received at the site, including inspection procedures, number and location of spotters at each working face, and procedures to be followed if prohibited wastes are discovered; and (4) each facility must undertake a load checking program, whereby the operator must examine at least three loads of waste per week. If any hazardous wastes are identified by random load checking, or otherwise, the landfill operator must notify the State, the hauler, and the generator. If the generator or the hauler cannot be identified, the landfill operator is responsible for delivery of the waste to a permitted hazardous waste facility. Subsequent shipments from sources identified as responsible for previous delivery of hazardous wastes are subject to precautionary measures.

Florida's regulations for C&D landfills operating under a general permit do not describe any screening procedures. (Florida Administrative Code, Title 17, Chapter 701.)

SECTION VI. CONCLUSIONS

EPA is currently reviewing regulatory options to revise criteria under Section 4010(c) of RCRA for non-municipal solid waste facilities that may receive CESQG waste. The purpose of this report is to compile existing information on CESQG waste generation and management practices to be used as background for the proposed regulation.

Overall, the data sources reviewed for this report provide information on the number of CESQG establishments, how much CESQG waste they generate, the major CESQG waste types, and how this waste is managed. The most comprehensive, national data source reviewed for this report, the *National SQG Survey*, uses data that is nearly ten years old. EPA believes that the current situation regarding CESQG waste generation and management practices is significantly different from when the data for this study were collected.

With regard to the other data sources reviewed for this report, EPA is reluctant to use them to draw overall conclusions at the national level for two primary reasons:

- Some studies focus on a narrow subset of CESQGs (e.g., the *TSS* focuses on manufacturing industries only and the *Montgomery County Survey* focuses on seven industries only), making it difficult to compare these studies to the more comprehensive *National SQG Survey*; and

- The state and local studies are limited in geographic area and are too few in number, which precludes a sufficient sample size from which to extrapolate to the national level.

Notwithstanding future EPA regulations, many states have already begun to address proper management of CESQG waste in a variety of ways, for example:

- **Seventeen** states prohibit disposal of CESQG waste at municipal and industrial solid waste landfills, requiring that all CESQG waste be disposed at permitted Subtitle C facilities.

- Many states, and EPA, have developed numerous technical assistance and outreach programs targeted at CESQGs to encourage them to first reduce their use of hazardous waste and, secondly, to manage the hazardous waste they generate properly.

- **Seven** states require non-municipal landfills, such as C&D landfills, to meet the regulatory requirements for municipal landfills.

- Moreover, states, such as Florida, may also require non-municipal facilities to screen out CESQG waste from the incoming waste stream. Even without specific state screening requirements, landfill operators may implement screening procedures due to potential liability concerns.

Appendix A

This Appendix contains four exhibits used to support the summary of major findings of the national and state and local findings presented in Sections II and III.

EXHIBIT A-1
Data Sources

Title	Date Published/ Author	Scope	Methodology	Response Rate	Comments
National Small Quantity Hazardous Waste Generator Survey	February 1985 EPA's Office of Solid Waste	National survey of 48,849 small quantity hazardous waste generators in 125 SIC codes, condensed into 22 MFR[25] and NMFR industry groups.	(1) developed survey sample using available data sources; (2) developed written questionnaire seeking information on waste generation and management practices; (3) developed estimates of generators in non-surveyed industries by analogy to surveyed industries and review of available data sources; and (4) extrapolated results to national level.	Survey responses totaled 18,648	Most comprehensive, national data source on CESQGs. However, data is nearly ten years old and should be viewed with caution considering the number of significant changes that have occurred in hazardous waste management since the data were collected. (See Executive Summary)
Screening Survey of Industrial Subtitle D Establishments	December 29, 1987 EPA's Office of Solid Waste	National survey of 18,051 establishments in 17 MFR industry groups with on-site Subtitle D land-based units.	(1) developed survey sample from available data sources; (2) narrowed sample frame to 17 MFR industry groups believed to generate 99 percent of all industrial process waste; (3) developed and administered a telephone survey (sequence of questions found in Exhibit A-2); and extrapolated results to the national level.	99 percent. Survey was mandatory.	Purpose of survey was to determine number of establishments generating industrial D waste and managing this waste in on-site, land-based units. Only those establishments that managed industrial D waste on-site were asked whether they also generated CESQG waste. Thus, industrial D generators who managed this waste off-site were not asked if they were CESQGs. For this reason, this study does not provide a complete picture of CESQGs in these 17 industry groups.

[25] "MFR" denotes manufacturing and "NMFR" denotes non-manufacturing.

EXHIBIT A-1 (continued)
Data Sources

Title	Date Published/ Author	Scope	Methodology	Response Rate	Comments
Hazardous Waste From Small Quantity Generators	Copyright 1990, Island Press Seymour I. Schwartz and Wendy B. Pratt	Discusses strategies and solutions for businesses and governments to reduce improper management of hazardous waste from small quantity generators.	Telephone interviews with 300 people in state and local government, waste management industry, and trade associations.	Not Applicable	Provides limited data on CESQGs. Only data used in this report are an estimate of the number of CESQGs and state requirements for CESQGs.
Moderate Risk Waste: Volumes 2-1 and 2-2	December 15, 1990 Washington State Department of Ecology	Documents the scope of moderate risk waste (including CESQG waste) in the State of Washington and examines progress of State and local governments in addressing these wastes.	To determine volumes and composition of waste stream, State tallied waste figures from 26 statewide planning areas and developed estimates for remaining seven planning areas. Also, conducted comparative study of planning areas to characterize waste management methods.	Not Applicable	Study is limited to one state, Washington. Information on how planning areas obtained information is not given.
Washington State 1988 Hazardous Waste Annual Report Summary	June 1991 Washington State Department of Ecology	Summarizes statewide generation and management data for generators of dangerous wastes (including hazardous waste).	Data is obtained from annual reports submitted by generators and management facilities pursuant to State statute.	143 CESQGs submitted reports.	Because number of CESQGs reporting is small (143 of estimated 43,000), the data included in this study is not used in this report.

EXHIBIT A-1 (continued)
Data Sources

Title	Date Published/ Author	Scope	Methodology	Response Rate	Comments
Survey of Conditionally Exempt Small Quantity Generators of Hazardous Waste in Montgomery County, Maryland	May 21, 1993 Montgomery County Department of Environmental Protection	Survey of 1,009 firms located in the county grouped into seven industry groups.	(1) targeted firms in seven industry groups expected to generate majority of county CESQG waste; (2) sent written questionnaires to obtain information on CESQG waste generation and management practices and conducted follow-up telephone calls; (3) and extrapolated results of survey to county level.	Collected 374 usable responses, of which 125 (12 percent of those surveyed) were CESQGs.	Data is limited to one county, Montgomery County, Maryland. Further, the County surveyed only seven industry groups.
Hazardous Waste from Conditionally Exempt Small Quantity Generators in the Municipal Solid Waste Stream: A Literature Review	September 1993 EPA	Summarizes available information on CESQGs obtained from a literature review of state and local studies.	Conducted literature review and contacted state government officials responsible for CESQG programs in their states.	Not Applicable	Information on methodology and response rates of studies summarized in review is too limited to describe accurately. The studies, however, are cited in the review. This original source material was not reviewed for this report.

Exhibit A-2
Sequence of Questions for *Screening Survey of Industrial Subtitle D Establishments*

Contains Data for

Postscript Only.

EXHIBIT A-3
Generators Disposing CESQG Waste in On-Site Solid Waste Landfills[26]

Industry	Number of CESQG Establishments in Industry Disposing CESQG Waste in On-Site Solid Waste Landfill	Percent of Total CESQG Establishments in Industry	Total Waste Volume (tons/yr)
Metals Manufacturing	677	2.6	101
Pesticide Application Services	406	5.2	54
Construction	366	3.2	239
Laundries	178	1.3	93
Wholesale/Retail Trade	112	2.2	22
Educational/Vocational Establishments	104	3.2	3
Pesticide End Users	99	7.1	7
Textile Manufacturing	14	9.4	1
TOTAL FOR ALL 22 INDUSTRIES	**1,956**	**0.75**[27]	**520**

[26] Source: *National Small Quantity Hazardous Waste Generator Survey*.

[27] This exhibit lists only those eight industries of the 22 surveyed that have any CESQGs disposing their CESQG waste in an on-site solid waste landfill. The percentages in the exhibit represent the percent of CESQG establishments within each of the eight industries that dispose of their CESQG waste in an on-site solid waste landfill. Of the estimated 250,000 CESQG establishments in all 22 industries surveyed, 1,956, or 0.75 percent, dispose of their CESQG waste in on-site solid waste landfills.

EXHIBIT A-4
Number of CESQGs Disposing CESQG Waste in On-Site, Land-Based Units[28]

Industry	Estimated Number of CESQGs in Industry	Estimated Number of CESQGs Disposing CESQG Waste in On-Site, Land-Based Unit	Percent of Total CESQGs in Industry Group
Stone, Clay, Glass, and Concrete	1266	160	12.6
Food and Kindred Products	896	131	14.6
Textile Manufacturing	207	50	24.2
Primary Iron and Steel	182	48	26.4
Pulp and Paper	169	43	25.4
Rubber and Miscellaneous Products	48	30	62.5
Petroleum Refining	196	28	14.3
Selected Chemical and Allied Products	31	25	80.6
Primary Nonferrous Metals	148	24	16.2
Electric Power Generation	224	22	9.8
Water Treatment	111	15	13.5
Transportation Equipment	53	15	28.3
Fertilizer and Agricultural Chemicals	45	5	11.1
Plastics and Resins Manufacturing	19	4	21.1
Organic Chemicals	13	3	23.1
Inorganic Chemicals	122	2	1.6
Leather and Leather Products	12	0	---
TOTAL FOR ALL 17 INDUSTRIES	**3,742**	**605**	**16.2**

[28] Source: *Screening Survey of Industrial Subtitle D Establishments*.

Appendix B

This Appendix contains an exhibit listing requirements for CESQGs in all 50 states and the District of Columbia. This exhibit corresponds to Section IV. Information in this exhibit was obtained from *Hazardous Waste From Small Quantity Generators* (Seymour Schwartz and Wendy Pratt, Island Press, c. 1990) and *Hazardous Waste From Conditionally Exempt Small Quantity Generators in the Municipal Solid Waste Stream* (USEPA, September 1993).

EXHIBIT B-1
State Requirements For CESQGs That Are More Stringent Than Federal Regulations
(1990, except where noted)

State	CESQG Generator Size (kg/mo)	State ID# Required	Limited Storage Period (Days)	Accumulation Limit On-site (kg)	Licensed Hauler or License Required for Hauling	Generator Self-Transport Limit (kg)	Manifest Required	Disposal only at Permitted Subtitle C TSDF	Reporting Required
FEDERAL	**0-100**	**No**	**Indefinite**	**1,000**	**No**	**None**	**No**	**No**	**No**
Alabama	0-100	State requirements no more stringent than Federal regulations.							
Alaska (1993)	0-100	State requirements no more stringent than Federal regulations.							
Arizona	0-100								Annual[1]
Arkansas	0-100				Yes				Annual[2]
California (1993)	0-100	Yes	365	100		23	Yes	Yes	Biennial
Colorado	0-100			999		999		Yes	
Connecticut (1993)	0-100							Yes	
Delaware	0-100	State requirements no more stringent than Federal regulations.							
District of Columbia	50-100 0-50	Yes	90 180	300	Yes Yes		Yes	Yes	Annual
Florida (1993)	0-100					100			
Georgia	0-100	State requirements no more stringent than Federal regulations.							
Hawaii	0-100	State requirements no more stringent than Federal regulations.							
Idaho	0-100	State requirements no more stringent than Federal regulations.							
Illinois	0-100	Yes						Yes	
Indiana	0-100							Yes[3]	
Iowa	0-100	State requirements no more stringent than Federal regulations.							
Kansas	25-100 0-25	Yes			Yes	25	Yes	Yes	Biennial
Kentucky	0-100					100		Yes	

EXHIBIT B-1
State Requirements For CESQGs That Are More Stringent Than Federal Regulations
(1990, except where noted)

State	CESQG Generator Size (kg/mo)	State ID# Required	Limited Storage Period (Days)	Accumulation Limit On-site (kg)	Licensed Hauler or License Required for Hauling	Generator Self-Transport Limit (kg)	Manifest Required	Disposal only at Permitted Subtitle C TSDF	Reporting Required
FEDERAL	**0-100**	**No**	**Indefinite**	**1,000**	**No**	**None**	**No**	**No**	**No**
Louisiana	0-100	Yes	365		Yes	-	Yes	Yes	Annual
Maine (1993)	0-100	Yes		100	Yes	-	Yes	Yes	
Maryland	0-100			100		100			
Massachusetts (1993)	0-100			600		200		Yes	
Michigan	0-100				Yes[4]		Yes[4]	Yes[4]	
Minnesota (1993)	0-100	Yes			Yes	-	Yes	Yes	Annual
Mississippi	0-100		365						
Missouri	0-100					100			
Montana	0-100	State requirements no more stringent than Federal regulations.							
Nebraska	0-100			100		100			
Nevada	0-100	State requirements no more stringent than Federal regulations.							
New Hampshire (1993)	0-100			100	Yes	-	Yes	Yes	
New Jersey	0-100			100[5]	Yes[6]	100		Yes[4]	
New Mexico	0-100							Yes	
New York	0-100					100			
North Carolina	0-100							Yes	
North Dakota	0-100							Yes[4]	
Ohio	0-100				Yes	-		Yes	
Oklahoma	0-100	State requirements no more stringent than Federal regulations.							
Oregon (1993)	0-100	State requirements no more stringent than Federal regulations.							

EXHIBIT B-1
State Requirements For CESQGs That Are More Stringent Than Federal Regulations
(1990, except where noted)

State	CESQG Generator Size (kg/mo)	State ID# Required	Limited Storage Period (Days)	Accumulation Limit On-site (kg)	Licensed Hauler or License Required for Hauling	Generator Self-Transport Limit (kg)	Manifest Required	Disposal only at Permitted Subtitle C TSDF	Reporting Required
FEDERAL	**0-100**	**No**	**Indefinite**	**1,000**	**No**	**None**	**No**	**No**	**No**
Pennsylvania	0-100						Yes	Yes	
Rhode Island (1993)	No CESQG	Yes	90	-	Yes	-	Yes	Yes	Biennial
South Carolina	0-100					100			
South Dakota	0-100	State requirements no more stringent than Federal regulations.							
Tennessee	0-100	State requirements no more stringent than Federal regulations.							
Texas	0-100	Yes[7]			Yes	-	Yes[7]		Monthly[8]
Utah	0-100	State requirements no more stringent than Federal regulations.							
Vermont (1993)	0-100	State requirements no more stringent than Federal regulations.							
Virginia	0-100	State requirements no more stringent than Federal regulations.							
Washington (1993)	0-100			100		100			Annual
West Virginia	0-100	Yes			Yes			Yes[9]	
Wisconsin	0-100				Yes	-		Yes	
Wyoming	0-100	State requirements no more stringent than Federal regulations.							

[1] First page of annual report only.
[2] Only CESQGs with State identification numbers need to report annually.
[3] Ignitable or infectious waste may not be disposed of in non-hazardous waste landfills.
[4] Required for liquid industrial waste only.
[5] 100 kg of hazardous waste or 1,001 gallons of waste oil.
[6] License required to haul waste oil only.
[7] Not required for non-industrial CESQG waste.
[8] Only if waste is sent out of state.
[9] Disposal at out of State MSWLFs are permissible; regulation is under review.

Appendix C

Exhibit C-1 lists available Federal and state documents that encourage pollution prevention and proper waste management by CESQGs in some CESQG waste generating industries. Those documents that are available from the Pollution Prevention Information Clearinghouse (PPIC) may be obtained by contacting PPIC at the following address:

PPIC
Environmental Protection Agency
401 M St, SW (7409)
Washington, D.C. 20460
PPIC Reference and Referral: (202) 260-1023
PPIC Fax Line: (202) 260-0178

EXHIBIT C-1
Available Pollution Prevention and Proper Waste Management Documents

Industry	Title of Document	Source
Vehicle Maintenance	Pollution Prevention Tips for Automotive Maintenance Shops	Alaska Department of Conservation, Pollution Prevention Office (907) 465-5275
	Environmental Guidelines and Pollution Prevention for the Automotive Service Industry	Colorado Department of Health, Pollution Prevention Waste Reduction Programs (303) 692-3003
	A Pollution Prevention Guide for Automotive Repair Shops	Delaware Department of Natural Resources and Environmental Control, Pollution Prevention Program (302) 739-5071/3822
	Waste Management Practices of Vehicle Maintenance Businesses and Local Government Vehicle Fleet Management Operations	District of Columbia, Metropolitan Washington Council of Governments, Department of Environmental Programs (202) 962-3355
	Waste Minimization Works for Businesses and Iowa - leaflet on vehicle maintenance operations	Iowa Department of Natural Resources, Waste Management Authority Division (515) 281-8941
	Case Study: Waste Minimization in the Auto Repair Sector Pollution Prevention in the Commercial Sector: A Waste Stream Assessment in the Vehicle Service and Repair Sector	University of Nebraska - Lincoln Center for Infrastructure Research (402) 472-5022
	Waste Management and Reduction for Automotive Repair Shops	University of Nevada, Reno, Small Business Development Center, Business Environmental Program (702) 784-1717
	Model Toxics Use and Hazardous Waste Reduction Plan for Oregon Automotive Services Industries, 1992	Oregon Department of Environmental Quality, Hazardous Waste Reduction and Technical Assistance Program (503) 229-6585

EXHIBIT C-1 (continued)
Available Pollution Prevention and Proper Waste Management Documents

Industry	Title of Document	Source
Metals Manufacturing	Waste Minimization Works for Businesses and Iowa - leaflet on metals fabrication/farm equipment manufacturing	Iowa Department of Natural Resources, Waste Management Authority Division (515) 281-8941
	Case Study: Alpha Metal Finishing Company - fact sheet	Michigan Department of Natural Resources, Office of Waste Reduction Services, Environmental Services Division (517) 335-1178
	Waste Minimization in a Metal-Finishing Industry: A Pilot Project	University of Nebraska - Lincoln Center for Infrastructure Research (402) 472-5022
	NJTAP Literature Review, Metals Finishing	New Jersey Institute of Technology, New Jersey Technical Assistance Program, Hazardous Substance Research Center (201) 596-5864
	Waste Reduction Assessment Report, The Forging Company Case Study of Waste Minimization at a Metal Fabricating Facility Case Study of Waste Minimization at a Metal Machining Facility	Ohio Environmental Protection Agency, Division of Hazardous Waste Management, Pollution Prevention Section (614) 644-3969
	Fabricated Metal Products Industry, Pollution Prevention Information Packet	Pennsylvania, Center for Hazardous Materials Research, University of Pittsburgh (412) 826-5320

EXHIBIT C-1 (continued)
Available Pollution Prevention and Proper Waste Management Documents

Industry	Title of Document	Source
Metals Manufacturing (continued)	Guidelines for Waste Reduction and Recycling: Metals Finishing, Electroplating, Printed Circuit Board Manufacturing	PPIC
	Case Studies for Metals Finishing	PPIC
	Pollution Prevention In Metals Manufacturing: Saving Money Through Pollution Prevention	PPIC
	Pollution Prevention Options in Metals Fabricated Products Industries: A Bibliographic Report	PPIC
	A Practical Guide to Pollution Prevention Planning for the Iron and Steel Industries	PPIC
	Waste Minimization in Metals Parts Cleaning	PPIC
Laundries	Dry Cleaning and Laundries	Colorado Department of Health, Pollution Prevention Waste Reduction Programs (303) 692-3003
	Pollution Prevention Guide for the Dry Cleaning Industry Pollution Prevention Success Story: Capitol Cleaners	Delaware Department of Natural Resources and Environmental Control, Pollution Prevention Program (302) 739-5071/3822
	Pollution Prevention in the Commercial Sector: A Waste Stream Assessment in the Solvent Based Dry Cleaning Industry	University of Nebraska - Lincoln Center for Infrastructure Research (402) 472-5022
	Dry Cleaning Project	PPIC
	Multiprocess Wet Cleaning: Cost Performance Comparison of Conventional Dry Cleaning and an Alternative Process	PPIC
	Multiprocess Wet Cleaning Demonstration Study: Background and Results	PPIC

EXHIBIT C-1 (continued)
Available Pollution Prevention and Proper Waste Management Documents

Industry	Title of Document	Source
Printers	Print Shops	Colorado Department of Health, Pollution Prevention Waste Reduction Programs (303) 692-3003
	A Pollution Prevention Guide for the Printing Industry	Delaware Department of Natural Resources and Environmental Control, Pollution Prevention Program (302) 739-5071/3822
	Waste Minimization Works for Businesses and Iowa	Iowa Department of Natural Resources, Waste Management Authority Division (515) 281-8941
	Pollution Prevention for the Commercial Printing Industry Winning Environmental Strategies for Printers	University of Nevada, Reno, Small Business Development Center, Business Environmental Program (702) 784-1717
	Pollution Prevention, Commercial Printing Industry	New Jersey Institute of Technology New Jersey Technical Assistance Program, Hazardous Substance Research Center (201) 596-5864
	Case Studies in Printing	PPIC
	Pollution Prevention in Printing and Allied Industries: Saving Money Through Pollution Prevention	PPIC
	Case Study #1: Managing Solvents and Wipes	PPIC
	Case Study #2: Reducing the Use of Reclamation Chemicals in Screen Cleaning	PPIC
	EPA Chemical Lists for the Printing Industry	PPIC
	Federal Environmental Regulations Potentially Affecting the Commercial Printing Industry	PPIC
	Printing Project	PPIC
	Use Cluster Analysis of the Printing Industry - Executive Summary	PPIC

EXHIBIT C-1 (continued)
Available Pollution Prevention and Proper Waste Management Documents

Industry	Title of Document	Source
Pulp and Paper	Results of the 1988 Toxics Release Inventory Reporting for the Pulp and Paper Industry in New England	Massachusetts, Northeast Waste Management Officials' Association (NEWMOA) (617) 367-8558
	Handbook on Pollution Prevention Opportunities for Bleached Kraft Pulp and Paper Mills	PPIC
	Pollution Prevention Technologies for the Bleached Kraft Segment of the U.S. Pulp and Paper Industry	PPIC
Petroleum Refining	Case Study of Minimization of Photolithiography and Ink Wastes in an Ink and Printer Manufacturing Facility	Ohio Environmental Protection Agency, Division of Hazardous Waste Management, Pollution Prevention Section (614) 644-3969
	Pollution Prevention Options in Petroleum Refining: A Bibliographic Report	PPIC
Pesticides	Indiana Pesticides News	Indiana Department of Environmental Management, Office of Pollution Prevention and Technical Assistance (317) 232-8172
	The Label, Purdue Pesticide Programs newsletter	Purdue University Cooperative Extensions Service, Indiana Pollution Prevention Program, Environmental Management and Education Program (317) 494-5038
	Pollution Prevention Pesticide Container Management Pollution Prevention at Agrichemical Dealerships	Missouri Department of Natural Resources, Hazardous Waste Program, Division of Environmental Quality (314) 751-3176
	Waste Management in Rural Sectors with Emphasis on Farm Cooperatives and Pesticide Applicators	University of Nebraska - Lincoln Center for Infrastructure Research (402) 472-5022
	Guide to Pollution Prevention: Non Agricultural Pesticide Users	Center for Environmental Research Information (CERI) 26 West Martin Luther King Drive Cincinnati, OH 45268 Phone (513) 569-7562 Fax (513) 569-7566