Cost and Economic Impact Analysis of the CESQG Rulemaking

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1. INTRODUCTION

This report presents a cost and economic impact analysis for revisions to the Criteria for Classification of Solid Waste Disposal Facilities and Practices (40 CFR Part 257) and Identification and Listing of Hazardous Waste (40 CFR Part 261). These revisions have been developed by the U.S. Environmental Protection Agency (EPA) in response to Sections 3001(d)(4) and 4010(c) of the Resource Conservation and Recovery Act (RCRA), and an agreement reached between EPA and the Sierra Club pursuant to a lawsuit filed by the Sierra Club in October 1993.

The revisions apply to generators and managers of conditionally exempt small quantity generator (CESQG) waste. CESQGs generate hazardous waste in quantities of no more than 100 kilograms (kg) per month, or acutely hazardous waste in quantities of no more than 1 kg per month. CESQGs may accumulate no more than 1,000 kg of hazardous waste or 1 kg of acutely hazardous waste at one time. Currently, CESQG waste may be managed at a hazardous waste facility or at a Subtitle D facility that is permitted, licensed, or registered by a State to manage municipal or industrial waste.

The revisions to Part 257establish facility standards for non-municipal solid waste disposal facilities that may receive CESQG wastes; they would not affect municipal solid waste landfills (MSWLFs), which are subject to the criteria found in 40 CFR Part 258. The revised facility standards would include location restrictions, groundwater monitoring, and corrective action. The revisions to Part 261 require CESQGs to manage their wastes at MSWLFs or at non-municipal solid waste facilities subject to the revised Part 257 facility standards.

Executive Order No. 12866 (FR V. 58 No. 170, 51735, October 4, 1993) requires that regulatory agencies determine whether a new regulation constitutes a significant regulatory action. A significant regulatory action is defined as an action likely to result in a rule that may:

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

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

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

- Raise novel legal or policy issues arising out of legal mandates,

the President's priorities, or the principles set forth in Executive Order 12866.

To meet the requirements of EO 12866, this report includes an estimate of the incremental costs of the rule and its potential effects on small businesses.

This *Cost and Economic Impact Analysis* was originally presented in May, 1995, accompanying the proposed rulemaking; this report replaces that version. Changes made in this final version include:

- **Revised labor rate**
- **Revised overall costs of the rulemaking, in anticipated scenario and "high-end" scenario.**
- **Clarifications of methodology used**

The report is organized as follows:

- **<u>Chapter 2</u> discusses the parties affected by this rulemaking;**

- **<u>Chapter 3</u> describes the methodology used for the cost analysis;**

- **<u>Chapter 4</u> presents the results of the cost analysis;**

- **<u>Chapter 5</u> discusses the limitations of the cost analysis; and**

- **<u>Chapter 6</u> discusses potential effects on small businesses.**

2. IDENTIFICATION AND CHARACTERIZATION OF AFFECTED PARTIES

EPA's revisions to 40 CFR Parts 257 and 261 will have the potential to affect both generators of CESQG waste and owners and operators of non-municipal solid waste disposal facilities in which CESQG wastes are managed. This chapter discusses the parties that may be affected by the rulemaking. Section 2.1 characterizes the number of CESQGs and the quantities of waste they generate nationwide. Section 2.2 characterizes the number of CESQG waste managers and the quantities of waste they manage nationwide. In Section 2.3, the number of generators and waste quantities affected by the rulemaking are estimated by adjusting the national numbers to account for the existence of state requirements similar to those contained in the rule.

2.1 GENERATORS OF CESQG WASTE

According to the National Small Quantity Hazardous Waste Generator Survey (National SQG Survey), 455,000 establishments nationwide generated 201,600 tons of CESQG waste in 1982. About 80 percent of CESQGs and 88 percent of CESQG waste were associated with the non-manufacturing sector, while the remainder was associated with the manufacturing sector.

Only a small fraction of the nation's 455,000 CESQGs will be affected by EPA's rulemaking, however, as many CESQGs currently manage their wastes in ways that are not covered by the rule (e.g., disposal in municipal solid waste landfills, recycling). As discussed in Chapter 1, this rule would apply only to CESQG wastes disposed in land-based Subtitle D units other than municipal solid waste landfills (MSWLFs).

Three types of CESQGs are potentially affected by this rulemaking:

- CESQGs who dispose their CESQG wastes along with their non-hazardous industrial wastes in on-site Subtitle D landfills, surface impoundments, land application units, or waste piles;

- CESQGs who send their wastes off site to commercial industrial Subtitle D waste management facilities; and

- CESQGs who send their wastes off site to construction and demolition (C&D) waste landfills.

These parties are discussed in more detail below.

2.1.1 CESQGs with On-site Disposal in Subtitle D Units

Manufacturing Sector

In 1985, EPA conducted the *Screening Survey of Industrial Subtitle D Establishments* (*Screening Survey*). While this is an old survey, it is the most recent source available for this information. The *Screening Survey* focused on 17 industries in the manufacturing sector believed to be responsible for most of the Subtitle D waste generation in the U.S. It was designed to develop national and industry-specific estimates of the number of establishments managing industrial non-hazardous wastes on site, specifically in land-based units (landfills, surface impoundments, land application units, and waste piles), and the volume of Subtitle D waste managed in these units. The Screening Survey also captured information on CESQG waste generation and management.

The *Screening Survey* estimated that 12,000 establishments managed industrial non-hazardous waste on site in land-based units in 1985. An estimated 3,742 of these establishments were also CESQGs, 605 of whom managed their CESQG wastes on site in Subtitle D land-based units. These 605 establishments used surface impoundments (309), waste piles (135), land application units (91), and landfills (69). The distribution of these 605 establishments among the 17 manufacturing industries surveyed is shown in Exhibit 2-1.

For the purposes of this cost analysis, EPA is assuming that all 605 CESQGs will be affected by the rulemaking. EPA believes that this figure overestimates the number of CESQGs that co-dispose industrial non-hazardous process waste and CESQG waste in on-site Subtitle D land-based units. Recent conversations with trade associations representing the Stone, Clay, Glass, and Concrete Industry and the Food and Kindred Products Industry (which together comprise almost half of the 605 CESQGs with on-site management) have indicated that most facilities no longer manage their CESQG waste in on-site disposal units.

The Screening Survey does not provide information on the volume of CESQG waste generated by these 605 establishments. For the purposes of this analysis, EPA has assumed that each CESQG generates 50 kg/month of hazardous waste (the midpoint of the range of 0-100 kg per month that defines a CESQG). Thus, the total amount of CESQG waste disposed in on-site Subtitle D units annually is estimated to be 400 tons.

EXHIBIT 2-1.
Number of CESQGs with On-site Management in Subtitle D Land-based Units

INDUSTRY	NUMBER OF ESTABLISHMENTS
Stone, Clay, Glass, Concrete	160
Food and Kindred Products	131
Textile Manufacturing	50
Primary Iron and Steel	48
Pulp and Paper	43
Rubber and Misc. Products	30
Petroleum Refining	28
Selected Chemical and Allied Products	25
Primary Nonferrous Metals	24
Electric Power Generation	22
Water Treatment	15
Transportation Equipment	15
Fertilizer & Agricult. Chem.	5
Plastics and Resins Manuf.	4
Organic Chemicals	3
Inorganic Chemicals	2
Leather and Leather Products	0
TOTAL	605

Source: *Screening Survey of Industrial Subtitle D Establishments* (Westat, 1987)

Non-manufacturing Sector

The National SQG Survey reported that certain CESQGs in the non-manufacturing sector also disposed of their wastes in on-site landfills in 1982. EPA views this finding with caution, however, since the National SQG Survey did not define the term "solid waste landfill." Moreover, more recent studies in the State of Washington and Montgomery County, Maryland, showed that *none* of the CESQGs in these locations disposed of their hazardous waste in an on-site solid waste landfill. This finding suggests that CESQGs have changed their management practices with regard to on-site disposal in landfills since the National SQG Survey was performed. For the purposes of this cost analysis, EPA has assumed that no CESQGs in the non-manufacturing sector manage their wastes in on-site disposal facilities.

2.1.2 CESQGs with Off-site Disposal in C&D Landfills

Debris generated from the construction and demolition of structures such as buildings, roads, and bridges may contain small quantities of materials that may meet the definition of RCRA hazardous waste. Examples include excess materials used in construction and their containers (e.g., adhesives, paints, roofing cement), waste oils, and other discrete items such as batteries and mercury switches. Thus, firms involved in the construction or demolition of structures are potentially affected by this rulemaking. EPA believes there to be approximately 194,000 construction firms (157,000 building contractors and 37,000 heavy construction contractors) and 1,240 demolition firms in the U.S.[1] Only a portion of these firms will be affected by this rulemaking. Only those generating RCRA hazardous waste below the CESQG threshold and currently sending this waste to a C&D landfill will be affected.

There is considerable uncertainty associated with the quantity of waste generated by the construction and demolition of structures. Though an estimate of approximately 30 million tons per year has often been cited,[2] this figure is clearly an underestimate of C&D generation because it includes only the volume that had been sent to MSW landfills. Recent literature[3] suggests that the quantity is more in the area of 100 million tons per year.

As will be discussed in Chapter 3, the compliance costs of the

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[1] 1987 *Census of Construction Industries.*

[2] *Characterization of Municipal Solid Waste in the United States, 1960 to 2000*, prepared for the U.S. Environmental Protection Agency by Franklin Associates, July 1986.

[3] An estimate that over 110 million tons of C&D waste are generated annually was provided by Mr. Lee Adelman, Waste Management Inc., proceedings of 1992 World Recycling Conference, June 2, 1992. An estimate that 80 to 120 million tons of C&D waste are generated each year is provided in "C&D Debris Recycling; The Forgotten Goal?", *C&D Debris Recycling*, October 1994.

rule depend on the proportion of C&D waste that is generated from construction vs. demolition activities. Again, very little information was found in the literature. A survey of C&D waste generation in the European Community[4] indicates that construction debris comprises 18 percent of C&D waste, and demolition debris 82 percent. Applying these percentages to the estimated 100 million tons of C&D waste generated annually provides the following waste generation rates:

- Construction debris: 18 million tons
- Demolition debris: 82 million tons

2.2 CESQG WASTE MANAGERS

Many types of Subtitle D solid waste facilities may be used for the disposal of CESQG waste. Manufacturing facilities that co-dispose industrial non-hazardous and CESQG waste in on-site waste management units are one type of facility; these were discussed in Section 2.1.1. This section focuses on Subtitle D facilities that may receive CESQG waste from off site (other than municipal solid waste landfills which are not subject to this rulemaking).

2.2.1 Commercial (Off-site) Subtitle D Industrial Waste Facilities

One type of facility that may receive CESQG waste is a commercial facility that co-disposes industrial non-hazardous wastes and CESQG hazardous wastes received from off site. EPA estimates that there are 10 to 20 such facilities in the U.S. (excluding commercial facilities that also receive municipal solid wastes). Through meetings with trade associations representing the commercial solid waste industry , EPA has found that CESQG disposal is generally prohibited at these types of facilities. This is a result of permitting conditions as well as decisions at the corporate level of individual companies not to accept CESQG waste. Industry representatives also indicate that these facilities already meet or exceed the requirements outlined in this rulemaking. For the purposes of this cost analysis, therefore, EPA has assumed that no commercial Subtitle D industrial waste facilities will be affected.

2.2.2 Construction and Demolition Landfills

EPA estimates that 1,889 C&D landfills receive wastes from off site in the U.S.[5]; for the purposes of this analysis, EPA assumed that

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[4] *Demolition and Construction Debris, Questionnaire About an EC Priority Waste Stream,* European Demolition Association, the Netherlands (undated).

[5] *List of Industrial Waste Landfills and Commercial and Demolition Waste Landfills,* prepared by Eastern Research Group, Inc., for the Office of Solid Waste, September 1994. In addition, there are an unknown number of on-site C&D landfills used for the disposal of C&D waste generated at a particular site. These are typically closed following completion of the activity. Because these sites are on

these 1,889 landfills receive all of the C&D

privately-owned land and receive only waste generated at that site, little information exists on the number of these landfills nationwide. On-site C&D landfills are not considered in this cost analysis.

waste generated in the U.S.[6] Exhibit 2-2 shows the estimated size distribution and average capacity of these landfills. EPA's approach for deriving the information presented in Exhibit 2-2 is explained below.

The only information available on the size distribution of C&D landfills is the 1986 *Subtitle D Study – Phase I Report*.[7] According to this report, there were 2,586 C&D landfills in existence in 1986, with the following the size distribution:

- 3.6 percent received > 500 tons per day;
- 21.7 percent received 30 to 500 tons per day;
- 74.7 percent received < 30 tons per day.

EXHIBIT 2-2.
Estimated Size Distribution and Capacities of the Nation's 1,889 C&D Landfills

SIZE	WASTE ACCEPTANCE RATE (tons per day)	ASSUMED ACCEPTANCE RATE (tons per day)	NUMBER OF LANDFILLS
Large	>500 tpd	1,000 tpd	97
Medium	30 - 500 tpd	265 tpd	600
Small	<30 tpd	15 tpd	1,192
TOTAL			1,889

For small and medium C&D landfills, EPA assumed an average acceptance rate midway between the lower and upper-bound waste acceptance rate for each size category. For large C&D landfills, EPA assumed an average acceptance rate of 1,000 tons per day. Although there is no theoretical upper-bound waste acceptance rate for large C&D landfills, the weighted average acceptance rate is likely to be closer to the 500 tons per day lower bound because there are very few extremely large C&D landfills. Multiplying the number of landfills in each size category by the tpd received yields an estimated annual C&D waste quantity that is very close to the 100 million tons estimated for today. EPA therefore believes that the acceptance rates presented in Exhibit 2-2 are a

[6] The 100 million tons of C&D "waste" estimated in the literature is assumed to reflect the quantity remaining after recycling. According to OSW's MSWLF survey, MSWLFs received 18 million tons of C&D waste in 1985. The quantity sent to MSWLFs is assumed to be lower today, given the capacity problems faced by MSWLFs. For this cost analysis, EPA has assumed that MSWLFs today receive an insignificant portion of discarded C&D waste, and that all 100 million tons are sent to C&D landfills. This is a conservative assumption whose likely effect is to overestimate compliance costs.

[7] U.S. EPA, Office of Solid Waste, *Subtitle D Study) Phase I Report*, October 1986.

reasonable assumption for this analysis.

Because the number of C&D landfills has decreased since 1986 (from 2,586 to 1,889) while the estimated amount of waste disposed has remained essentially the same, EPA has assumed that the size distribution of C&D landfills has shifted. Specifically, EPA has assumed that the number of mid-sized and large C&D landfills has increased, while the number of small C&D landfills has decreased to a greater extent, resulting in a net decline in the total number of C&D landfills. Exhibit 2-2 reflects EPA's revised estimate of the current size distribution of the nation's 1,889 C&D landfills.

2.3 ACCOUNTING FOR STATE REQUIREMENTS

Many states have location restrictions, groundwater monitoring requirements, and/or corrective action requirements in place for C&D landfills. This section explains how the existence of these state requirements was accounted for in the national cost analysis. EPA did not account for state requirements in the estimation of compliance costs for non-C&D CESQGs because the affected volumes and compliance costs for non-C&D CESQGs are minimal.

EPA conducted a study of state regulatory requirements for C&D landfills in 1994 and found that 24 states prohibit C&D landfills from receiving CESQG wastes. Of the 26 remaining states, eight have mandatory groundwater monitoring and corrective action requirements at C&D landfills. EPA assumed that C&D landfills and C&D waste generators located in these 32 states will be unaffected by the rulemaking.

Of the eight states that require both groundwater monitoring and corrective action at C&D landfills, some states' groundwater monitoring requirements are less stringent than specified in the revisions to Part 257. EPA's assumption that landfills in these states will be unaffected by the rule may lead to an underestimate of compliance costs. On the other hand, some landfills located in the 18 states assumed to be affected by the rule have groundwater monitoring requirements without corrective action requirements. In this case, EPA's analysis overestimates compliance costs for these landfills , by assuming that they will incur the full costs of complying with the Part 257 requirements even though they are already required to incur the costs of groundwater monitoring. EPA believes that these biases are, for the most part, offsetting.

As discussed above, EPA assumed that there would be no compliance costs for C&D waste generators or managers in any of the 32 states. EPA then calculated the number of C&D landfills and quantity of waste in the 18 remaining states (referred to in the remainder of this report as the "affected" states). According to a recent study conducted for the

Office of Solid Waste[8], there are 718 C&D landfills in the affected states. To estimate the number of C&D waste generators and the quantity of C&D waste generated in the affected states, EPA apportioned the number of generators and quantity of waste to each state based on population. Using this approach, EPA estimates that about 28 percent of all C&D waste generators are located in the 18 affected states, and that they generate 28 percent of all C&D wastes, or 28 million tons.

The next step was to apportion the 28 million tons of waste in the affected states to the 718 C&D landfills present in these states. Lacking any other data, EPA began by assuming that in affected states, both the percent distribution of landfills across the size categories and the average acceptance rate in each size category are the same as in the nation as a whole. EPA found, however, that these assumptions do not yield a waste generation rate of 28 million tons per year in the affected states. Therefore, EPA adjusted the average acceptance rates in each size category downward to reflect the lower average population per landfill in the affected states (since demolition debris is assumed to be correlated with population). EPA also divided the "medium" size category in half to allow for more detailed analysis. The results, shown in Exhibit 2-3, were used as the basis for estimating compliance costs in affected states.

EXHIBIT 2-3
Estimated Size Distribution and Capacities of the 718 C&D Landfills in Affected States

SIZE	WASTE ACCEPTANCE RATE (tons per day)	ASSUMED ACCEPTANCE RATE (tons per day)	NUMBER OF LANDFILLS
Large	>500 tpd	738 tpd	37
Medium	500 - 265 tpd	282 tpd	114
	265 - 30 tpd	109 tpd	114
Small	<30 tpd	11 tpd	453
TOTAL			718

[8] *List of Industrial Waste Landfills and Commercial and Demolition Waste Landfills*, prepared by Eastern Research Group, Inc., for the Office of Solid Waste, September 1994.

3. METHODOLOGY FOR ESTIMATING COSTS

This chapter discusses EPA's methodology for estimating the national compliance costs of the rulemaking. The chapter begins with an overview of the methodology, and then presents a detailed approach for each type of affected party.

3.1 OVERVIEW

EPA estimated the national costs of this rulemaking to waste generators and managers in 18 affected states. To estimate national costs, EPA first identified the compliance options available to each affected party. EPA then selected the compliance practice or practices likely to be selected by each party based on technical feasibility, cost, and other factors. The next step was to estimate the per-ton unit costs associated with each compliance practice; this was based on information available in the literature or obtained through selected telephone contacts with representatives of the C&D industry. National costs were estimated by multiplying the per-ton costs of each compliance practice by the number of tons of waste affected.

As will be discussed in more detail later in this chapter, EPA believes that compliance behavior under this rule will favor separation of the small amounts of hazardous waste from the bulk of the affected waste, with disposal of the hazardous components in a MSWLF or Subtitle C facility. EPA believes that the alternative scenario — C&D landfill owners upgrade their landfills to accept non-hazardous waste mixed with CESQG waste, and recover the costs by charging higher tipping fees to waste generators — would be more expensive to waste generators than separating their wastes. If generators choose to separate wastes rather than use upgraded landfills, there will be no demand for upgraded landfills, and landfill owners will be unlikely to recover their upgrading costs through higher tipping fees. Thus, EPA's estimate of national costs is based on the assumption that no C&D landfills will upgrade in response to this rulemaking. For the reader's information, EPA has also included at the end of this chapter a "high-end" analysis of national costs if some C&D landfills do, for some reason, opt to upgrade.

The next three sections discuss EPA's methodology for estimating national compliance costs for each affected party.

3.2 CESQGS WITH ON-SITE DISPOSAL IN SUBTITLE D UNITS

3.2.1 Compliance Practices

Manufacturing facilities with on-site land-based management will have three compliance options under the rule:

1. Upgrade the on-site units to meet the revised Part 257 requirements;

2. Separate the hazardous portion of the waste from the non-hazardous portion. Send the hazardous portion off site to a Subtitle C facility or a municipal solid waste landfill (MSWLF), and continue disposing the non-hazardous portion on site; or

3. Do not separate the hazardous portion of the waste from the non-hazardous portion. Send all of the waste off site to a Subtitle C facility or a MSWLF.

EPA contacted a small sample of firms in two industry sectors representing a large proportion of CESQGs with on-site Subtitle D land disposal units: the Stone, Clay, Glass and Concrete industry, and the Food and Kindred Products Industry. Representatives of both industries reported that industry practice is to keep hazardous wastes separate from non-hazardous wastes. If this is true of the other industries as well, the costs of separating hazardous wastes from non-hazardous wastes are negligible, and option 2 is the least-cost compliance option. The incremental costs of option 2 are only those associated with sending the hazardous portion of the waste off site, which is less expensive than sending <u>all</u> of the waste off site (option 3), or bringing on-site units into compliance with the Part 257 revisions (option 1).

For costing purposes, EPA assumed that under option 2, the hazardous portion of the waste would be sent to a Subtitle C facility. According to EPA's Municipal Solid Waste Landfill Survey, in 1985 over 70 percent of MSWLFs explicitly refused to accept CESQG waste. However, under today's rule, sending the CESQG waste to a MSWLF or upgraded landfill would be acceptable as well.

3.2.2 Unit Costs

As noted above, the costs of separating out hazardous wastes were assumed to be negligible or zero, as were the costs associated with continuing to dispose of the non-hazardous portion of the waste on site.

There will be incremental costs for sending the CESQG wastes off-site for disposal. While the generators have the option of sending the CESQG waste to a Subtitle C landfill, MSWLF or upgraded C&D landfill, EPA used the most costly alternative for the purposes of this analysis, i.e., sending the waste to a Subtitle C landfill. This scenario is not unreasonable, since many MSWLFs choose not to accept CESQG wastes and there may not be an upgraded C&D landfill available nearby. The cost of pick-up and disposal of CESQG waste may vary. For the purposes of this

analysis, EPA used an estimated cost of $430/ton.[9] However, since there is such a low volume of CESQG waste generated, fluctuations in this cost will not dramatically affect national cost estimates.

3.2.3 National Costs

To estimate national costs incurred by the 605 CESQGs with on-site disposal in Subtitle D units, EPA simply multiplied the estimated 400 tons of CESQG waste[10] by the estimated pickup and disposal cost of $430 per ton. EPA has not adjusted the costs incurred by these generators to account for state requirements that may be as stringent as those imposed by this rulemaking.

3.3 CONSTRUCTION AND DEMOLITION WASTE GENERATORS

EPA believes that construction waste generators will be affected by this rulemaking, but that demolition waste generators will not. Road and bridge demolition waste will be unaffected because it typically does not contain CESQG waste. While there may be CESQG types of wastes in buildings, EPA assumed that building demolition waste will not need to go to an upgraded landfill. EPA assumed that a decision on the nature of building demolition waste would occur once the building had been demolished. If the waste was determined to be hazardous, the volumes would be far beyond the CESQG levels. Otherwise, if the waste is determined to be non-hazardous, it would not need to go to an upgraded landfill.

3.3.1 Compliance Practices

Construction waste generators who currently send their waste to a C&D landfill that is not in compliance with the revisions to Part 257 will have two options:

1. **Separate the hazardous portion of the waste from the non-hazardous portion and send the hazardous waste to a MSWLF, a C&D landfill that has been upgraded to be in compliance with the Part 257 revisions (an "upgraded C&D landfill"), or a**

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[9] Because the volumes involved would be quite small, EPA has kept its analysis of the costs of disposing these wastes simple. A standard construction cost estimating guide provided a range of $130 to $300 per ton (with a midpoint of $215 per ton) for pickup and disposal of hazardous waste, *Mean's Construction Cost Estimating Guide*, p. 25, 1991. This source did not indicate how the cost per ton might be affected by the volume of wastes to be picked up. If costs per ton are higher for small quantities due to fixed costs of hiring a truck and driver, the true costs of disposal would be higher. While EPA assumes that the midpoint of the reported costs, $215 per ton, is a reasonable assumption, for the purposes of this analysis, a cost twice that amount, $430 per ton, was used. This cost is significantly higher than the reported range, and will capture some of the uncertainty about increased costs due to small volumes. However, because the volumes involved are quite small, even a doubling of the midpoint cost (from $215 to $430 per ton) does not significantly affect national costs.

[10] See Section 2.1.1

Subtitle C facility; or

2. Do not separate the hazardous portion of the waste from the non-hazardous portion, and send all of the waste to a MSWLF, an upgraded C&D landfill, or a Subtitle C facility.

The compliance option that construction firms will select will depend on several factors, such as the feasibility and cost associated with separating the hazardous from the non-hazardous components of the waste; whether or not the waste will be accepted at a MSWLF; the costs to transport the waste from the point of generation to the disposal site; and the tipping fees charged by the different types of landfills.

EPA assumed that generators of construction waste would choose option 1. According to the National Association of Demolition Contractors (NADC) [11], it is relatively easy to keep the hazardous components of construction waste (e.g., paints and solvents) separate from the non-hazardous components. EPA believes that it will be less expensive for construction waste generators to separate out the hazardous portion of construction waste and send it off site (option 1) than to send <u>all</u> of the waste off site (option 2). MSWLFs are unlikely to accept all of this waste, given the capacity problems that many of them face. As will be discussed in section 3.4.3 of this report, even if some C&D landfills choose to upgrade, the upgrading costs are likely to be passed along to the waste generators, making disposal in an upgraded C&D landfill expensive relative to the costs of option 1.

While generators will have the option of sending CESQG waste to MSWLFs or upgraded facilities, for costing purposes, under option 1, EPA assumed the CESQG waste separated from construction waste will be sent to a Subtitle C facility, as was assumed for CESQG separated from industrial non-hazardous waste (see Section 3.2.1).

3.3.2 Unit Costs

As noted above, EPA has assumed that construction waste generators will separate out the hazardous portion of the waste and send it to a Subtitle C facility and keep sending the non-hazardous portion to the non-upgraded C&D landfill they used prior to the rule.

EPA assumed that at most small construction sites, there would be no incremental costs of separating out the CESQG wastes. It is assumed that CESQG waste would be separated during routine site clean-up activities and disposed of in a container near the non-hazardous waste dumpsters on site. The cost of this separation is assumed to be negligible. For heavy construction establishments [12], EPA assumed that

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[11] Telephone communication with Mike Taylor, Executive Director, National Association of Demolition Contractors, September 19, 1994.

[12] Where each "establishment" represents a group of job sites.

an unskilled worker at $17.32 per hour [13] would inspect sites and pick-up CESQG wastes periodically. One hour per week per establishment was assumed for a yearly cost of $901 per establishment.

Incremental costs for the pickup and disposal of the CESQG wastes which are separated out was assumed to be the same as for generators with on-site disposal. As discussed in section 3.2.2., a unit cost of $430 per ton was used.

[13] ($11.57 per hour for laborer with an approximate overhead rate of 1.5). Source for wage rate: Bureau of Labor Statistics.

3.3.3 National Costs

The national costs of the rule for generators of construction waste are the sum of the costs for (1) separating the hazardous and non-hazardous components of construction waste, and (2) sending the hazardous portion off site to a Subtitle C facility.

To estimate the national cost of separating out CESQG wastes, EPA multiplied the estimated number of heavy construction establishments by the incremental cost per facility of inspecting major sites to ensure CESQG wastes are separated. The *1987 Census of Construction Industries* reports there are approximately 37,000 heavy construction establishments in the United States. This would work out to be approximately 10,000 heavy construction establishments in the affected states. It was estimated that these establishments incur an incremental separation cost of $901 per year.

To estimate the national costs of sending the hazardous portion of the waste to a Subtitle C facility, EPA multiplied the quantity of hazardous waste separated from construction waste by the transportation and disposal cost of $430 per ton. According to the National Small Quantity Hazardous Waste Generator Survey, 2,270 tons of hazardous construction waste are generated each year nationwide; this translates to 636 tons in affected states.

EPA assumed that there would be no increase in costs for disposing the non-hazardous portion of construction wastes: these wastes are assumed to go to the same C&D landfill, and to be charged the same tipping fee, as before the rule.

3.4 C&D WASTE LANDFILL OWNERS

3.4.1 Compliance Practices

Construction and demolition waste landfills that are not currently in compliance with the Part 257 revisions may respond to the regulation in one of two ways:

1. Choose not to upgrade, and accept only C&D waste that does not contain hazardous waste.

2. Upgrade and accept all C&D waste.

C&D landfill owners who choose not to upgrade may only receive C&D waste that does not contain hazardous waste. EPA assumes that C&D landfills that choose not to upgrade (option 1) will take steps to ensure that CESQG waste is not disposed of in their landfills.

C&D landfill owners who choose option 2 will upgrade the landfill to come into compliance with the Part 257 revisions. EPA assumes that C&D landfill owners will choose this option if they believe that it will be profitable to do so. In making this decision, they will consider the costs of upgrading, the additional tipping fees they would have to charge waste generators to recover these costs, and the extent to which waste generators would be willing to pay the increased tipping fees. Those waste generators with less expensive alternatives (e.g., separation and disposal in a Subtitle C facility) would be likely to avoid paying the additional tipping fees, and landfill owners would lose business. If landfill owners believe that most of their customers will be unwilling to pay tipping fee increases large enough to cover the costs of upgrading, they will probably choose not to upgrade.

Section 3.4.2 presents the units costs of each option, and Section 3.4.3 discusses the number of landfills nationwide that EPA expects to select each option.

3.4.2 Unit Costs

<u>Spot Checking Costs</u>

C&D landfills that choose not to upgrade (option 1) will take steps to ensure that CESQG waste is not disposed of in their landfills. C&D landfill owners are expected to include in their contracts with haulers a clause specifically forbidding CESQG waste, and to perform spot checks of the waste entering the facility. Based on conversations with the National Association of Demolition Contractors (NADC), [14] EPA assumed that an unskilled worker would spend one hour a day spot checking the waste entering the facility to assure that no CESQG waste is being disposed. At $17.32 per hour and 260 days per year, the resulting annual cost per facility would be $4,500.

<u>Upgrading Costs</u>

C&D landfills owners that choose to upgrade (option 2) must first meet the location restrictions (to be eligible to upgrade) and will then need to comply with the groundwater monitoring and corrective action requirements.

Location Criteria:

Criteria that apply to existing landfills address floodplains; the revisions to Part 257 only add demonstration requirements for facilities located in floodplains or wetlands. EPA has not included costs for location-related demonstrations in this cost and economic impact analysis because these costs are expected to be small relative to the

[14] Mike Taylor, Executive Director, National Association of Demolition Contractors, telephone communication, February 14, 1995.

other costs of the rule.

Groundwater Monitoring:

The groundwater monitoring requirements of the rule are similar to those imposed on MSWLFs under Part 258. To estimate the costs for C&D landfills to comply with these requirements, EPA used the costs estimated for existing MSWLFs to comply with the Part 258 groundwater monitoring requirements. The RIA for the MSWLF criteria revisions [15] provides per-ton groundwater monitoring costs for each of seven MSWLF sizes (ranging from 10 to 1,500 tons per day), two post-closure care periods (10 years and 40 years), and two assumptions concerning the duration of the remaining active life over which monitoring costs can be amortized (10 years and 20 years). EPA used these costs to calculate per-ton monitoring costs associated with a 30-year post-closure care period (the duration required under the Part 257 revisions) and an assumed 15-year remaining active life for each size class. EPA then fit a smooth curve to these cost estimates to generate a simple function relating per-ton monitoring costs to landfill size. This function was then used to estimate per-ton monitoring costs for all but the smallest C&D landfill size category shown in Exhibit 2-3 (EPA assumed that the smallest C&D landfills would not choose to upgrade because the per-ton costs would be prohibitive). Typical groundwater monitoring costs for landfills in each size category are shown in Exhibit 3-1 (per-ton costs are rounded).

EXHIBIT 3-1.
Groundwater Monitoring Costs for Different C&D Landfill Size Categories

SIZE	WASTE ACCEPTANCE RATE (tons per day)	ASSUMED ACCEPTANCE RATE (tons per year)	MONITORING COSTS (per ton)	ANNUAL MONITORING COSTS (per landfill)
Large	>500 tpd	269,000 tpy	$1.01	$271,000
Medium	500 - 265 tpd	103,000 tpy	$2.08	$214,000
	265 - 30 tpd	40,000 tpy	$3.97	$158,000
Small	<30 tpd	4,000 tpd	NA	NA

Note: Numbers are rounded

Corrective Action:

EPA used a similar approach to estimate corrective action costs for C&D landfills. The RIA for the MSWLF criteria revisions provides information on the proportion of existing MSWLFs that trigger corrective

[15] *Regulatory Impact Analysis for the Final Criteria for Municipal Solid Waste Landfills*, Prepared for EPA's Office of Solid Waste, December 1990.

action in each of three landfill size categories and four environmental settings, and provides per-ton corrective action costs for each landfill size and environmental setting. These per-ton costs were based on an assumed remaining life of 10 years.

To apply these costs to C&D landfills, EPA adjusted them to reflect a 15-year remaining life. Otherwise, the clean-up technologies and per-ton clean-up costs for C&D landfills that trigger corrective action are assumed to be the same as for MSWLFs of similar sizes and in similar environmental settings. Based on the assumption that the distribution of C&D landfills across the environmental settings is the same as MSWLFs, EPA calculated an average per-ton corrective action cost for each size category. As with groundwater monitoring costs, EPA fit a smooth curve to these cost estimates to generate a simple function relating per-ton corrective action costs to landfill size. This function was then used to estimate per-ton corrective action costs for landfills that trigger corrective action in all but the smallest of the four C&D landfill size categories shown in Exhibit 2-3. Typical corrective action costs for landfills in each size category are shown in Exhibit 3-2 (per-ton costs are rounded).

EXHIBIT 3-2.
Corrective Action Costs for Landfills that Trigger Corrective Action by C&D Landfill Size Category

SIZE	WASTE ACCEPTANCE RATE (tons per day)	ASSUMED ACCEPTANCE RATE (tons per year)	CORRECTIVE ACTION COSTS (per ton)	CORRECTIVE ACTION COSTS (per landfill that triggers)
Large	>500 tpd	269,000 tpy	$1.04	$280,000
Medium	500 - 265 tpd	103,000 tpy	$1.64	$168,000
	265 - 30 tpd	40,000 tpy	$2.78	$110,000
Small	<30 tpd	4,000 tpd	NA	NA

Note: numbers may not add due to rounding

3.4.3 National Costs

To calculate the national costs of the rule, EPA first estimated the number of C&D landfills that would upgrade to come into compliance with the Part 257 revisions. To do this, EPA compared (1) the per-ton costs that waste generators would incur in separating out the hazardous portion of their waste and sending it to a Subtitle C facility, to (2) the increased tipping fees that C&D landfills would charge waste generators to recover the costs of upgrading. Presumably, if the costs to the waste generator under (2) exceeds that under (1), the C&D landfill industry would, by and large, choose not to upgrade.

As discussed in Section 3.3.3, EPA estimates that it will cost generators of heavy construction waste $901 per establishment to see

that hazardous waste is separated. Multiplying this per-establishment cost by 10,000 heavy construction establishments gives a national cost of $9,010,000 for separating hazardous waste. It will cost construction waste generators $430 to dispose of each ton of separated hazardous waste. Multiplying this unit cost by 636 tons of hazardous waste gives a national cost of $273,480. Thus, the total national cost to construction waste generators under this scenario is $9,283,500. Dividing

this national cost by the number of tons of construction waste generated in the affected states (18 percent of 28 million tons, or 5,040,000 tons) gives an average per-ton separation/disposal cost of $1.79. [16]

Exhibits 3-1 and 3-2 show the per-ton costs for groundwater monitoring and corrective action for landfills that choose to upgrade. In Exhibit 3-3, these costs are combined to show the per-ton costs of upgrading landfills in different size categories, both for landfills that trigger corrective action and those that do not. If these costs are passed along equally to all users of the upgraded landfill — construction and demolition waste generators alike — then the increase in tipping fees would be equal to those shown in Exhibit 3-3. However, as noted before, demolition wastes are assumed not to be CESQG wastes. Thus, demolition waste generators are not affected by this rulemaking and will probably be unwilling to pay these added tipping fees. If the upgrading costs are passed along only to the construction waste generators, the increased tipping fees would be distributed across the 18 percent of C&D waste generated by the construction industry, (1 / 0.18) or 5.6 times higher than those reflected in Exhibit 3-3.

EXHIBIT 3-3.
Per-ton Costs of Upgrading C&D Landfills
(Ground-water Monitoring and Corrective Action)

SIZE	ASSUMED ACCEPTANCE RATE (tons per day)	COSTS FOR LANDFILLS THAT DO NOT TRIGGER CORRECTIVE ACTION (per ton)	COSTS FOR LANDFILLS THAT TRIGGER CORRECTIVE ACTION (per ton)
Large	>500 tpd	$1.01	$2.05
Medium	500 - 265 tpd	$2.08	$3.72
	265 - 30 tpd	$3.97	$6.75
Small	<30 tpd	NA	NA

Based on this analysis, EPA assumed for the purposes of this analysis, that overall, the least cost response to this rulemaking will be comprised of (1) separation and Subtitle C disposal of hazardous waste on the part of construction waste generators, and (2) avoiding receipt of CESQG wastes (no upgrading) on the part of C&D landfill owners.

Under this assumption, the only costs to C&D landfill owners will be those associated with spot checking the waste entering the facility to assure that no CESQG waste is being disposed. To calculate national

[16]The per-ton costs would be higher than this amount for firms that conduct inspections to assure that hazardous waste is screened out (in this analysis, firms that conduct heavy construction), and lower than this amount for construction firms that do not. The $1.79 per-ton cost is a national average.

costs for this activity, EPA multiplied the per-landfill cost of $4,500 by the total number of landfills in the affected states (718).

3.5 "HIGH-END" COST ANALYSIS -- IF C&D LANDFILLS UPGRADE

Although in the least cost of compliance scenario, no C&D landfills are expected to upgrade in response to this rulemaking, EPA conducted an analysis to estimate "high-end" costs if some landfills choose to do so. This scenario changes the national costs of the rule for construction and waste generators and managers, as described below.

3.5.1 C&D Landfill Owners

The unit costs of upgrading C&D landfills to come into compliance with the Part 257 revisions are presented in Exhibits 3-1 and 3-2. Calculating the national costs associated with upgrading required an estimate of the number of landfills that upgrade under the hypothetical "high-end" scenario.

EPA assumed that the larger C&D landfills with greater remaining capacity would upgrade, and that the smaller C&D landfills with less remaining cap acity would not. Therefore, EPA assumed that all of the landfills in each of the two largest size categories would upgrade (37 landfills in the >500 tpd category and 114 landfills in the 265-500 tpd category). EPA also assumed that 19 landfills in the 30-265 tpd category would upgrade.[17] To calculate the national costs of groundwater monitoring for these 170 landfills, EPA simply multiplied the number of upgrading landfills in each size category by the appropriate per-landfill groundwater monitoring cost shown in Exhibit 3-1. A similar approach was used to calculate corrective action costs, although here it was also necessary to estimate the number of upgrading landfills that would trigger corrective action.

The RIA for the MSWLF criteria revisions estimated that about two-thirds of existing MSWLFs would trigger corrective action under Part 258. Although the revisions to Part 257 are similar to Part 258 with regard to corrective action, EPA believes that the characteristics of C&D landfills are such that they are less likely than MSWLFs to trigger corrective action. To estimate the proportion of C&D landfills that would trigger corrective action, EPA examined C&D landfill leachate data provided by NADC. Specifically, EPA calculated the median concentrations of constituents found in leachate from 21 landfills, and divided these concentrations by a dilution/attenuation factor of 10 to approximate concentrations at a monitoring well located at the waste management boundary.[18] These concentrations were then compared to

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[17] This assumption was based on an analysis of capacity, and does not affect the national costs significantly.

[18] Median leachate concentrations were based on all samples, including those in which the constituent tested for was not detected.

corrective action trigger levels such as Maximum Contaminant Levels (MCLs) promulgated under the Safe Drinking Water Act or, for constituents without MCLs, health-based levels in drinking water (reference concentrations for non-carcinogens and 10^{-5} risk-specific doses for carcinogens).

Using this approach, 3 of the 21 landfills, or 14.3 percent, trigger corrective action. For this analysis, then, EPA assumed that 14.3 percent of C&D landfills that upgrade would trigger corrective action. [19]

For the remaining 548 landfills (those that do not upgrade and stop receiving CESGQ waste), the costs are simply those associated with spot checking incoming loads, as discussed in Section 3.4.2.

3.5.2 Construction and Demolition Waste Generators

Disposal costs under the high compliance cost scenario will increase for construction and demolition waste generators if the C&D landfill to which they currently send their waste chooses to upgrade. Under this scenario, the waste generator would either continue to use the same landfill at a higher cost, or take the waste to a different landfill, presumably at a greater distance. For this analysis, EPA assumed that waste generators would continue to send their waste to the newly upgraded landfill and pay the increased tipping fees. To estimate the increase in tipping fees that would be charged by landfill owners, EPA simply divided the total upgrading costs for the 170 landfills by the total number of tons received by those landfills. Implicit in this approach is that the upgrading costs will be passed along to <u>all</u> users of the landfill, including demolition waste generators, who are not CESQG waste generators and are not required to use upgraded landfills.

The total quantity of waste received annually by the 170 landfills assumed to upgrade is 21.3 million tons, approximately 76 percent of the total generation of construction and demolition waste in the affected states. The total annual cost of upgrading these landfills is $41.9 million (see Exhibit 4-5c). Therefore, the average per-ton cost of upgrading is estimated to be $1.97. EPA assumes that this is equal to the incremental tipping fees these landfills will charge for waste disposal.

To calculate costs associated with increased tipping fees for <u>demolition waste</u> going to C&D landfills that upgrade, EPA simply multiplied the quantity of demolition waste that will go to upgraded

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[19] Estimated monitoring well concentrations of iron, manganese, sulfates, and/or total dissolved solids exceed secondary drinking water standards (SMCLs) at several additional landfills. However, these constituents are not among those the rule requires owners of C&D landfills to monitor for, and are not of concern for health reasons (SMCLs are based on aesthetics). Therefore, EPA has not included these landfills in estimating the proportion of C&D landfills that will trigger corrective action under the rule.

landfills (82 percent of 21.3 million tons, or 17.5 million tons) by the incremental tipping fee of $1.97 per ton (Exhibit 4-5b)

Similarly, to calculate costs associated with increased tipping fees for construction waste going to C&D landfills that upgrade, EPA multiplied the quantity of construction waste that will go to upgraded landfills (18 percent of 21.3 million tons, or 3.8 million tons) by the incremental tipping fee of $1.97 per ton. In addition, generators of construction waste who currently send their wastes to C&D landfills that do not upgrade will incur the costs of separating out the hazardous portion of the waste and sending it to a Subtitle C facility.

However, not all construction waste will be going to an upgraded landfill. Thus, some construction sites will still need to separate their wastes. Inspection costs to ensure CESQG wastes are separated for heavy construction establishments were presented in section 3.3. It is uncertain, what portion of the 10,000 establishments assumed to "inspect" sites in section 3.3, would continue to incur this cost under this scenario where the majority of large C&D landfills upgrade. To be conservative, EPA assumed 70 percent of these establishments will continue to "inspect" the sites capture a reasonable upper-bound of facilities which might continue to inspect and separate. To calculate separation and disposal costs for these construction waste generators, then, EPA simply multiplied the costs estimated previously for all construction waste generators by 70 percent.

4. RESULTS OF THE COST ANALYSIS

This chapter presents the results of the cost analysis. Sections 4.1 through 4.3 present the costs to each type of affected party, and Section 4.4 summarizes the costs to the economy. Section 4.5 examines costs under a hypothetical "high-end" scenario in which the majority of large C&D landfills upgrade in response to the rulemaking; EPA believes this to be an unlikely scenario.

4.1 CESQGS WITH ON-SITE DISPOSAL IN SUBTITLE D UNITS

Exhibit 4-1 shows the estimated annual costs of the rule to CESQGs in the manufacturing sector with on-site disposal. The total cost, estimated to be $172,000, is relatively low because (1) the cost of separating the hazardous waste from the rest of the waste is assumed to be negligible, and (2) the quantities of hazardous waste requiring off-site disposal are very small.

EXHIBIT 4-1
Estimated Annual Costs to CESQGs With On-Site Disposal

Cost for Hazardous Waste Pickup and Disposal (per ton)	Tons of Hazardous Waste Generated	Total Annual Cost
$430	400	$172,000

4.2 CONSTRUCTION WASTE GENERATORS

Exhibit 4-2 shows the estimated annual costs of the rule to construction waste generators in affected states, first for separating out the hazardous portion of the waste and then for disposing of it. The bulk of the total annual costs are associated with the separation process itself rather than from the disposal of the small quantity of separated hazardous waste.

4.3 CONSTRUCTION AND DEMOLITION LANDFILLS

C&D landfills are assumed not to upgrade in response to the rule, and to incur compliance costs only from spot checking incoming waste at the landfill. Exhibit 4-3 shows the estimated costs of the rule to C&D landfills.

EXHIBIT 4-2.
Estimated Annual Costs to Construction Waste Generators

Cost of Separating Hazardous Waste (per construction establishment)	Number of Heavy Construction Establishments	Total Cost of Separation
$901	10,000	$9,010,000

Cost for Hazardous Waste Pickup and Disposal (per ton)	Tons of Hazardous Waste Separated	Total Cost of Pickup and Disposal	Total Annual Cost
$430	636	$273,000	$9,283,500

Note: numbers are rounded

EXHIBIT 4-3.
Estimated Annual Costs to C&D Landfills

Cost of Spot Checking Incoming Waste (per landfill)	Number of C&D Landfills in Affected States	Total Annual Cost
$4,500	718	$3,231,000

4.4 TOTAL COSTS TO THE ECONOMY

The total costs to the economy, shown in Exhibit 4-4, are estimated to be $9.96 million. These consist of (1) costs of hazardous waste disposal for a small quantity of hazardous waste from CESQGs currently using on-site disposal; (2) costs to construction waste generators to separate out the hazardous portion of their wastes and send it to Subtitle C facilities; and (3) costs to C&D landfill owners to spot check incoming waste for CESQG waste. Over 70 percent of the costs of the rule are associated with separating out the hazardous portion of construction waste.

EXHIBIT 4-4.
Estimated Costs to the Economy

Affected Parties		Annual Costs (millions)
CESQGs with On-site Disposal		$0.17
Construction Waste Generators	Hazardous Waste Separation	$9.01
	Pickup and Disposal	$0.27
	Total Costs	$9.28
Construction and Demolition Waste Landfills		$3.23
Total		$12.65

4.5 "HIGH-END" COSTS -- IF 170 C&D LANDFILLS UPGRADE

Exhibits 4-5a through 4-5c show the estimated costs to construction waste generators, demolition waste generators, and C&D landfills under the hypothetical scenario that 170 C&D landfills upgrade to come into compliance with the Part 257 revisions. Costs to CESQGs with on-site disposal are the same under this scenario as presented above in Section 4.1.

EXHIBIT 4-5a.
Estimated Annual Costs to Construction Waste Generators

Cost of Separating Hazardous Waste (per construction establishment)	Number of Heavy Construction Establishments	Total Cost of Separation
$901	7,000	$6,307,000

Cost for Hazardous Waste Pickup and Disposal (per ton)	Tons of Hazardous Waste Separated	Total Cost of Pickup and Disposal
$430	445	$191,000

Incremental Tipping Fee to Upgraded C&D Landfills (per ton)	Tons of Waste to Upgraded C&D Landfills	Total Cost of Disposal in Upgraded C&D Landfills
$1.97	3,830,000	$7,545,000

Total Estimated Annual Costs to Construction Waste Generators	$14,043,000

Note: numbers may not add due to rounding.

The incremental tipping fee of $1.87 per ton is based on the assumption that landfill owners will pass along upgrading costs to all users of the landfill. If landfill owners do not pass along these costs, this exhibit overstates the compliance costs of the rule to construction waste generators. If landfill owners pass along these costs only to construction waste generators (demolition waste generators are not CESQGs and therefore are not required to use upgraded landfills), the compliance costs incurred by construction waste generators would be higher than those shown in the exhibit.

EXHIBIT 4-5b.
Estimated Annual Costs to Demolition Waste Generators

Incremental Tipping Fee to Upgraded C&D Landfills (per ton)	Tons of Waste to Upgraded C&D Landfills	Total Annual Cost
$1.97	17,466,250	$34,480,000

As stated above, this analysis assumes that upgrading costs will be passed along to all users of the upgraded landfill. If upgrading costs are not passed along, or are passed along only to construction waste generators, the incremental costs of the rule to demolition waste generators would be zero. About 85 percent of the upgrading costs are associated with groundwater monitoring.

EXHIBIT 4-5c.
Costs to C&D Landfills

Size Range (Capacity in Tons Per Day)	Number of Landfills Assumed to Spot Check Only	Number of Landfills Assumed to Upgrade	Annual Cost (millions)			
			Spot Checking	Monitoring	Corrective Action	Total
0-30	453	0	$2.0	0	0	$2.0
30-265	95	19	$0.4	$3.0	$0.3	$3.7
265-500	0	114	0	$24.4	$2.7	$27.1
> 500	0	37	0	$10.0	$1.5	$11.5
Total	548	170	$2.4	$37.4	$4.5	$44.3

Exhibit 4-5d shows the total costs to the economy under the assumption that 170 landfills upgrade. EPA estimates these costs to be $51 million per year. These consist of (1)

EXHIBIT 4-5d.
Estimated Costs to the Economy Under the Hypothetical "High-End" Scenario

Affected Parties		Annual Costs (millions)	
CESQGs with On-site Disposal			$0.17
Construction Waste Generators	Haz. Waste Separation[1]	$6.31	
	Pickup and Disposal[1]	$0.19	
	Total		$6.5
Demolition Waste Generators			$0
C&D Landfill Owners	Spot Checking[2]		$2.4
	Monitoring[3]	$37.4	
	Corrective Action[3]	$4.5	
	Total Upgrading Costs		$41.9
Total			$51.0

Note: numbers may not add due to rounding
All increased costs attributed to landfill owners

1. **70 percent of Construction Waste Generators separate**
2. **548 C&D landfills spot check**
3. **170 C&D landfills upgrade**

costs of hazardous waste disposal for small quantity of hazardous waste from CESQGs currently using on-site disposal; (2) costs to a subset of construction waste generators to separate out the hazardous portion of their waste and send it to a Subtitle C facility; (3) costs to a subset of C&D landfills for spot checking incoming wastes; and (4) costs to a second subset of C&D landfills for upgrading.

Increases in tipping fees incurred by construction and demolition waste generators who send their wastes to upgraded C&D landfills under this hypothetical high-end scenario are not included in the costs to the economy. To estimate costs to the economy, it is necessary to distinguish between opportunity costs and transfers: the former represent true social costs, while the latter are payments that "net out," since the cost to one entity is exactly balanced out by the gain to the entity receiving the payment. Changes in tipping fees paid by generators are exactly balanced out by the increased revenues received by the C&D landfills. Thus, these two categories are not included in the estimate of total costs to the economy.

As shown in Exhibit 4-5d, the high costs of the rule in this hypothetical high-end scenario result mainly from the high costs associated with upgrading existing landfills.

5. LIMITATIONS OF THE COST ANALYSIS

A number of assumptions and simplified methodologies were used in this analysis. Important caveats and limitations are discussed in this chapter.

5.1 OVERALL LIMITATIONS IN THE ANALYSIS

One important limitation of the analysis is the considerable uncertainty associated with the quantities, management practices, and characteristics of construction and demolition wastes. The analysis assumes that 100 million tons of C&D waste are generated annually, based on two estimates presented in the literature. EPA also assumes that all of this waste is currently sent to C&D landfills; this is a conservative assumption that likely overestimates costs somewhat.

EPA found very little information on how much C&D waste is construction waste versus demolition waste. There is also uncertainty with respect to the frequency with which construction and demolition waste generators are CESQGs. EPA has assumed that all construction waste generators are CESQGs, and that no demolition waste generators are CESQGs.

Finally, with the exception of the hypothetical "high-end" analysis, EPA has developed only point estimates of costs, not range estimates. The presentation of point estimates should not be interpreted to indicate precision in the results.

5.2 LIMITATIONS IN THE ANALYSIS OF COSTS TO CESQGS USING ON-SITE MANAGEMENT

EPA's estimate of the costs to CESQGs using on-site management is very rough. Limitations include the following:

- Separation costs are not included.

- EPA assumed that all of the CESQG waste sent off site will go to Subtitle C facilities. Some portion of this waste might be accepted at MSWLFs.

- When CESQGs with on-site waste management units begin shipping the hazardous portion of their wastes off site, they will begin using their on-site capacity at a slightly lower rate. This analysis does not account for the slight extension of the useful life of on-site units as a result of the rule.

Because the affected waste quantities are very small, these uncertainties have correspondingly small effects on the national cost estimate.

5.3 LIMITATIONS IN THE ANALYSIS OF COSTS TO CONSTRUCTION AND DEMOLITION WASTE GENERATORS

EPA assumed that it would be feasible, in all cases, to separate out the hazardous portion of construction waste, and that the added costs would be attributable only to inspection of construction sites. There is considerable uncertainty associated with the activities and associated costs for separating out hazardous waste at construction sites.

In the hypothetical "high-end" analysis, EPA assumed that owners of landfills opting to upgrade would pass along all of the upgrading costs to the users of their landfills, and calculated increased tipping fees based on this assumption. If landfill owners do not pass along the upgrading costs, tipping fees will not increase, and the analysis overstates compliance costs to both construction waste and demolition waste generators. If landfill owners pass along the upgrading costs only to construction waste generators, the analysis understates compliance costs to construction waste generators and overstates compliance costs to demolition waste generators. Finally, the analysis does not account for any changes in behavior on the part of construction or demolition waste generators resulting from higher tipping fees charged by landfill owners that upgrade; it assumes that all generators will continue to send their waste to the same landfill as before the rule.

5.4 LIMITATIONS IN THE ANALYSIS OF COSTS TO C&D LANDFILLS

EPA's cost estimate is based on the assumption that no C&D landfills will find it profitable to upgrade after the rule is in effect. The cost comparison presented in Section 3.4.3 indicates that the (1) per-ton costs incurred by owners of landfills that upgrade are in some cases lower than (2) the per-ton costs incurred by construction waste generators who separate their wastes, but only for the largest landfills and only if they do not trigger corrective action. It is possible that the economics favor upgrading under other circumstances as well.

To analyze the hypothetical "high-end" scenario, EPA modeled total upgrade costs and transportation costs as a function of the number of C&D landfills that chose to upgrade. As the number of landfills that upgrade increases, transpiration costs will decline on average while total upgrade costs will increase. EPA found that the minimum sum of total transportation costs and upgrade costs occurred when 162 landfills upgrade in response to this rulemaking. EPA’s model assumes that landfills in the larger size categories will find it economical to upgrade, while the smaller landfills will not.

There are several uncertainties associated with the estimate of upgrading costs in the hypothetical "high-end" scenario:

- The per-ton costs for groundwater monitoring and corrective action were assumed to be the same as for MSWLFs.

- EPA assumed that C&D landfills opting to upgrade would upgrade the entire facility. Some C&D landfill owners might choose instead to stop receiving CESQG waste in the existing portion of the landfill, and to open a new, separate section which would receive only CESQG-containing waste. Under this scenario, only the new section would be upgraded (assuming that this is allowed), and the upgrading costs would be lower.

- C&D landfills were assumed to have a 15-year remaining life over which to amortize the upgrading costs. No information was found on the remaining life of C&D landfills.

- The costs of making demonstrations in response to the location restrictions are not included in the national cost estimates.

- The analysis did not consider the possible construction of new C&D landfills, and how competition from new landfills may affect tipping fees.

- The analysis did not consider the effects of the rule on the generators of C&D waste that currently use on-site C&D landfills.

6. POTENTIAL IMPACTS ON SMALL ENTITIES

EPA anticipates that this rule will increase costs for two classes of facilities. CESQG generators that still handle their CESQG waste on site are expected to send their CESQG waste to Subtitle C facilities, at a maximum per-facility cost of $570 per year. Construction waste generators will incur maximum additional per-firm costs of $1,469 per year, for separation, transportation, and disposal of hazardous wastes.

The Regulatory Flexibility Act of 1980 requires federal agencies to assess the effects of regulations on small entities and to examine alternatives to the regulations that may reduce adverse economic effects on significantly impacted entities (5 U.S. Code 601 *et. seq.*). The Act requires agencies to prepare a preliminary analysis for all rulemakings to determine if a Regulatory Flexibility Analysis (RFA) is necessary.

This chapter examines the potential impacts of the rulemaking on small entities. Section 6.1 provides a description of the requirements of the Regulatory Flexibility Act and the EPA guidelines for determining significant impacts on small businesses. The general methodology used to determine whether the action may have significant impacts on small entities is described in Section 6.2. Section 6.3 presents the results of the analysis for each type of entity affected by the rulemaking.

This analysis is based on EPA's assessment of the most likely compliance behavior on the part of affected entities. EPA performed a high end analysis, predicated on an assumption that C&D landfills upgrade to meet these standards. In this scenario, cost impacts would be higher. EPA does not expect C&D landfills to upgrade, however, since they would be unlikely to recover the high costs of upgrading. The analysis of effects on small entities is predicated on an assumption that the owners of C&D landfills act rationally, and choose not to upgrade. Therefore, the hypothetical "high-end" scenario described in Chapters 3 and 4 is considered to be an unlikely outcome of the rulemaking and is not addressed in this chapter.

6.1 REGULATORY FLEXIBILITY ACT AND EPA GUIDELINES

The Regulatory Flexibility Act requires federal agencies to determine whether their actions will have a significant impact on a substantial number of small entities, including businesses, nonprofit agencies, and governmental jurisdictions. The Act does not define the key terms "small entity," "significant impact," or "substantial number."

In cases where the approximate severity of the impacts of a rule on small entities is unknown, the EPA guidelines recommend undertaking an initial screening analysis.[20] As one possible method, the EPA guidelines suggest comparing the annual compliance costs under the rulemaking to operating characteristics of the affected firms, such as annual sales, operating expenditures, net profits, or cash flow. The results of the screening analysis are then used to ascertain the potential economic impacts of the rulemaking and to determine the level of additional analysis needed.

6.2 GENERAL APPROACH

To obtain a preliminary indication of the potential impacts of the rule on small entities, this analysis compares annual compliance costs to average annual sales revenue (or average annual dollars of business done) for each type of affected facility. When available, the analysis also examines annual compliance costs as a percentage of annual net income. For the purposes of a screening analysis, comparing compliance costs to revenues provides a reasonable indication of the magnitude of the potential regulatory burden relative to a commonly available measure of a company's business volume. If the compliance costs represent a very small fraction of a typical firm's revenues (e.g., less than one percent), the financial impacts are likely to be minimal. When the ratio of compliance costs to annual revenue or net income is very high, additional analysis may be necessary to determine whether or not affected entities can "pass on" these additional costs to their consumers or absorb the additional costs themselves.

As discussed in previous chapters, three types of entities may be affected by this rule:

- CESQGs with on-site disposal in Subtitle D units (primarily manufacturing facilities from various industries);
- CESQGs with off-site disposal in C&D landfills (primarily construction companies); and
- C&D waste landfills.

Each type of entity is examined separately because they face different compliance costs and represent wholly different industries. The specifics of the analysis of each group are described below in Section 6.3.

Data on the average annual "dollar value of business done," or revenues, for the construction industries and the wrecking and demolition industry were obtained from the *1987 Census of Construction*

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[20] "Appendix E: Screening Analysis to Determine Severity of a Rule's Impacts on Small Entities," from *EPA Guidelines for Implementing the Regulatory Flexibility Act*.

***Industries*. Data on the average annual sales revenues for the waste disposal industry and for selected manufacturing industries with on-site disposal were obtained from Robert Morris Associates, *Annual Statement Studies for 1993* (RMA). Annual compliance costs per facility were estimated based on the results of the national cost analysis. Since the compliance cost estimates are in 1993 dollars, the revenue data from the Census were inflated to 1993 dollars based on the average gross domestic product (GDP) for 1987 and the estimated GDP for the final quarter of 1993.** [21]

While compliance costs are estimated on a per-facility basis, the financial data used for this analysis is at the firm level (i.e., for an average parent company). The financial data for a firm and an affected facility could differ if the firm operates more than one facility. This analysis assumes that a firm operates only one facility, and could therefore underestimate the potential impacts to firms with more than one affected facility.

Three possible criteria are provided in the EPA guidelines for defining "small entity." First, "the cutoff can be the point at which the adverse economic impact appears to rise or fall substantially, for example, in the form of higher costs or closures." Second, "EPA can use the point in the range of size segments that most closely approximates the Small Business Administration's definitions." Third, "EPA can use the point at which the regulation effectively includes a large number of regulated entities without covering a large portion of the pollution problem (e.g., 50 percent of regulated entities, but only 10 percent of the discharge of pollutant)."

For this analysis, the definition of a small entity varies by type of facility and by industry. For most industries examined, the analysis uses average annual sales data for the smallest size range of companies (in terms of annual sales revenues or number of employees) for which data are provided by RMA and Census. The specific definitions and data used for each type of affected party are discussed below.

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[21] Implicit price deflators for the gross domestic product are produced by the Bureau of Economic Analysis in the Department of Commerce. An annual average was not available for 1993 so revenues were inflated using the final quarter GDP estimate. The resulting GDP inflator for converting the 1987 Census data to 1994 dollars is 1.2263.

6.3 RESULTS

6.3.1 CESQGs with On-Site Disposal in Subtitle D Units

CESQGs in the manufacturing sector are not expected to be significantly impacted by the rulemaking because (1) few facilities still manage their CESQG waste in on-site disposal units; (2) industry practice is to keep hazardous wastes separate from non-hazardous wastes, so separation costs are insignificant; and (3) the quantities of CESQG waste generated are small, and the cost of disposing these wastes off site is correspondingly small.

Facilities that still handle their CESQG waste on site are expected to send their CESQG waste to Subtitle C facilities. The costs for pickup and disposal of the CESQG waste are estimated to be approximately $430 per ton.

Given that a CESQG, by definition, produces less than 100 kg of hazardous waste per month, or 1.32 tons per year, the cost of disposing this waste off site is estimated to be less than or equal to $568 per year per facility. Exhibit 6-1 presents the potential impact of $568 in additional waste disposal costs to small companies, or those with annual sales of $1 million or less, in various segments of the Stone, Clay, Glass, and Concrete industry and Food and Kindred products industry.[22] Impacts are measured by examining compliance costs as a percentage of annual sales and as a percentage of net income. As Exhibit 6-1 shows, the highest possible annual compliance costs represent only a small impact on the smallest companies in these industries. The impacts on larger firms, with higher annual revenues, are expected to be even lower.

EXHIBIT 6-1

Estimated Impacts on CESQGs with On-Site Management, with Annual Revenues of $1 Million or Less (1993 Dollars)

Industry	Maximum Estimated Compliance Costs	Annual Costs as Percentage of Annual Revenues	Annual Costs as Percentage of Annual Net Income

[22] The potential impact to facilities in these industries is examined to demonstrate that the potential compliance costs represent a very small percentage of revenues and net income for this category of facilities. Specific industries were chosen from the Stone, Clay, Glass, and Concrete, and Food and Kindred products industries because facilities from these industries represent almost 50 percent of the CESQGs that with on-site management, based on the *Screening Survey of Industrial Subtitle D Establishments* (Westat, 1987). The impact of the additional costs to facilities in other industries is expected to be similar.

Cut Stone and Stone Products[a] (SIC Code 3281)	$568	0.10%	2.1%
Glass Products[b] (SIC Code 3231)	$568	0.09%	NA
Concrete Brick, Block and Other Products[c] (SIC Code 3271 and 3272)	$568	0.09%	7.2%
Dairy Products[d] (SIC Codes 2021, 2022, 2024, and 2026)	$568	0.10%	NA
Canned and Dried Fruits and Vegetables[e] (SIC Codes 2033 and 2034)	$568	0.06%	NA

a Impact percentages are calculated using an average annual revenue of $563,700 and an average profit before taxes of $27,058. These average numbers are calculated from data in RMA, 1993.

b Impact percentages are calculated using an average annual revenue of $652,000, calculated from data in RMA, 1993. Average profit before taxes was not available for this size category.

c Impact percentages are calculated using an average annual revenue of $607,400 and an average profit before taxes of -$7,900. These average numbers are calculated from data in RMA, 1993. Although these smaller firms have negative profits before taxes, on average, the loses are small, on the order of 1 percent. The annual costs to these companies under the rule represent a small percentage of these losses.

d Impact percentages are calculated using an average annual revenue of $584,500, calculated from data in RMA, 1993. Average profit before taxes was not available for this size category.

e Impact percentages are calculated using an average annual revenue of $877,000, calculated from of -$7,900. These average numbers are calculated from data in RMA, 1993. Although these smaller firms have negative profits before taxes, on average, the loses are small, on the order of 1 percent. The annual costs to these companies under the rule represent a small percentage of these losses.

6.3.2 Construction Industry

There are approximately 194,000 construction contractors in the U.S., of which approximately 157,000 are building contractors (residential, operative, and nonresidential) and approximately 37,000 are heavy construction contractors (roads, bridges, etc.). [23] Based on the distribution of the national population, approximately 44,000 building contractors and 10,000 heavy construction contractors could be affected by the rule. [24] In the cost analysis, EPA assumed that building contractors will separate the hazardous and non-hazardous portions of their waste and continue to dispose of the non-hazardous portion as in the baseline. The hazardous portion is assumed to be disposed in a Subtitle C facility.

EPA has estimated that it will cost each of the 10,000 heavy construction contractors $901 per year to separate out the hazardous portion of construction waste. It will also cost $430 per ton, on average, to dispose of the hazardous portion of construction waste in a Subtitle C facility. Multiplying $430 per ton by a maximum of 1.32 tons of CESQG waste per year, each heavy construction company faces a maximum disposal cost of $568 per year under the rule. The total maximum increase in costs to construction companies is therefore $1,469.

Exhibit 6-2 shows the cost impacts as a percentage of annual revenues for four segments of the construction industry: single family house construction, residential construction other than single family, highway and street construction, and heavy construction not elsewhere classified. To be conservative, all segments were assumed to incur a maximum cost of $1,469, even though the cost analysis is based on the assumption that only companies involved in heavy construction would incur inspection costs. As shown in the exhibit, the increase in costs represents a small impact, less than one percent of annual revenues, for all sizes and types of construction companies. The cost impacts as a percentage of annual revenues are similar or lower for the other segments of the construction industry, such as non-residential and elevated highway and bridge construction.

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[23] Based on data from the *1987 Census of Construction Industries.*

[24] The states affected by the rule represent approximately 28 percent of the U.S. population. The number of construction contractors to be affected is estimated by multiplying the total number of contractors in the U.S. by 28 percent.

6.3.3 C&D Waste Landfills

This rule does not impose any new requirements on C&D landfills. Under the assumption that the landfills will choose not to upgrade, they will probably spot check incoming loads to make sure that they do not contain CESQG wastes. EPA notes that C&D landfills generally already implement source control programs, screening wastes before accepting them. This was confirmed in industry comments submitted to EPA on the proposal for this rule. [25] Inasmuch as this screening constitutes a baseline practice for the industry, EPA believes that landfills will not incur additional costs.

6.3.4 Conclusions

It is unlikely, given the assumptions applied in the analysis and the results of the screening analysis, that any of the affected parties will be impacted significantly by this rulemaking. If there are changes in any of EPA's expectations regarding the behavior of firms within the industries affected, it may be necessary to reexamine the potential impacts.

EPA anticipates that this rule will increase costs for two classes of facilities. CESQG generators that still handle their CESQG waste on site are expected to send their CESQG waste to Subtitle C facilities, at a maximum per-facility cost of $570 per year. Construction waste generators will incur maximum additional per-firm costs of $1,469 per year, for separation, transportation, and disposal of hazardous wastes. In each case, EPA's analysis shows that the impacts are less than one percent of annual revenues, for all sizes and types of companies.

This determination is based on EPA's projection of the response of CESQG waste generators and disposal facilities to today's rule. EPA performed a high end analysis, predicated on an assumption that C&D landfills upgrade to meet these standards. In this scenario, cost impacts would be higher. EPA does not expect C&D landfills to upgrade, however, since they would be unlikely to recover the high costs of upgrading. The analysis of effects on small entities is predicated on an assumption that the owners of C&D landfills act rationally, and choose not to upgrade.

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[25] Comments from Sanifill of Texas, Inc. and Beck Readymix Concrete Co., date August 11, 1995 (p. 2 of attachment, NCEP-00013).

EXHIBIT 6-2

Estimated Compliance Costs and Impacts for the General Contractors - Single Family Houses Industry (SIC Code 1521)

(1993 Dollars)

	Establishments with an average of								
	1 to 4 employees	5 to 9 employees	10 to 19 employees	20 to 49 employees	50 to 99 employees	100 to 249 employees	250 to 499 employees	500 to 999 employees	1000+ employees
Maximum Annual Compliance Costs per Company	$1,469	$1,469	$1,469	$1,469	$1,469	$1,469	$1,469	$1,469	$1,469
Average Annual Revenues per Company[a] (Thousands of Dollars)	NA	564	1,292	2,754	6,508	18,170	70,683	NA	NA
Average Annual Costs as Percentage of Average Annual Revenues	NA	0.26%	0.11%	0.05%	0.02%	< 0.01%	< 0.01%	NA	NA

[a] Average annual revenue is calculated based on data obtained from the *1987 Census of Construction Industries* report. Estimates were inflated to 1993 dollars based on GDP.

NA = Not Available

EXHIBIT 6-2 cont'd
Estimated Compliance Costs and Impacts for the General Contractors - Residential Buildings Other than Single Family Houses Industry (SIC Code 1522)
(1993 Dollars)

	Establishments with an average of								
	1 to 4 employees	5 to 9 employees	10 to 19 employees	20 to 49 employees	50 to 99 employees	100 to 249 employees	250 to 499 employees	500 to 999 employees	1000+ employees
Maximum Annual Compliance Costs per Company	$1,469	$1,469	$1,469	$1,469	$1,469	$1,469	$1,469	$1,469	$1,469
Average Annual Revenues per Company[a] (Thousands of Dollars)	280	880	2,039	4,918	14,124	29,573	95,372	NA	NA
Average Annual Costs as Percentage of Average Annual Revenues7	0.52%	0.17%	0.07%	0.03%	0.01%	< 0.01%	< 0.01%	NA	NA

[a] Average annual revenue is calculated based on data obtained from the 1987 Census of Construction Industries report. Estimates were inflated to 1993 dollars based on GDP.
NA = Not Available

EXHIBIT 6-2 cont'd
Estimated Compliance Costs and Impacts for the Highway and Street Construction Contractors Industry (SIC Code 1611)
(1993 Dollars)

	Establishments with an average of								
	1 to 4 employees	5 to 9 employees	10 to 19 employees	20 to 49 employees	50 to 99 employees	100 to 249 employees	250 to 499 employees	500 to 999 employees	1000+ employees
Maximum Annual Compliance Costs per Company	$1,469	$1,469	$1,469	$1,469	$1,469	$1,469	$1,469	$1,469	$1,469
Average Annual Revenues per Company[a] (Thousands of Dollars)	224	663	1,437	3,568	9,323	21,146	45,829	118,373	NA
Average Annual Costs as Percentage of Average Annual Revenues	0.66%	0.22%	0.10%	0.04%	0.02%	< 0.01%	< 0.01%	< 0.01%	NA

[a] Average annual revenue is calculated based on data obtained from the 1987 Census of Construction Industries report. Estimates were inflated to 1993 dollars based on GDP.
NA = Not Available

EXHIBIT 6-2 cont'd
Estimated Compliance Costs and Impacts for the Heavy Construction Contractors Industry
(SIC Code 1629)
(1993 Dollars)

	Establishments with an average of								
	1 to 4 employees	5 to 9 employees	10 to 19 employees	20 to 49 employees	50 to 99 employees	100 to 249 employees	250 to 499 employees	500 to 999 employees	1000+ employees
Maximum Annual Compliance Costs per Company	$1,469	$1,469	$1,469	$1,469	$1,469	$1,469	$1,469	$1,469	$1,469
Average Annual Revenues per Company[a] (Thousands of Dollars)	161	505	1,121	3,088	7,124	16,527	44,901	65,250	237,759
Average Annual Costs as Percentage of Average Annual Revenues	0.91%	0.29%	0.13%	0.05%	0.02%	< 0.01%	< 0.01%	< 0.01%	< 0.01%

[a] Average annual revenue is calculated based on data obtained from the 1987 Census of Construction Industries report. Estimates were inflated to 1993 dollars based on GDP.