*Docket Number: F-2001-PMLP-FFFFF*

# Regulatory Flexibility Screening Analysis for the Proposed Concentration-Based Listing of Wastewaters and Non-wastewaters from the Production of Paints and Coatings

**FINAL REPORT**

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U.S. Environmental Protection Agency

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332 Minnesota Street, St. Paul, Minnesota 55101) for the overall organization and development of this report. DPRA developed the methodology, database, and analytical model that allowed for the comprehensive analyses of the regulatory scenarios presented in this report. Lyn D. Luben, Gary Ballard, and Barnes Johnson, all of the U.S. Environmental Protection Agency, Office of Solid Waste, provided guidance and review.

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# 1.0 EXECUTIVE SUMMARY

This Regulatory Flexibility Screening Analysis (RFSA) was conducted to determine the potential impacts of the Agency's proposal to list as hazardous two waste streams generated by the paint industry on small paint manufacturing entities. The analysis was conducted per the requirement of the Regulatory Flexibility Act (RFA) as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA).

The proposed wastes generated by the paint industry are: 1) Paint manufacturing waste solids generated by paint manufacturing facilities that, at the point of generation, contain any of the constituents of concern at a concentration equal to or greater than the hazardous level set for that constituent, and, 2) Paint manufacturing waste liquids generated by paint manufacturing facilities that, at the point of generation, contain any of the constituents of concern at a concentration equal to or greater than the hazardous level set for that constituent, unless the wastes are stored or treated exclusively in tanks or containers prior to discharge to a POTW or under a NPDES permit.

Paint manufacturers produce varnishes, lacquers, enamels and shellac, putties, wood fillers and sealers, paint and varnish removers, paint and brush cleaners, and allied products. The products are manufactured for four end-use markets: architectural coatings, product finishes for original equipment manufacturers, special purpose coatings, and allied paint products. According to Census data for 1997 there are approximately 1,495 facilities in operation in the U.S., owned by 1,206 different companies. Total production is estimated to range from 1.2 billion and 1.5 billion gallons per year between 1992 and 1998 with a total product value of $17.2 billion in 1998. This industry segmentation includes all facilities identified in Standard Identification Classification (SIC) 2851 and under the North American Industrial Classification (NAICS) code 325510; this includes some manufacturers of miscellaneous allied paint products which will not be affected by the proposed rule.

Approximately 1,146, or 95 percent of the paint manufacturing companies in the U.S. are estimated to be small according to the Small Business Administration (SBA) definition: fewer than 500 employees based on corporate level data[1]. Many of these facilities (and companies) are very small, with fewer than 10 employees.

While the Census of Manufacturers identified 1,495 facilities, not all of these facilities are actually paint manufacturers which may potentially be affected by the proposed waste listing. The Agency has estimated, on the basis of a RCRA 3007 survey of the industry, that there are 972 facilities which manufacture paints and coatings in the U.S.. Of this total, we estimate that 615 generate the wastestreams of concern for this proposed listing. Extrapolated survey results suggest that these facilities generated nearly 107,000 metric tons of the targeted wastestreams in 1998 (K179+K180), of which about 36 percent is currently managed as hazardous waste. This analysis relies primarily on data generated through the Agency's survey of the industry, augmenting this information with Census and other industry specific information as appropriate.

We have estimated the impacts of the concentration-based listing proposal (the Agency's preferred

[1] *Small Business Size Standards* - Matched to North American Industrial Classification System (NAICS) Codes, Effective October 1, 2000, Small Business Administration (SBA)

approach), and two key options: a no-list or status quo option and a standard or traditional listing approach option. Under the proposed approach we also evaluated two alternative scenarios. These are: a nonwastewaters option which limits the listing to waste solids (K179), and a sensitivity analysis scenario where wastes currently going to hazardous fuel blending and cement kilns would be diverted to a commercial hazardous waste incinerator.

A supplementary analysis of our RCRA 3007 survey data suggests that an estimated 50 percent of the nonwastewaters and 20 percent of the wastewaters are nonhazardous. These estimates were applied under the aggregate findings for the concentration-based listing approach (the Agency's proposed approach). Our findings under this approach may overestimate compliance costs for waste streams containing listed constituents that fall below risk-based concentration levels. One-hundred percent of all targeted wastes were designated as hazardous under the aggregate findings for the traditional or standard listing option.

The estimated impacts associated with the Agency proposed approach, alternative scenarios to the proposed approach, and alternative waste listing options are presented in Table 1-1 below. As indicated, the nonwastewaters scenario under the proposed approach is the least costly, at $6.7 million per year for all impacted facilities. The Agency's proposed approach has slightly higher costs, at an estimated $7.3 million per year. The costs associated with the proposed listing approach with the assumption that the wastes currently going to hazardous waste fuel blending will be diverted to commercial incinerators (the sensitivity analysis) indicates an aggregate cost of $18.1 million per year. The traditional or standard listing option is estimated to cost $10.9 million per year. The no-list or status quo option would result in no incremental costs to industry. The impact estimates in Table 1-1 are fully weighted to account for model facility representation. These figures also assume baseline conditions where 50 percent of the nonwastewaters and 20 percent of the wastewaters are nonhazardous, as managed under the proposed waste listing option.

**Table 1-1. Summary of Estimated Impacts from All Waste Listing Options and Scenarios**

| Listing Option/Scenario | Average Weighted Incremental Annual Cost as a Percent of Gross Annual Sales | Aggregate Annual Compliance Cost Impacts (million 1999 dollars) |
|---|---|---|
| Proposed Concentration-Based Listing - Agency Preferred Approach (APA) | 0.07 | $7.3[1] |
| Agency Preferred Approach - Sensitivity Analysis Scenario (APA 1) (Waste going to all fuel blending is diverted to commercial incineration) | 0.19 | $18.1[2] |
| Agency Preferred Approach - Scenario to List Solids Only (APA 2) | 0.06 | $6.7 |
| | | |
| Traditional or Standard Listing Option | 0.10 | $10.9[1] |
| No List - Status Quo Option | 0.0 | $0.0 |

[1] While cost estimates under the APA represent only 50 percent of total nonhazardous solids and 80 percent of the nonhazardous liquids, aggregate impacts do not directly reflect this difference. The unweighted and unscaled waste management costs under the APA are estimated at $1.8 million. The unweighted and unscaled waste management costs under the Traditional Listing Option are estimated at $3.5 million. Applying the weighting and scaling factors, plus transportation, administrative, and analytical (APA only) costs results in aggregate annual nationwide compliance costs of $7.3 million for the APA and $10.9 million for the Traditional Option.

[2] The sensitivity analysis under the Agency preferred Approach assumes all liquids currently going to both hazardous *and nonhazardous* waste fuel blending/kilns are diverted to hazardous waste incineration.

Table 1-2 below presents impacts for different size classes of the model facilities, based on employment. The impacts presented in this table represent the impacts on the facilities associated with the proposed waste listing approach. However, these figures assume that 100 percent of all of the waste generated is hazardous, as a high-cost or worst-case impacts scenario. In general cost impacts as a percent of sales are modest, averaging just over 0.1 percent or gross annual revenues. For three of the 151 model facilities impacts exceed 1.0 percent of gross sales; these three model facilities are estimated to represent six total facilities. [The reader should note these findings are at the facility, not the company or parent firm level.]

**Table 1-2. Estimated Cost Impacts on Model Facilities from the Agency Preferred Listing Approach**

| Model Facility Size Range (number of employees per facility) | Estimated 1999 Average Annual Gross Sales (thousand dollars) | Unweighted Incremental Cost Range Per Facility* (Percent of gross annual sales) | Average Unweighted Incremental Cost as a Percent of Sales * |
|---|---|---|---|
| 1-19 | $3,661 | 0.04 - 3.77 | 0.11% |
| 20-49 | $11,484 | 0.01 - 0.50 | 0.05% |
| 50-149 | $31,839 | 0.01 - 4.06 | 0.11% |
| 150 & Above | $85,791 | 0.01 - 1.33 | 0.17% |

* Estimates derived assuming 100 percent of all waste streams generated by the model facilities are hazardous.

The Agency is required to make an initial determination if any regulatory action may have a "significant economic impact on a substantial number of small entities," as required by the RFA as amended by SBREFA. However, the legislation presents no explicit guidelines regarding what constitutes a significant impact or what constitutes a significant number of small entities for this particular industry. Based on a review of overall impacts we believe that the impacts on small entities, as estimated in this report, should not be considered "significant." It is also anticipated that the industry will pass at least some of these costs on in the form of higher paint prices, thereby reducing the actual effect on individual small entities.

It is important to note that the industry is dominated by small entities, at least in terms of number of facilities. Accordingly it may be argued that there could be a substantial number of small entities impacted. However it appears that the impacts on these small entities are modest, especially compared with large facilities, as illustrated in Table 1-3.

**TABLE 1-3. Summary of Estimated Impacts from All Waste Listing Options Small and Large Facilities***

| Listing Option | Entity Size | Number of Unweighted Model Facilities ** | Average Incremental Cost as a Percent of Sales | Aggregate Annual Cost Impacts (Million 1999$/year) |
|---|---|---|---|---|
| No List Option | Large | 14 | 0.00 | $0.0 |
| | Small | 137 | 0.00 | $0.0 |
| Standard or Traditional Listing | Large | 14 | 0.16 | $3.6 |
| | Small | 137 | 0.08 | $7.4 |
| Agency Preferred Approach | Large | 14 | 0.09 | $2.1 |
| | Small | 137 | 0.06 | $5.2 |
| Agency Preferred Approach (APA1) Sensitivity Analysis Scenario (Waste going to all fuel blending is diverted to commercial incineration) | Large | 14 | 0.42 | $9.4 |
| | Small | 137 | 0.11 | $8.7 |
| Agency Preferred Approach (APA2) (Scenario to Not List Liquids) | Large | 14 | 0.09 | $2.0 |
| | Small | 137 | 0.05 | $4.7 |

* Large entities include all facilities which could be identified as being owned by companies with more than 500 employees (SBA determination). The small entity category contains all other facilities.

** The estimated total number of small entities affected by the rule industry-wide is 572; there are an estimated 43 large entities affected.

# 2.0 INTRODUCTION

This assessment presents a cost and economic impact analysis corresponding to the proposed rule to list two paint industry wastes. The wastes are solid (or sludge) solvent, water or caustic cleaning wastes, wastewater treatment sludge, emission control dust, and off-specification production wastes (proposed as K179) and liquid solvent, water, and caustic cleaning wastes (proposed as K180). More formally, the waste listings are defined as follows:

K179---- Paint manufacturing waste solids generated by paint manufacturing facilities that, at the point of generation, contain any of the constituents of concern at a concentration equal to or greater than the hazardous level set for that constituent. Paint manufacturing waste solids are: (1) waste solids generated from tank and equipment cleaning operations that use solvents, water and or caustic; (2) emission control dusts or sludges; (3) wastewater treatment sludges; and (4) off-specification product. Waste solids derived from the management of K180 by paint manufacturers would also be subject to this listing. Waste liquids derived from the management of K179 by paint manufacturers are not covered by this listing, but such liquids are subject to the K180 listing.

| Constituent | Concentration Levels (mg/kg) | Alternative Concentration Levels for Leachate (mg/L) |
|---|---|---|
| Acrylamide | 310 | 0.70 |
| Acrylonitrile | 43 | 0.91 |
| Antimony | 2,300 | 58 |
| Methyl Isobutyl Ketone | 73,000 | 42 |
| Methyl Methacrylate | 28,000 | 160 |

K180---- Paint manufacturing waste liquids generated by paint manufacturing facilities that, at the point of generation, contain any of the constituents of concern at a concentration equal to or greater than the hazardous level set for that constituent, unless the wastes are stored or treated exclusively in tanks or containers prior to discharge to a POTW or under a NPDES permit. Paint manufacturing liquids are generated from tank and equipment cleaning operations that use solvents, water, and/or caustic. Waste liquids derived from the management of K179 by paint manufacturers would also be subject to this listing. Waste solids derived from the management of K180 by paint manufacturers are not covered by this listing, but such solids are subject to the K179 listing.

| Constituent | Concentration Levels (mg/L) |
|---|---|
| Acrylamide | 12 |
| Acrylonitrile | 9.3 |
| Antimony | 390 |
| Ethylbenzene | 11,000 |
| Formaldehyde | 82,000 |
| Methyl Isobutyl Ketone | 340 |
| Methylene Chloride | 4,500 |
| Methyl Methacrylate | 2,100 |
| N–Butyl Alcohol | 41,000 |
| Styrene | 4,600 |
| Toluene | 1,200 |
| Xylene (mixed isomers) | 3,900 |

This impact analysis is then used to prepare a Regulatory Flexibility Screening Analysis (RFSA) for the proposed listing. The RFSA determines if there may be significant economic impacts to a substantial number of small entities potentially subject to the requirements of the proposed rulemaking. The analysis adheres to SBREFA, as signed into law on March 29, 1996, and related provisions of the Regulatory Flexibility Act (RFA). The determination of what entities are defined as small is based on Small Business Administration (SBA) guidelines.

Several analyses were conducted in order to complete this RFSA including preparing or developing industry and small entity profiles, waste generation and management profiles, compliance costs, incremental impacts, and a determination of significant and substantial impacts. In this RFSA, compliance costs and incremental economic impacts are determined on a per unit basis (metric ton, gallon, etc.), facility, and aggregate (total industry) basis. In addition, determination of significant and substantial impacts are first defined (see Chapter 6) and then estimated on a per facility, and company basis to the extent data are available.

## 2.1 Limitations of Analysis

The following is a non-exhaustive list of some of the limitations of this RFSA:

- Ownership of some manufacturing facilities is not known. Some facilities currently classified as small may in fact be large according to Small Business Administration definitions. This factor may result in an overstatement of the impacts on small entities.

- In assessing the impacts on the model facilities, it is assumed that all paint waste generated is hazardous. In fact, industry wide, it is estimated that 50 percent of the solids and 20 percent of the liquid wastes do not have the constituents of concern and would not be hazardous. Accordingly impact estimates are overstated for at least some of the model facilities.

- This analysis does not capture all of the variables that may affect a generator's decision to manage the proposed waste streams. It is not clear how facilities will react regarding sampling of wastes or the management of wastes under compliance conditions.

- The analysis is limited by data gaps relating to facility sales (which are estimated based on industry averages). The analysis is also limited by a lack of data regarding what facilities are actually small entities; in general data are limited for corporate employment.

- Data collected from responses to the RCRA 3007 survey of paint manufacturers was scaled to reflect the sampling population of 566 facilities assuming a simple percentage (64 percent) rather than a weighted percentage (57.7%) resulting in an 11 percent overestimate of the universe of paint manufacturers (972 vs.876) and a 15 percent overestimation of the total universe quantity in the analysis. As a result, industry impacts assessed in this report may be overstated.

- It is assumed that the generation and management practices reported by the 187 respondents to the RCRA 3007 survey identified as paint manufacturers and generating the wastes of interest to the proposed concentration-based listing are statistically representative of the total universe of paint manufacturers.

- The unit costs reflect national averages and may not assess local or regional waste management price anomalies.

## 2.2 Organization of Report

The remainder of this report is divided into four sections. Section 3 presents a profile of the paint manufacturing industry. This includes available economic profile data, such as products manufactured, profiles of facilities, market structure, an assessment of the market value of industry shipments, and product imports and exports.

Section 4 presents the waste management cost analysis; this includes nationwide per-unit costs and prices for the baseline and post-regulatory compliance. Section 5 documents the preliminary economic impacts of the regulation, and Section 6 presents the findings of the small entity impact analysis.

# 3.0 PAINT INDUSTRY PROFILE

## 3.1 Background

The total value of paints and coatings comprises only a small fraction of the U.S. gross domestic product (GDP), 0.22 percent in 1997; however, a large portion of the U.S. economy depends on the paint and surface coatings manufacturing industry.[2] Paint and surface coatings are used by almost all producers of durable and non-durable goods and also are used in the maintenance and repair of existing goods and structures. Paint manufacturers are listed under the Standard Identification Classification (SIC) as industry 2851 and under the North American Industrial Classification (NAICS) code for Paints and Coatings, 325510. These establishments produce varnishes, lacquers, enamels and shellac, putties, wood fillers, and sealers, paint and varnish removers, paint and brush cleaners, and allied paint products.

The U.S. Department of Commerce, Current Industrial Reports identify the following four general end-use markets for paints and surface coatings:[3]

1. Architectural Coatings; NAICS 3255101

2. Product Finishes for Original Equipment Manufacturers; NAICS 3255104

3. Special Purpose Coatings; NAICS 3255107

4. Allied Paint Products; NAICS 325510A

For purposes of this industry profile, all four segments are included. However, the currently proposed listing does not affect the production of allied paint products.

## 3.2 Production and Shipment Values

Total product shipments for the four end-use markets identified above are estimated to range from 1.2 and 1.5 billion gallons per year between 1992 and 1998, with a total product value estimated at $17.2 billion in 1998.[4] Table 3-1 provides a summary of estimated U.S. total quantity and value of shipments for paints and allied products from 1992 through 1999.

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2 Environmental Protection Agency, Office of Solid Waste, *Draft Paint Production Wastes Industry Overview*, prepared by Dynamac Corporation, Contract No. 68-W-98-231, July 15, 1999.

3 U.S. Department of Commerce, Economics and Statistics Administration, *Current Industrial Reports: Paint and Allied Products-Annual Report 1997*. MA28F(97)-1.

4 Environmental Protection Agency, Office of Solid Waste, *Draft Paint Production Wastes Industry Overview*, prepared by Dynamac Corporation, Contract No. 68-W-98-231, July 15, 1999.

**Table 3-1. Summary of Estimated United States Total Quantity and Value of Shipments of Paint and Allied Products: 1992-1999**

| YEAR | TOTAL | | ARCHITECTURAL COATINGS | | PRODUCT COATINGS OEM | | SPECIAL PURPOSE COATINGS | | MISCELLANEOUS ALLIED PAINT PRODUCTS | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Quantity[1] | Value[2] | Quantity[1] | Value[2] | Quantity[1] | Value[2] | Quantity[1] | Value[2] | Quantity[1] | Value[2] |
| 1999 | N/A | N/A | 659.0 | 6,791.8 | 486.9 | 6,325.8 | 164.6 | 3,174.7 | N/A | N/A |
| 1998 | 1,491.5 | 17,249.2 | 636.3 | 6,159.8 | 458.5 | 6,050.7 | 188.6 | 3,365.4 | 208.1 | 1,673.3 |
| 1997 | 1,472.8 | 16,559.5 | 655.6 | 6,264.9 | 425.4 | 5,750.7 | 181.8 | 2,896.0 | 210.0 | 1,647.9 |
| 1996 | 1,468.2 | 16,554.7 | 640.3 | 6,246.3 | 398.7 | 5,474.1 | 208.9 | 3,263.8 | 220.3 | 1,570.5 |
| 1995 | 1,408.3 | 15,951.6 | 621.1 | 6,041.3 | 376.2 | 5,263.6 | 195.1 | 3,103.0 | 215.9 | 1,543.7 |
| 1994 | 1,431.1 | 15,645.2 | 644.8 | 5,888.3 | 372.9 | 5,069.9 | 193.8 | 3,197.3 | 219.6 | 1,489.7 |
| 1993 | 1,336.5 | 14,630.1 | 608.1 | 5,615.3 | 356.6 | 4,788.3 | 179.0 | 2,937.7 | 192.6 | 1,288.8 |
| 1992 | 1,236.0 | 13,595.1 | 575.6 | 5,294.3 | 311.7 | 4,213.5 | 172.7 | 2,933.8 | 176.0 | 1,153.5 |

*Source*: U.S. Department of Commerce, Bureau of the Census, Current Industrial Reports, *Paint and Allied Products-Annual Report 2000, MQ* 325F(00)-1, June 2000, *and 1998*, MA325F(98)-1, February 2000.

[1] Quantity in millions of gallons.
[2] Value in millions of dollars.

## 3.3 Industry Size and Market Share

Data used to characterize the paint manufacturing industry are from three sources: the 1997 Census of Manufacturers and the *Modern Paint and Coatings Red Book* (Paint Red Book), a commercial directory of paint and related industry suppliers, and Dun and Bradstreet data which were used to complete a survey of the industry. The remainder of this subsection discusses the industry as depicted by the Census and Paint Red Book. The next subsection focuses on the Dun and Bradstreet data and the survey conducted by EPA of the paints industry. The results of this survey are used to more narrowly focus on the segment of the paint industry that is projected to be subject to the requirements of this proposed rule.

Census data provide information on the total number of paint manufacturing facilities and companies. The Paint Red Book provides background on industry concentration and the percentage of companies in the industry which are considered small according to the Small Business Administration (SBA) standard (less than 500 employees at the firm level). The Paint Red Book is not a comprehensive source of all paint manufacturing facilities. This source only reports information on 954 facilities in the 1999 edition. Comparatively, the 1997 Census of Manufacturers reports a total of 1,495 facilities.

As noted above, 1997 Census data indicate that there are 1,495 paint manufacturing facilities located within the U.S., owned by 1,206 individual companies. The industry is relatively fragmented but is dominated, in terms of aggregate value of shipments, by less than 10 percent of all facilities. Just over 90 percent of all facilities, however, employ fewer than 100 people. A distribution of facilities by number of employees, and their respective share of the total value of shipments is provided in Table 3-2. The geographic distribution of the manufacturing facilities tends to follow general population densities, with the bulk of the facilities located on the East Coast, California, and in the Midwest. This reflects the tendency of paint manufacturers to locate in proximity of their customers, in order to minimize product shipping costs.[5]

[5] ibid.

**Table 3-2. Distribution of *Facilities* by Employment**

| Employees Per Facility | Number of Facilities | Percent of Facilities | Percent of Total Shipments Value |
|---|---|---|---|
| 1-19 | 912 | 61.0% | 8.0% |
| 20-49 | 298 | 20.0% | 13.0% |
| 50-99 | 154 | 10.3% | 21.0% |
| 100-249 | 106 | 7.1% | 35.0% |
| 250-499 | 20 | 1.3% | 23.0% |
| 500 & above | 5 | 0.3% | ** |
| **Total** | **1,495** | 100.0% | 100.0% |

** *Shipments included in 250-499 category totals*

*Source:* 1997 Census of Manufacturers, USDC.

The Census of Manufacturers indicates that there are 1,206 individual companies operating in the U.S. paint and coating manufacturing industry. Unfortunately the Census provides no data to identify how many of these companies have more than 500 employees and are classified as large, according to SBA definitions. To estimate the number of large companies, Paint Red Book data are relied upon. While the Paint Red Book is not a comprehensive source of all paint manufacturing enterprises, it is assumed, for purposes of this assessment, to be representative of the entire industry. The distribution of companies identified in the Paint Red Book, by total corporate employment is presented in Table 3-3.

**Table 3-3. Distribution of *Companies* by Employment**

| Employees Per Company | Number of Companies* | Percent of Companies* | | Number of Facilities** |
|---|---|---|---|---|
| | | Individual | Cumulative | |
| 1 to 9 | 65 | 10% | 10% | 65 |
| 10 to 49 | 288 | 44% | 54% | 303 |
| 50 to 99 | 95 | 15% | 69% | 114 |
| 100 to 249 | 99 | 15% | 84% | 132 |
| 250 to 499 | 32 | 5% | 89% | 82 |
| Not Specified (assumed small) | 38 | 6% | 95% | 56 |
| 500 & above (Large) | 33 | 5% | 100% | 151 |
| **Total** | **650** | 100% | 100% | 903 |

* Represents only 650 of the total companies, or approximately 54% of the companies as reported in the Census
** Represents only 903 of the total facilities, or approximately 60% of the facilities as reported in the Census

*Source:* Modern Paint and Coatings Red Book, 1999

Assuming that approximately 5 percent of the paint manufacturing industry companies are large (i.e., with 500 or more employees), then of the 1,206 companies reported in the 1997 Census, approximately 60 would be large companies, and 1,146 would be small according to SBA size definitions.

Prices in the paint and coatings industry generally follow the economy's inflationary trends, rising just above the changes in the economy's general price level as measured by the GNP deflator. We may speculate that this is due to the fragmented structure of the industry and increasing price resistance from customers, particularly original equipment manufacturers. Table 3-4 lists the market share of the ten largest U.S. coatings companies in 1997. In total, these companies were responsible for 78 percent of domestic sales in 1997.[6]

[6] ibid.

**Table 3-4. The Ten Largest U.S. Coatings Companies, 1997**

| Company | Market Segment | Domestic Market Share *(Percent of Total U.S. Sales)* |
|---|---|---|
| Sherwin-Williams | Architectural<br>Product Finishes<br>Special Purposes | 20 |
| PPG Industries | Architectural<br>Product Finishes | 12 |
| ICI | Architectural<br>Product Finishes | 9 |
| Akzo Nobel | Architectural<br>Product Finishes<br>Special Purposes | 8 |
| BASF | Product Finishes | 6 |
| RPM | Product Finishes<br>Special Purposes | 6 |
| Dupont | Product Finishes<br>Special Purposes | 5 |
| H.B. Fuller | Product Finishes | 4 |
| Valspar | Architectural<br>Product Finishes | 4 |
| Courtaulds (purchased by Akzo) | Architectural<br>Product Finishes<br>Special Purposes | 4 |
| **Market Share of Ten Largest Companies** | | **78** |

*Source: Chemical & Engineering News*, October 12, 1998, "Paints and Coatings," p.56.

The paint and coatings industry is in constant flux, with numerous mergers, acquisitions, consolidations, and spinoffs occurring every year. Recent activities of a number of these companies are documented in various news articles covering the industry. Some of these activities, especially as reported in *Chemical and Engineering News*, and *Chemical Week* are presented in Appendix A and summarized in Section 3.3.5 below.

### 3.3.1 Typical Products

The majority of U.S. manufacturers rely on the contribution of paints and coatings to add value to their products. Generally, paints and coatings are applied to products to protect them from environmental corrosion and to improve their consumer appeal. In certain instances, paints and coatings provide an essential element, such as the coatings that protect food and beverages in metal cans from contamination and spoilage. The various paint and coating products are classified in one of the following categories: Architectural Coatings, Industrial Coatings (product coatings used by Original Equipment Manufacturers (OEM)), Special Purpose Coatings, or Miscellaneous Allied Paint Products.[7] Table 3-5 provides a brief summary of the different types of paint and coatings products as well as their 1997 and 1998 market share as a percent of annual industry sales.

**Architectural Coatings**

Architectural coatings accounted for approximately 37.2 percent, or $6.1 billion of the industry's annual sales in 1997 and 35.6 percent, or $6.2 billion of the industry's annual sales in 1998. Typically, this type of paint or coating is applied on-site to new and existing residential, commercial, institutional, and industrial buildings. These paints and coatings reach consumers, painters, contractors, and the government via retail or wholesale distribution channels and outlets.

The use of organic solvent-based (oil) paints has declined in recent years due, in part, to the growing popularity of water-based paints, increased environmental regulations, and other factors

**Industrial Coatings**

Industrial coatings also known as OEM coatings are coatings that are factory applied as part of the production process. These coatings accounted for 35.4 percent, or about $5.8 billion of the industry's 1997 sales and 35.1 percent, or about $6.1 billion of the industry's 1998 sales. OEM coatings are used to protect or decorate nearly all manufactured products in use today. For instance, while the cost of paint on the average automobile generally represents as little as 1.0 percent of the showroom price, without its protection a car body would be apt to rust out after just one winter in many areas of the country.[8]

The 1997 "Paint & Coatings 2000: Review and Forecast" study identified 14 important manufacturing industries that depend on OEM coating for their production. Some of these industries include: automotive; metal containers, coil sheet and strip; wood furniture and fixtures; machinery and equipment; metal furniture and fixtures; and electrical and electronic among others.[9]

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7 National Paint and Coatings Association, 1999, "Paint & Coatings Industry Facts," http://www.paint.org.

8 National Paint and Coatings Association, 1999, "Economic Value of Paints and Coatings," http://www.paint.org.

9 ibid.

**Special Purpose Coatings**

Special purpose coatings accounted for 17.6 percent, or nearly $2.9 billion of 1997 industry sales. In 1998 special purpose coatings accounted for 19.5 percent, or almost $3.4 billion of industry sales. These coatings typically are used where durability is important. They include marine paints, high performance maintenance coatings, automotive refinish paints, traffic and highway markings, and aerosol paints.[10]

Marine coatings generally are used to protect new and existing commercial ships, offshore oil and gas rigs and equipment, and pleasure craft. Annual sales for this market grew by about 31 percent from 10 million gallons in 1990 to 13.1 million gallons in 1997.[11]

High performance maintenance coatings are used to combat the corrosion of exposed steel found in structures, tanks, pipes, industrial equipment, and tank linings. Some of the largest consumers of these coatings include on-shore oil and gas exploration, production and transmission operations; petrochemical plants and refineries; public utilities; and food and beverage processing plants.[12]

Paints and coatings used for highway and traffic markings are designed for high visibility, durability, and adhesion. Sales in this industry increased by approximately 69 percent from 22 million gallons in 1990 to 37.1 million gallons in 1997.[13]

Coatings that are packaged in aerosol cans are mostly used for auto refinishing and touch-up, appliance touch-up, corrosion inhibition, and hobbies and crafts. The typical aerosol can holds about 10 ounces of paint, generally at a low solids level to facilitate spraying. Common propellants for aerosol paints are base on hydrocarbon gases like n-butane, isobutane and propane. Production of aerosol paints increased by approximately 13 percent from 21.9 million gallons per year in 1990 to 24.8 million gallons in 1997.[14]

**Miscellaneous Allied Paint Products**

The remaining 9.8 percent, or $1.6 billion of the total $16.4 billion 1997 paint and coating industry sales, represents the sale of miscellaneous allied paint products. In 1998, the sale of miscellaneous allied paint products was 9.8 percent, or about $1.7 billion of the total $17.4 billion paint and coating industry sales for that year. This category includes thinners for dopes, lacquers, and oleoresinous thinners, including mixtures and proprietary thinners; aerosol paints made from purchased paint, both exterior and interior; organisols and plastisols, other than

10 ibid.

11 ibid.

12 ibid.

13 ibid.

14 ibid.

coatings; paint and varnish driers; and miscellaneous related paint products, e.g., pigment dispersions, ink vehicles, and bleached shellac (not varnish). It also includes putty and allied products such as wood and textile preservatives (nonpressure type) such as wood fillers and sealers, putty and glazing compounds, paint and varnish removers, and other allied paint products, including brush cleaners.

**Table 3-5. Summary of Paint and Coating Products And Their Market Share**

| Typical Products | 1997 Sales (billion dollars) | Percent of Total Industry Sales (1997) | 1998 Sales (billion dollars) | Percent of Total Industry Sales (1998) |
|---|---|---|---|---|
| **Architectural Coatings:** | $6.1 | 37.2% | $6.2 | 35.6% |
| **Industrial Coatings (applied by original equipment manufacturers):** | $5.8 | 35.4% | $6.1 | 35.1% |
| **Special Purpose Coatings:** | $2.9 | 17.6% | $3.4 | 19.5% |
| **Miscellaneous Allied Paint Products** | $1.6 | 9.8% | $1.7 | 9.8% |
| **TOTAL PAINT AND COATINGS INDUSTRY SALES** | **$16.4** | **100%** | **$17.4** | **100%** |

***Source:*** **U.S. Department of Commerce, Bureau of the Census, Current Industrial Reports, *Paint and Allied Products-Annual Report 1997*, MA28F(97)-1, August 26, 1998, and 1998, MA325F(98)-1, February 2000.**

**Note: Annual sales derived from Commerce reports. The percentages were calculated from data provided.**

### 3.3.2 Imports and Exports for Selected Paint Products

The U.S. is a net exporter of paints and allied coatings. As Table 3-6 shows, manufacturers' shipments for certain paint products declined slightly from 1996 to 1997. Both exports and imports continued to grow during this time, while U.S. consumption decreased for paint, varnish, lacquer, paint and varnish removers, and thinners. U.S. consumption for miscellaneous allied paint products increased by approximately 13 percent from 1996 to 1997.

**Table 3-6. Imports and Exports of Selected Paint Products**

| Product Description (SIC Code) | Year | Manufacturers' Shipments (million dollars) | Exports (million dollars) | Imports (million dollars) | Apparent U.S. Consumption (million dollars) |
|---|---|---|---|---|---|
| Paint, varnish, and lacquer (2851100, 2851200, 2851300) | 1997 | $14,785.7 | $859.0 | $297.3 | $14,224.0 |
| | 1996 | $14,984.2 | $747.2 | $265.3 | $14,502.3 |
| Paint and varnish remover including thinners (2851523, 2851531) | 1997 | $230.7 | $60.9 | $16.3 | $186.1 |
| | 1996 | $313.1 | $49.4 | $14.8 | $278.5 |
| Other miscellaneous allied products (2851598) | 1997 | $879.8 | $145.0 | $66.5 | $801.3 |
| | 1996 | $767.5 | $114.9 | $56.1 | $708.7 |

Source: U.S. Department of Commerce, Bureau of the Census, Current Industrial Reports, *Paint and Allied Products-Annual Report 1997*, MA28F(97)-1, August 26, 1998.

## 3.4 Industry Universe Potentially Subject to Requirements of the Proposed Listing

The Agency conducted a statistically designed survey of paint manufacturers to create a hazardous and nonhazardous paint waste database in support of a listings determination under RCRA. The Agency chose to conduct a statistical survey, rather than a census in order to reduce the burden on the paint industry, meet project deadlines, and to minimize costs.[15]

The first step was to identify and select a group of representative paint manufacturers to include in the survey. We used the Dun and Bradstreet (D&B) database for this purpose. We believe the Dun & Bradstreet database properly represents the paint manufacturing universe (notwithstanding the database inevitably includes some out-of-scope operations also listed under SIC 2851). We also believe that our stratified statistical random-sampling design adequately covered the variety of paint manufacturing types, paint production wastes, and waste management practices of interest to this listing determination.

[15] Dynamac Corporation. July 12, 2000. Paint Manufacturing Hazardous Waste Listing Determination Support.

The D&B database sort used to determine the recipients of the questionnaire is a compilation of all entries in the D&B master database that are filed under SIC 2851, Manufacturers of Paint and Allied Products. The database included not only paint manufacturers but also manufacturers of allied products such as putty, sealers, and cleaners, which are not of interest to the listing determination. These manufacturers and others, as explained below, were not included in the survey.

None of the data sources evaluated by the Agency include all paint manufacturers. Given the data and other resource constraints, we were unable to develop a definite and accurate count of paint manufacturers in the U.S. Based on our sample quality review and data analysis, we believe that the data collected from the survey respondents are valid and reliable, and are representative of the paint manufacturing facilities in the sampling population as well as the universe of paint manufacturers of interest. Our review of other data sources such as RCRA Biennial Reporting System (BRS) data for comparison did not suggest otherwise. Therefore, we believe that it is appropriate to weight and extrapolate certain data (such as total number of paint manufacturers, waste quantities, numbers of facilities associated with waste management practices) from survey responses to the sampling population and the paint universe. This report describes the methodology used to sample the paint manufacturers and provides the calculation details for the estimate of paint manufacturers in the U.S.

### 3.4.1 Sampling Methodology

The Agency decided to perform a statistical survey rather than a census. A detailed description of the sampling methodology is provided in *Paint Manufacturing Hazardous Waste Listing Determination Support*, Dynamac Corporation, July 12, 2000. The following discussion is a summary of the sampling process used for the survey.

The D&B database for SIC 2851, dated July 20, 1999, lists 1,764 paint and allied product manufacturers by an eight digit code. The first four digits of the D&B code are 2851, and the last four are unique to D&B. The database code was used to categorize the manufacturing facilities. Table 3-7, provides a breakdown of the major categories used by D&B, their description, and the number of facilities within each category.

**Table 3-7. Description of D&B Numerical Code**

| D&B Code | Manufacturing Description | Number of Facilities |
|---|---|---|
| 2851 00 00 | Paint, varnish, lacquer, enamel, and allied product manufacturer with *insufficient data* on file to further categorize | 705 |
| 2851 01 xx | Manufacturer of paint and paint additives | 525 |
| 2851 02 xx | Manufacturer of lacquers, varnishes, enamels and other coatings | 457 |
| 2851 03 xx | Manufacturer of putty, wood fillers, and sealers | 31 |
| 2851 04 xx | Manufacturer of removers and cleaners | 46 |
| **Total under SIC Code 2851** | | **1764** |

The Agency assumes that the waste characteristics of paint manufacturing processes are influenced by size of facility and type of paint produced (waterborne, solvent based, etc.). Therefore, we decided to categorize, or stratify, the paint manufacturing universe to obtain the data required for the listing determination. The stratification of the paint universe is described in *Paint Manufacturing Hazardous Waste Listing Determination Support*, Dynamac Corporation, July 12, 2000. Twelve (12) stratification categories were identified based on size of facility (sales), type of paint produced (2851 01 xx or 2851 02 xx), and whether the facility is listed in the TRI database. Sales volume information was obtained from a D&B sort under SIC 2851, dated December 6, 1999.

To increase the chances of obtaining meaningful data for the listing determination, we decided to exclude from the sampling population the 705 entries (2851 00 00) that had insufficient information to properly categorize them under 2851 01 xx and 2851 02 xx. Including the 705 manufacturers listed under 2851 00 00 would have prevented the Agency from categorizing the sampling frame due to lack of data. However, we later characterized these facilities using the characteristics of other more certain data.

In addition, the 77 allied Product manufacturers listed under 2851 03 xx and 2851 04 xx were excluded from sampling consideration because they were outside the scope of the listing determination. Those facilities identified under 2851 03 xx and 2851 04 xx did not fit the categories of interest.

These decisions reduced the paint manufacturing universe for sampling to 982 potential facilities (1764 - 705 - 77 = 982). Based on their characterization, a total of 31 of the 982 manufacturers meeting the requirements to be listed were considered non-paint manufacturers for the purposes of this project. Forty (40) of the 982 entries were judged duplicates and 27 did not have sales volume data to allow categorization. The 884 facilities (982 - 31 - 40 - 27 = 884) identified as paint manufacturers with sales volume information were included in the stratification and random sampling.[16]

### 3.4.2 Sampling Results

A total of 299 facilities within the 884 paint sample frame were randomly chosen to receive a questionnaire. Sampling was performed in two phases. The first phase included the distribution of 250 questionnaires and the second included the distribution of 49 additional questionnaires. Based on a statistical model, the Agency required a total of 210 responses from paint manufacturers to meet the 90 percent probability of identifying a 1 in 20 event from each of the 12 categories (assuming all recipients of the questionnaires were paint manufacturers of interest). This target level was established to help ensure a high probability of capturing waste management scenarios with more than 5 percent chance of occurrence. In order to assure sufficient returns, an additional 89 questionnaires were sent to paint manufacturers, for a total of 299. This additional number of facilities was included to account for such factors as companies going out of business, not characterized properly, or failure to return a completed distribution form for any unforseen reason.

We received a total of 292 responses out of the 299 questionnaires sent out. Of these, 187 (64 percent) were returned from manufacturers and the data were usable. The other paint

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[16] ibid.

manufacturers who returned their paint distribution forms, a total of 105, identified themselves as non paint manufacturers. Approximately 19 percent (36 of 187) of respondents also identified themselves as paint manufacturers that do not generate wastes of interest to the project. Our economic analysis is based on 151 actual facilities (187 less 36), with results weighted and scaled to derive aggregate industry impact estimates.

### 3.4.3 Paint Manufacturers Population Estimate

As discussed previously, we believe that 1,019 (982 - 40 + 77) facilities in the D&B database can be readily identified as manufacturers of paints or allied products. Based on the available information from D&B, 911 of the 982 facilities, or 92.8 percent, are paint manufacturers, 31 (3.2 percent) are non paint manufacturers and 40 (4.1 percent) are without sales information and were not included since categorization could not be performed.

From the distribution forms received, sixty-four percent (64 percent) of the facilities, or 187 out of 292, have identified themselves as paint manufacturers. When this factor is applied to the survey universe (884), a total of 566 paint manufacturing facilities is the result. We assume that we can apply this factor (64 percent) to the 27 entries removed because of lack of sales information. Seventeen (17) facilities in this group are then paint manufacturers (27 x 0.64 = 17).

We also estimated the total paint manufacturing population, based on the original 1,764 facilities in the D&B database can also be made. We calculated a distribution for the 705 facilities, not fully defined and not considered in the sampling population based on the survey results and the information provided by D&B. This approach assumes that the characteristics of the facilities included in the sampling population are representative of those facilities that are not fully defined in the D&B database. Table 3-8 provides a summary of the calculation.

Of the facilities listed under 2851 03 xx and 2851 04 xx, we identified a total of 77 facilities or 7.3 percent of those fully defined (982 + 77 = 1,059) in the database, that are not paint manufacturers. We expect that 7.3 percent of the 705 facilities insufficiently defined in the database also belong in this category, for a total of 51 (705 x 0.073 = 51), leaving 654 facilities (705-51 = 654) that are likely to meet the requirements to be listed under 2851 01 xx and 2851 02 xx (paint and paint additives, lacquers, varnishes, enamels and other coatings).

Our evaluation of the D&B database indicates that 92.8 percent of the facilities described as manufacturers under 2851 01 xx and 2851 02 xx are paint manufacturers of interest to this project (911 out of 982). We applied the same percentage to the 654 facilities calculated in the previous paragraph in order to estimate the number of paint manufacturing facilities. Based on this analogy with the D&B data, we estimate there are 607 potential paint manufacturing facilities out of 654 (654 x 0.928 = 607).

**Table 3-8: Estimate of Total Number of Paint Manufacturers, based on D&B Data and Sample Results**

| Item | From statistical survey | | Distribution of 705 Facilities not Fully Defined | |
|---|---|---|---|---|
| | Number | Result | Number | Result |
| Total facilities listed by D&B under SIC 2851 | 1764 | **1764** | | |
| ***Less***: | | | | |
| Facilities not sufficiently defined | 705 | **1059** | 705 | **705** |
| Facilities not of interest (7.3%) | 77 | **982** | 51 | **654** |
| Mischaracterized Facilities (3.2%) | 31 | **951** | 21 | **633** |
| Duplicates (4.1%) | 40 | **911** | 27 | **607** |
| Non paint manufacturers (36%) | 328 | **583** | 218 | **388** |
| Sub-Total - Paint and Coatings Manufacturers | **583** | | **388** | |
| | | | | |
| **Total Estimated Universe of Paint and Coatings Manufacturers (583 + 388)** | | **972** | | |

*Note*: The total estimated Universe may not add exactly due to rounding

On the basis of our analysis of the survey questionnaire responses, we determined that only 64 percent of the facilities identified as paint manufacturers in the D&B database and of interest to this project are, in fact, paint manufacturers. We applied the same percentage to the 607 facilities calculated in the previous paragraph, to estimate that 388 facilities are paint manufacturers (0.64 x 607 = 388).

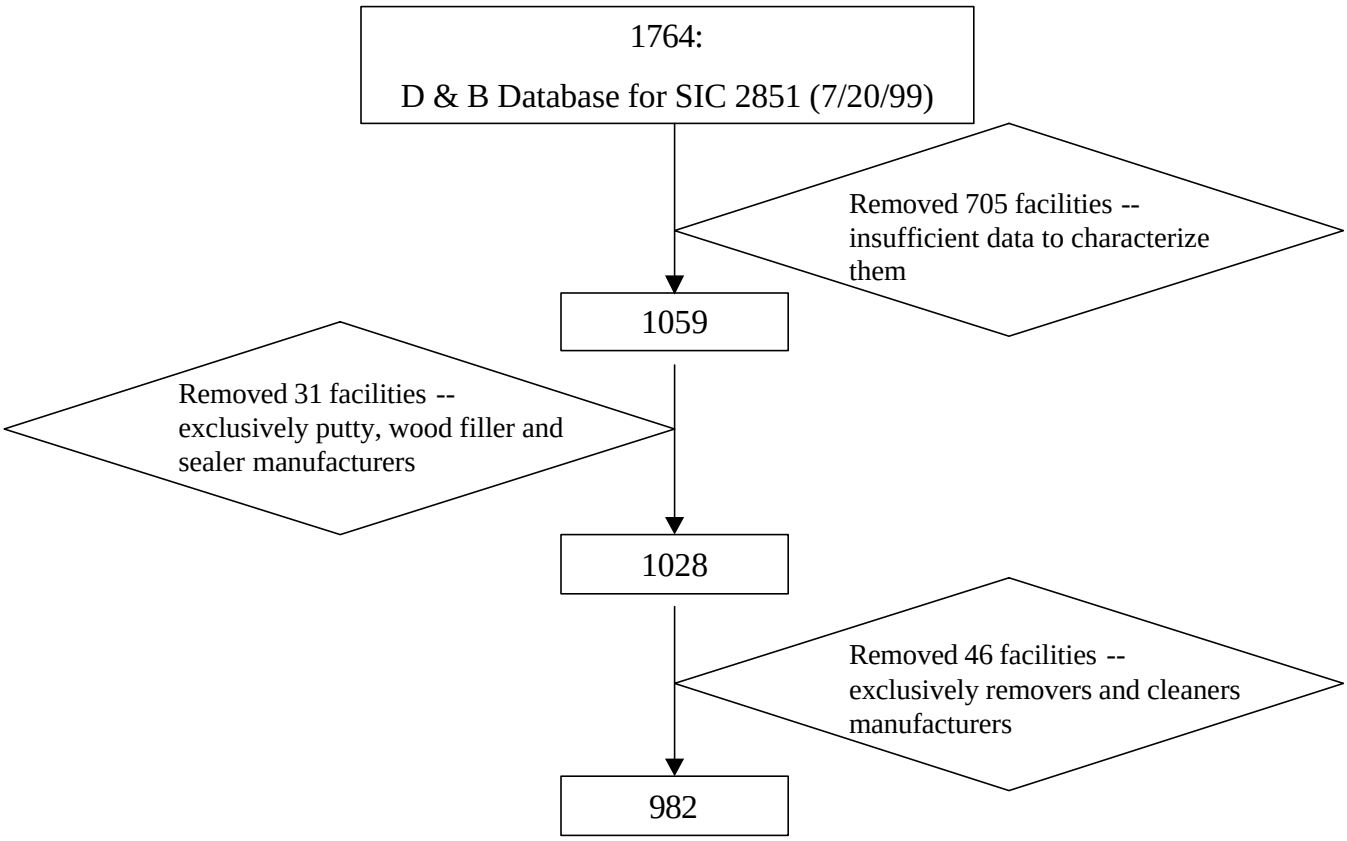
In conclusion, we estimate that the total number of paint manufacturing facilities in the U.S. is 972 (566 + 17 + 388 = 972).[17] Please see Exhibit 3-1 below for a flowchart presentation of the derivation of sample returns and universe of paint manufacturers.



[17] ibid. (Note: The actual total carried to one decimal place is 971.5, which we have rounded to 972)

**Exhibit 3-1. Derivation of Sample and Returns Used For Analysis:**

**Paint Hazardous Waste Listing Determination -- Proposal**




Continued...

**Exhibit 3-1. Derivation of Sample and Returns Used For Analysis:**

**Paint Hazardous Waste Listing Determination -- Proposal**

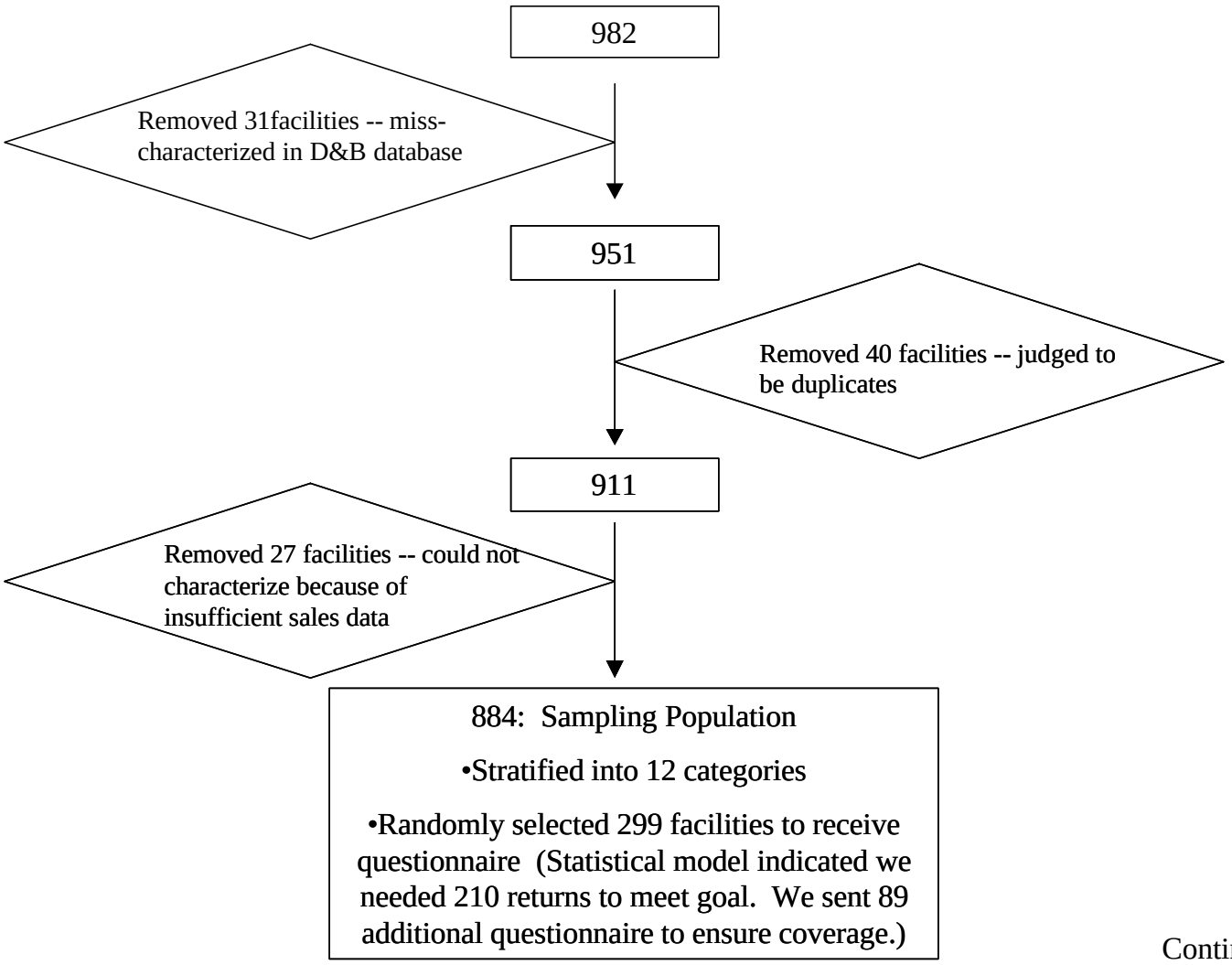



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**Exhibit 3-1. Derivation of Sample and Returns Used For Analysis:**

**Paint Hazardous Waste Listing Determination -- Proposal**

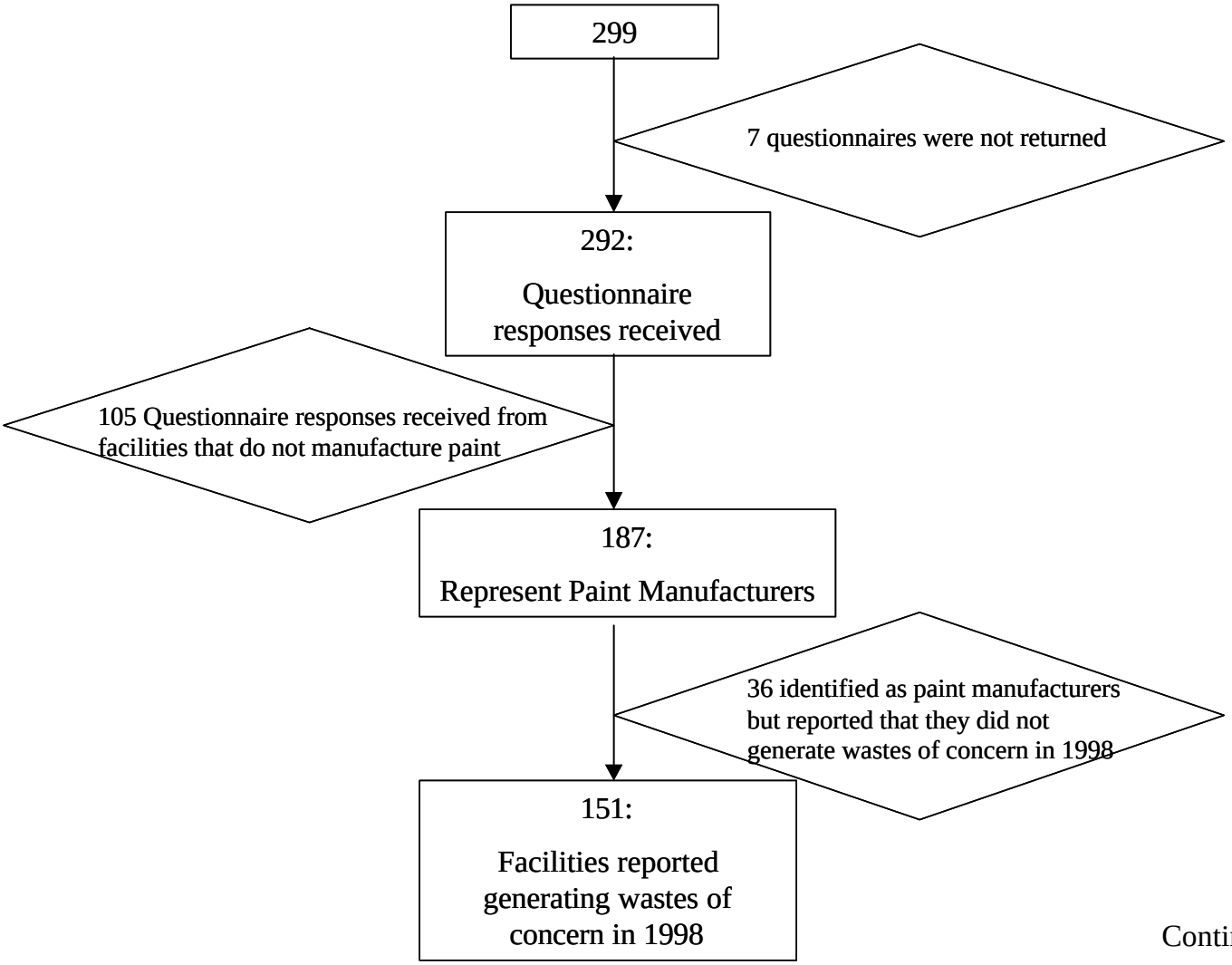


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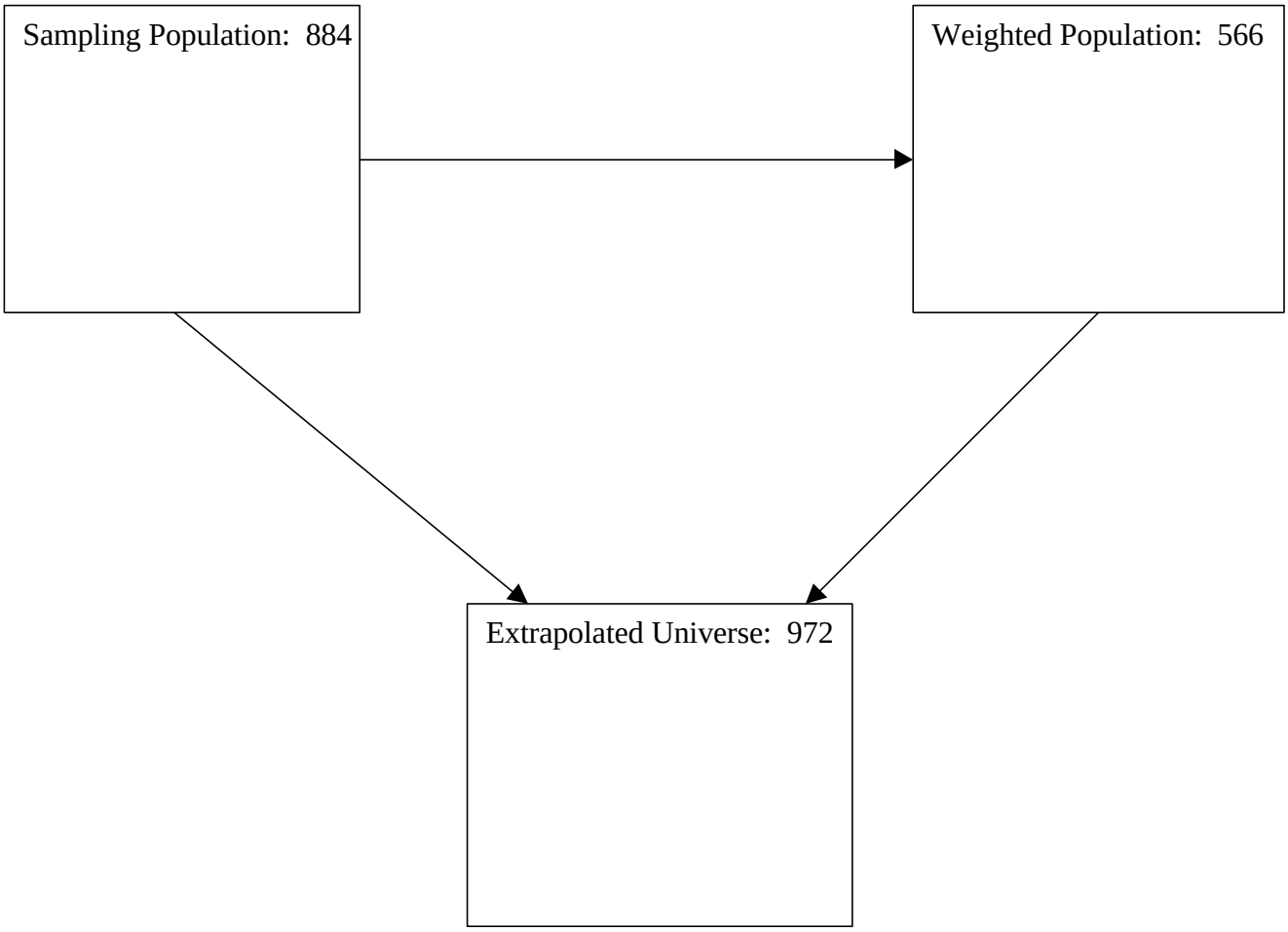
**Exhibit 3-1. Derivation of Sample and Returns Used For Analysis:**

**Paint Hazardous Waste Listing Determination -- Proposal**



# 4.0 WASTE GENERATION, MANAGEMENT, AND COSTS

Two wastes generated during the production of paints are proposed for listing as hazardous under RCRA. This section describes the two wastes, the estimated quantity of each waste generated, current (baseline) management practices, most likely compliance management practices after listing, and the unit costs and prices of managing these wastes.

As described earlier, the wastes generated by the paint industry proposed for listing are:

K179---- Paint manufacturing waste **solids** generated by paint manufacturing facilities that, at the point of generation, contain any of the constituents of concern (identified in Chapter 2) at a concentration equal to or greater than the hazardous level set for that constituent. Paint manufacturing waste solids are: (1) waste solids generated from tank and equipment cleaning operations that use solvents, water and or caustic; (2) emission control dusts or sludges; (3) wastewater treatment sludges; and (4) off-specification product. Waste solids derived from the management of K180 by paint manufacturers would also be subject to this listing. Waste liquids derived from the management of K179 by paint manufacturers are not covered by this listing, but such liquids are subject to the K180 listing.

The proposed constituents of concern for this solid waste stream and their corresponding regulatory levels are presented in the table below. The waste stream would be considered hazardous if it contains one or more of the constituents presented below at or above the regulatory concentration level.

| Constituent | Regulatory Concentration Levels (mg/kg) |
|---|---|
| Acrylamide | 310 |
| Acrylonitrile | 43 |
| Antimony | 2,300 |
| Methyl Isobutyl Ketone | 73,000 |
| Methyl Methacrylate | 28,000 |

K180---- Paint manufacturing waste **liquids** generated by paint manufacturing facilities that, at the point of generation, contain any of the constituents of concern (identified in Chapter 2) at a concentration equal to or greater than the hazardous level set for that constituent, unless the wastes are stored or treated exclusively in tanks or containers prior to discharge to a POTW or under a NPDES permit. Paint manufacturing liquids are generated from tank and equipment cleaning operations that use solvents, water, and/or caustic. Waste liquids derived from the management of K179 by paint manufacturers would also be subject to this listing. Waste solids derived from the management of K180 by paint manufacturers are not covered by this listing, but such solids are subject to the K179 listing.

The proposed constituents of concern for this liquid waste stream and their corresponding

regulatory levels are presented in the table below. The waste stream would will be considered hazardous if it contains one or more of the constituents presented below at or above the regulatory concentration level.

| Constituent | Regulatory Concentration Levels (mg/L) |
|---|---|
| Acrylamide | 12 |
| Acrylonitrile | 9.3 |
| Antimony | 390 |
| Ethylbenzene | 11,000 |
| Formaldehyde | 82,000 |
| Methyl Isobutyl Ketone | 340 |
| Methyl Methacrylate | 2,100 |
| Methylene Chloride | 4,500 |
| N–Butyl Alcohol | 41,000 |
| Styrene | 4,600 |
| Toluene | 1,200 |
| Xylene (mixed isomers) | 3,900 |

The focus of the proposed listing includes only wastes produced by the Architectural, OEM and Special Purpose Coatings segments of the industry. Wastes generated by Allied Paint Products manufacturing are not included in the scope of this proposed listing.

## 4.1 Waste Generation

This section presents waste generation estimates based on extrapolation from our 3007 Survey responses and selected alternative sources for comparative purposes. Estimates are presented by waste type and baseline management scenario.

Based on our 3007 Survey responses, we estimate that a total of 106,763 metric tons of paint and coating wastes are generated annually meeting our proposed listing descriptions (not considering constituent concentrations). Of this estimated total, 27,354 metric tons (25.6%) are solids and sludges, and 79,409 metric tons are liquids. Hazardous waste represents approximately 38,9851 metric tons, or 36 percent of the total.

### 4.1.1 Equipment (Solvent, Water or Caustic) Cleaning Wastes

Process equipment[18] are cleaned regularly to mitigate product contamination and/or restore operational efficiency. In addition, most equipment are cleaned during shut-downs or when a significant change in production lines (e.g., different colors) occurs. They are usually cleaned by flushing with solvent or water creating cleaning wastes, depending on the product formulation (i.e., solvent or latex-based product). The resulting cleaning wastes will consist of paint solids and sludges containing pigments, partially or completely cured binders, and other additives, as well as varying levels of organic solvents depending on the manufacturing process and the type of cleaning solvent used. Agitators, rollers, etc. may be cleaned by hand using rags or brushes. Thick residues from tanks are often removed by scraping.[19]

Our survey data suggest that equipment cleaning wastes contribute 75 to 80 percent of the total waste generated (excluding filter cakes). These wastes are separated into solvent-based washes, water-based washes, and aqueous caustic wastes.[20]

EPA considers cleaning wastes as "spent" when, as a result of contamination, they can no longer serve the purpose for which it was produced without processing (40 CFR 261.1(c)(1)). A cleaning waste is "reclaimed" if it is processed to recover a usable product, or it is regenerated (40 CFR 261.1(c)(4)). A cleaning waste is "used or reused" if it is either (40 CFR 261.1(c)(5):

- Employed as an ingredient in an industrial process to make a product; or
- Employed in a particular function or application as an effective substitute for a commercial product.

EPA does not classify secondary materials (i.e., solvent and water/caustic cleaning wastes) as solid wastes when they are reclaimed and returned to the original process or processes in which they were generated where they are reused in the production process provided (40 CFR 261.4(a)(8)(i-iv)):

- Only tank storage is involved, and the entire process through completion of reclamation is closed by being entirely connected with pipes or other comparable enclosed means of conveyance;
- Reclamation does not involve controlled flame combustion (such as occurs in boilers, industrial furnaces, or incinerators);
- The secondary materials are never accumulated in such tanks for over 12 months without being reclaimed; and
- The reclaimed material is not used to produce a fuel, or used to produce products that are used in a manner constituting disposal.

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18 Process Equipment Includes: high-speed dispersion mixers, sand mills, colloid mills, rotary batch mixers and blenders, drum mixers and rollers, grinding equipment, mixing vessels, pumps and motors, filters and strainers, filling and capping equipment, and packaging equipment.

19 U.S. Environmental Protection Agency, Office of Solid Waste, *Draft Paint Production Wastes Industry Overview*, prepared by Dynamac Corporation, Contract No. 68-W-98-231, July 15, 1999.

20 ibid.

Thus, solvent and caustic/water cleaning wastes are not considered to be solid wastes until it is the intent of the paint manufacturer to dispose the material as a waste. Table 4-1 presents reported annual waste generation quantities by a few paint manufacturing facilities for cleaning wastes. Tables 4-2 and 4-3 present reported annual generation quantities by several large quantity generators (LQGs) of hazardous waste in the 1995 and 1997 Biennial Reports. Tables 4-4a and 4-4b present reported generation quantities by paint manufacturers who completed our RCRA 3007 Survey (representing 1998 data).

**Solvent Washes**

Solvent washes are used to clean solvent-based contaminants. Typically, the same solvent used in the paint product is used as the cleaning agent. In some cases, a solvent with comparable solvency but with a higher boiling point is used to minimize evaporation. Common solvents used in paints and coatings include aliphatic hydrocarbons, toluene, xylene, glycol ethers and ether esters, methyl ethyl ketone, ethanol, acetone, other ketones and esters, butyl acetates, other aromatics, butyl alcohols, and other solvents.[21]

We believe that nearly all of the solvent cleaning waste quantity that is generated already is regulated as a hazardous waste. Biennial Report System (BRS) data for 1997 indicate that these wastes are managed as listed spent solvent hazardous waste under F001 through F005, and/or an ignitable characteristic (D001) or toxicity characteristic (TC) methyl ethyl ketone (D035) waste. Based on 1995 and 1997 Biennial Report data, the average amount of hazardous solvent cleaning waste generated per facility decreased from 205 tons (186 metric tons) in 1995 to 179 tons (163 metric tons) in 1997.

The extrapolated RCRA 3007 Survey data (Table 4-4a) suggest that the paint industry generates approximately 7,429 metric tons of ***solvent cleaning sludges***, of which, 0.8 percent is nonhazardous waste (2.3 metric tons per generator; 26 generators) and 99.2 percent is hazardous waste (41 metric tons per generator; 180 generators). Also, the extrapolated RCRA 3007 Survey data (Table 4-4b) suggest that the paint industry generates approximately 24,419 metric tons of ***solvent cleaning liquids***, of which, 0.02 percent is nonhazardous waste (3.7 metric tons per generator; 2 generators) and 99.98 percent is hazardous waste (73 metric tons per generator; 335 generators).

**Water Washes**

Water washes are used to clean water-based contaminants. The wash water may contain detergents. Water-based washes are used more liberally because of the low cost resulting in lower solids concentrations than solvent cleaning wastes.[22]

BRS data for 1997 indicate that there are some instances where water cleaning waste is already regulated as an ignitable characteristic (D001) waste, TC characteristic methyl ethyl ketone (D035) waste, TC characteristic metal (D005-D008) waste or solvent listed (F003 or F005) waste. Based on 1995 and 1997 BRS data, the average amount of hazardous aqueous cleaning

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21 SRI International (September 1992) U.S. Paint Industry Data Base. Published by National Paint and Coatings Association, Washington, DC.

22 U.S. Environmental Protection Agency, Office of Solid Waste, *Draft Paint Production Wastes Industry Overview*, prepared by Dynamac Corporation, Contract No. 68-W-98-231, July 15, 1999.

waste generated per facility decreased from 73 tons (66 metric tons) in 1995 to 56 tons (51 metric tons) in 1997.

Our extrapolated Survey data (Table 4-4a) suggest that the paint industry generates approximately 5,187 metric tons of ***water cleaning sludges***, of which, 99.0 percent is nonhazardous waste (42 metric tons per generator; 122 generators) and 1.0 percent is hazardous waste (10 metric tons per generator; 5 generators). Also, the extrapolated RCRA 3007 Survey data (Table 4-4b) suggest that the paint industry generates approximately 53,974 metric tons of ***water cleaning liquids***, of which, 98.8 percent is nonhazardous waste (202 metric tons per generator; 265 generators) and 1.5 percent is hazardous waste (10 metric tons per generator; 65 generators).

**Caustic Washes**

Caustic or alkaline washes are used to remove solvent- and water-based contaminants that are not amenable to solvent flushing. An additional waste rinse is usually required after caustic washing to remove residual caustic. This residual, if not removed, could interfere with production of the next paint batch and cause odor problems resulting from the evaporation of caustic solutions.[23]

According to the 1997 BRS data, much of the caustic cleaning waste quantity that is generated may already be regulated as a corrosive characteristic (D002) waste. Based on 1995 and 1997 Biennial Report data, the average amount of hazardous caustic cleaning waste generated per facility decreased from 131 tons (119 metric tons) in 1995 to 90 tons (82 metric tons) in 1997.

The extrapolated 3007 Survey data (Table 4-4a) suggest that the paint industry generates approximately 180 metric tons of ***caustic cleaning sludges***, of which, 5.6 percent is nonhazardous waste (0.6 metric tons per generator; 15 generators) and 94.4 percent is hazardous waste (12 metric tons per generator; 14 generators). Also, the extrapolated 3007 Survey data (Table 4-4b) suggest that the paint industry generates approximately 1,016 metric tons of ***caustic cleaning liquids***, of which, 11.1 percent is nonhazardous waste (22 metric tons per generator; 5 generators) and 88.9 percent is hazardous waste (88 metric tons per generator; 10 generators).

### 4.1.2 Wastewater Treatment Sludge

Wastewater is generated by paint manufacturers from equipment cleanings, floor washdowns, spill cleanups, laboratory sinks, boiler and cooling water blowdown, scrubber blowdown, resin and pigment production (for some facilities), off-specification product, contaminated stormwater runoff, and distillation condensate. The most common wastewater treatment method is physical-chemical using chemical addition and gravity settling of suspended solids. Chemicals (coagulants) added include lime, alum, or ferric chloride. Settled sludge waste is generated from the wastewater treatment process. Table 4-1 presents reported annual waste generation quantities by a few paint manufacturing facilities for wastewater treatment sludge.

[23] ibid.

We believe that a portion of the wastewater treatment sludge quantity that is generated is regulated for its characteristic ignitability (D001), solvent content (F002, F003, or F005), and characteristic TC metal hazardous waste under D004-D008 or TC methyl ethyl ketone waste (D035). Tables 4-2 and 4-3 present reported annual hazardous generation quantities by a few LQGs in the 1995 and 1997 Biennial Reports. Based on 1995 and 1997 Biennial Report data, the average amount of hazardous wastewater treatment sludge generated per facility decreased from 50 tons (45 metric tons) in 1995 to 9 tons (8 metric tons) in 1997.

The extrapolated 3007 Survey data (Table 4-4a) suggest that the paint industry generates approximately 2,559 metric tons of ***wastewater treatment sludges***, of which, 100 percent is non-hazardous waste (53 metric tons per generator; 48 generators).

### 4.1.3 Emission Control Dust

Paint manufacturers collect airborne particulates in production areas through air hoods and exhaust fans. Particulates enter the air during the loading of dry materials into processing equipment. Particulates are filtered from the collected air using bag houses and other air filters prior to exhaust or return. Pigments represent a large fraction of the particulates collected. Segregation of collected particulate matter into hazardous and nonhazardous constituents is usually not possible. The collected dusts are dry, having less than 5 percent moisture content. Approximately 4.9 pounds of dust is generated for every 1,000 gallons of paint produced.[24]

We believe a small portion of the emission control dust quantity that is generated is regulated as a TC characteristic metal waste under D005-D008. Tables 4-2 and 4-3 present reported annual generation quantities by a few LQGs in the 1995 and 1997 Biennial Reports. Based on Biennial Report data, the average amount of hazardous emission control dust generated per facility decreased from 21 tons (19 metric tons) in 1995 to 11 tons (9.6 metric tons) in 1997.

Our extrapolated Survey data (Table 4-4a) suggest that the paint industry generates approximately 3,452 metric tons of ***emission control dust***, of which, 98.1 percent is nonhazardous waste (26 metric tons per generator; 131 generators) and 1.9 percent is hazardous waste (4.9 metric tons per generator; 14 generators).

### 4.1.4 Off-Specification Production Wastes

We define off-specification production wastes as finished products which are not saleable or usable. Many of these off-specification wastes are generated by smaller paint manufacturing plants that sell specialty paints. These wastes may be generated when there are changes in customer demand, creation of new product substitutes, expiration of shelf life, operator errors, equipment malfunctions, improper equipment cleaning, quality control failures, and disposal of product samples or quality control samples.[25] Table 4-1 presents reported annual waste generation quantities for a couple of paint manufacturing facilities for off-specification waste.

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24 ibid.

25 ibid.

We believe that a portion of the off-specification production waste quantity that is generated is regulated as an ignitable characteristic (D001) waste and/or TC hazardous metal waste under D006-D009 or listed solvent waste (F002, F003, or F005). Tables 4-2 and 4-3 present reported annual generation quantities by a few LQGs in the 1995 and 1997 Biennial Reports. Based on Biennial Report data, the average amount of hazardous off-specification production waste generated per facility decreased from 117 tons (107 metric tons) in 1995 to 96 tons (87 metric tons) in 1997.

The extrapolated Survey data (Table 4-4a) suggest that the paint industry generates approximately 8,547 metric tons of ***off-specification production wastes***, of which, 39.1 percent is non-hazardous waste (19 metric tons per generator; 180 generators) and 60.9 percent is hazardous waste (22 metric tons per generator; 241 generators).

**Table 4-1. Reported Paint Production Waste Generation**

| Waste | Waste Generation (Sample Facilities) | Year of Generation |
|---|---|---|
| Solvent Cleaning Waste | Sample Facilities | |
| | 6,839 lb/yr | 1992[1] |
| | 17,520 lb/yr | 1994[1] |
| | 47,705 lb/yr | 1992[1] |
| | 114,675 lb/yr | 1992[1] |
| | 447,000 lb/yr | 1987[1] |
| | 477,048 lb/yr | 1992[1] |
| | 1,301,040 lb/yr | 1992[1] |
| | Estimated Waste Generation Ratios | |
| | 0.0092 lb waste/lb of solvent based coatings | 1987[2] |
| | 0.00493 lb waste/lb of water based coatings | 1987[2] |
| Water or Caustic Cleaning Waste | Sample Facilities | |
| | 133,440 lb/yr | 1992[1] |
| | 1,626,300 lb/yr | 1992[1] |
| | Estimated Waste Generation Ratios | |
| | 0.00297 lb waste/lb of solvent based coatings | 1987[2] |
| | 0.00849 lb waste/lb of water based coatings | 1987[2] |
| Wastewater Treatment Sludge | Sample Facilities | |
| | 26,400 lb/yr | 1987[1] |
| | 78,000 lb/yr | 1992[1] |
| | 208,330 lb/yr | 1994[1] |
| | Estimated Waste Generation Ratios | |
| | 0.00216 lb waste/lb of solvent based coatings | 1987[2] |
| | 0.00497 lb waste/lb of water based coatings | 1987[2] |
| Emission Control Dust | Estimated Waste Generation Ratio | |
| | 4.9 lb dust/1,000 gallons of paint manufactured | 1976[1] |
| Off-specification Production Wastes | Sample Facilities | |
| | 18,848 lb/yr | 1994[1] |
| | 27,105 lb/yr | 1992[1] |

[1] U.S. Environmental Protection Agency, Office of Solid Waste, *Draft Paint Production Wastes Industry Overview*, prepared by Dynamac Corporation, Contract No. 68-W-98-231, July 15, 1999.

[2] U.S. Environmental Protection Agency, Office of Solid Waste, *Draft Strategy Document for the Determination of Potential Constituents of Concern Paint Wastes*, prepared by Dynamac Corporation, Contract No. 68-W-98-231, August 11, 1999.

| Table 4-2. 1995 Biennial Report Data for SIC 2851 (Paints And Allied Products) | | | | | | |
|---|---|---|---|---|---|---|
| | **Solvent Cleaning Wastes** | **Caustic Cleaning Wastes** | **Aqueous Cleaning Wastes** | **Wastewater Treatment Sludge** | **Emission Control Dust** | **Off-Spec. Production Wastes** |
| Number of LQGs (RCRA definition) | 261 | 24 | 31 | 14 | 22 | 176 |
| Total Generation (metric tons/yr) | 48,661 | 2,863 | 2,047 | 636 | 397 | 18,803 |
| Minimum Generation/Facility (metric tons/yr) | 0.0 | 0.2 | 0.2 | 0.8 | 0.1 | 0.0 |
| 10th Percentile Generation/ Facility (metric tons/yr) | 4.8 | 0.8 | 0.9 | 0.9 | 0.2 | 0.5 |
| 25th Percentile Generation/ Facility (metric tons/yr) | 17 | 3.6 | 1.9 | 2.0 | 1.3 | 3.4 |
| 50th Percentile Generation/ Facility (metric tons/yr) | 51 | 35 | 10 | 6.7 | 4.9 | 16 |
| 75th Percentile Generation/ Facility (metric tons/yr) | 157 | 170 | 50 | 33 | 15 | 54 |
| 90th Percentile Generation/ Facility (metric tons/yr) | 421 | 260 | 155 | 133 | 33 | 111 |
| Maximum Generation/Facility (metric tons/yr) | 6,675 | 766 | 936 | 293 | 138 | 3,338 |
| Average Generation/Facility (metric tons/yr) | 186 | 119 | 66 | 45 | 19 | 107 |
| Standard Deviation (metric tons/yr) | 507 | 180 | 175 | 80 | 37 | 361 |
| Number of LQGs Shipping Off Site | 247 | 24 | 31 | 14 | 22 | 176 |
| Number of LQGs Shipping <15.18 metric tons* | 65 (26.3%) | 11 (45.8%) | 17 (54.8%) | NA | NA | 87 (49.4%) |
| Number of LQGs Shipping <18.2 metric tons** | NA | NA | NA | 8 (57.1%) | 18 (81.8%) | NA |

**Table 4-2. 1995 Biennial Report Data for SIC 2851 (Paints And Allied Products) [continued ...]**

*Source:* 1995 Biennial Report (see Appendix B for data query algorithm).

* Shipping costs for liquids vary between bulk and drum shipments. For our transportation cost analysis we need to estimate the number of generators who are likely to ship in bulk vs. drum. We have assumed that a tanker truck transporting liquids has 4,000 to 6,000 gallon capacity. We have also assumed drum pickup instead of bulk pickup if a facility's generated 90-day accumulation is < 1,000 gallons (4.17 tons assuming 8.34 lbs/gallon). Under this scenario, annual total generation equals 4,000 gallons or 16.68 tons (15.18 metric) per year. Those generating greater than this quantity of liquids are assumed to ship bulk.

** Shipping costs for solids vary between bulk and drum shipments. For our transportation cost analysis, we need to estimate the number of generators who are likely to ship in bulk vs. drum. We have assumed that a truck dumpster transporting solid waste has 10 to 20 cubic yards (cy)(10 to 20 ton) capacity. We have also assumed drum/jumbo bag pickup instead of bulk (dumpster) pickup if a facility's generated 90-day accumulation is < 5 cy (5 tons assuming 1 ton/cy). Under this scenario, annual total generation equals 20 cy or 20 tons (18.2 metric) per year. Those generating greater than this quantity of solids are assumed to ship bulk..

**Table 4-3. 1997 Biennial Report Data for SIC 2851 (Paints And Allied Products)**

| | Solvent Cleaning Wastes | Caustic Cleaning Wastes | Aqueous Cleaning Wastes*** | Wastewater Treatment Sludge | Emission Control Dust | Off-Spec. Production Wastes |
|---|---|---|---|---|---|---|
| Number of LQGs | 254 | 20 | 28 | 8 | 22 | 181 |
| Total Generation (metric tons/yr) | 41,424 | 1,634 | 1,390 | 65 | 211 | 15,823 |
| Minimum Generation/ Facility (metric tons/yr) | 0.4 | 0.4 | 0.4 | 0.1 | 0.0 | 0.01 |
| 10th Percentile Generation/ Facility (metric tons/yr) | 3.9 | 1.4 | 1.3 | 0.2 | 0.2 | 0.5 |
| 25th Percentile Generation/ Facility (metric tons/yr) | 15 | 12 | 4.1 | 1.3 | 0.7 | 4.3 |
| 50th Percentile Generation/ Facility (metric tons/yr) | 51 | 31 | 25 | 2.7 | 2.5 | 14 |
| 75th Percentile Generation/ Facility (metric tons/yr) | 164 | 59 | 41 | 15 | 7.0 | 59 |
| 90th Percentile Generation/ Facility (metric tons/yr) | 348 | 203 | 98 | 21 | 18 | 223 |
| Maximum Generation/ Facility (metric tons/yr) | 5,671 | 610 | 530 | 25 | 94 | 1,711 |
| Average Generation/ Facility (metric tons/yr) | 163 | 82 | 51 | 8.1 | 9.6 | 87 |
| Standard Deviation (metric tons/yr) | 418 | 151 | 102 | 9.6 | 21 | 224 |
| Number of LQGs Shipping Off Site | 247 | 19 | 28 | 7 | 22 | 175 |
| Number of LQGs Shipping <15.18 metric tons* | 63 (24.8%) | 6 (30.0%) | 12 (42.9%) | NA | NA | 92 (50.8%) |
| Number of LQGs Shipping <18.2 metric tons** | NA | NA | NA | 6 (75.0%) | 19 (86.4%) | NA |

**Table 4-3. 1997 Biennial Report Data for SIC 2851 (Paints And Allied Products) [continued.....]**

*Source:* 1997 Biennial Report (see Appendix A for data query algorithm).

* Shipping costs for liquids vary between bulk and drum shipments. For our transportation cost analysis we need to estimate the number of generators who are likely to ship in bulk vs. drum. We have assumed that a tanker truck transporting liquids has 4,000 to 6,000 gallon capacity. We have also assumed drum pickup instead of bulk pickup if a facility's generated 90-day accumulation is < 1,000 gallons (4.17 tons assuming 8.34 lbs/gallon). Under this scenario, annual total generation equals 4,000 gallons or 16.68 tons (15.18 metric) per year. Those generating greater than this quantity of liquids are assumed to ship bulk..

** Shipping costs for solids vary between bulk and drum shipments. For our transportation cost analysis, we need to estimate the number of generators who are likely to ship in bulk vs. drum. We have assumed that a truck dumpster transporting solid waste has 10 to 20 cubic yards (cy)(10 to 20 ton) capacity. We have also assumed drum/jumbo bag pickup instead of bulk (dumpster) pickup if a facility's generated 90-day accumulation is < 5 cy (5 tons assuming 1 ton/cy). Under this scenario, annual total generation equals 20 cy or 20 tons (18.2 metric) per year. Those generating greater than this quantity of solids are assumed to ship bulk..

*** One data point (12,904.2 tons or 11,742.8 metric tons) was assumed to be an outlier compared to the other reported data and omitted. This plant was the only one to report managing this waste via direct discharge to surface water/POTW. All other plants ship their aqueous cleaning waste off site for management.

**Table 4-4a. RCRA 3007 Survey Data for Nonwastewater Generation (Proposed as K179)**
**1998 Data from the Paints and Coatings Industry**

| | Solvent Cleaning Sludges | | Caustic Cleaning Sludges | | Aqueous Cleaning Sludges | | Wastewater Treatment Sludge | | Emission Control Dust | | Off-Specification Production Wastes | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NH | H | NH | H | NH | H | NH | H | NH | H | NH | H |
| No. of Survey Respondents with Waste of Concern | 4 | 49 | 1 | 7 | 21 | 3 | 15 | NA | 44 | 5 | 40 | 70 |
| Total Reported Generation (metric tons) | 32 | 3,336 | 0.6 | 98 | 2,585 | 25 | 927 | NA | 1,163 | 38 | 965 | 2,340 |
| Total Reported Generation (gallons) | 7,831 | 870,693 | 150 | 20,865 | 465,386 | 6,087 | 148,238 | NA | 181,356 | 16,799 | 216,414 | 587,215 |
| No. Surveyed | 15 | 105 | 9 | 8 | 71 | 3 | 28 | NA | 76 | 8 | 105 | 140 |
| Total Weighted Generation (metric tons) | 35 | 4,291 | 5.6 | 99 | 2,990 | 30 | 1,490 | NA | 1,971 | 39 | 1,948 | 3,029 |
| Total Weighted Generation (gallons) | 8,682 | 1,104,289 | 1,329 | 21,009 | 524,940 | 7,238 | 215,386 | NA | 598,175 | 17,071 | 437,213 | 747,842 |
| Avg. Weighted Generation (metric tons/generator/yr) | 2.3 | 40.9 | 0.6 | 12.4 | 42.1 | 10.0 | 53.2 | NA | 25.9 | 4.9 | 18.6 | 21.6 |
| Avg. Weighted Generation (gal/generator/yr) | 579 | 10,517 | 148 | 2,626 | 7,394 | 2,413 | 7,692 | NA | 7,871 | 2,134 | 4,164 | 5,342 |

**Table 4-4a. RCRA 3007 Survey Data for Nonwastewater Generation (Proposed as K179)**
**1998 Data from the Paints and Coatings Industry**

| | Solvent Cleaning Sludges | | Caustic Cleaning Sludges | | Aqueous Cleaning Sludges | | Wastewater Treatment Sludge | | Emission Control Dust | | Off-Specification Production Wastes | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NH | H | NH | H | NH | H | NH | H | NH | H | NH | H |
| Weighted No. Shipping <18.2 metric tons* | 14 (93%) | 79 (75%) | 9 (100%) | 7 (87%) | 61 (86%) | 2 (65%) | 16 (58%) | NA | 59 (78%) | 6 (75%) | 84 (80%) | 104 (78%) |
| Estimated Number of Generators in Universe of 972 | 26 | 180 | 15 | 14 | 122 | 5 | 48 | 0 | 131 | 14 | 180 | 241 |
| Total Universe Generation (metric tons) | 60 | 7,369 | 10 | 170 | 5,135 | 52 | 2,559 | 0 | 3,385 | 67 | 3,345 | 5,202 |
| Total Universe Generation (gallons) | 14,910 | 1,896,411 | 2,282 | 36,079 | 901,487 | 12,430 | 369,885 | 0 | 1,027,255 | 29,316 | 750,832 | 1,284,280 |

*Source:* RCRA 3007 Survey - Paint Manufacturing Waste (data for 1998).

NH: Non-Hazardous;
H: Hazardous

*Note:* Universe based on scaling factor of 972/566.

* Shipping costs for solids vary between bulk and drum shipments. For our transportation cost analysis, we need to estimate the number of generators who are likely to ship in bulk vs. drum. We have assumed that a truck dumpster transporting solid waste has 10 to 20 cubic yards (cy)(10 to 20 ton) capacity. We have also assumed drum/jumbo bag pickup instead of bulk (dumpster) pickup if a facility's generated 90-day accumulation is < 5 cy (5 tons assuming 1 ton/cy). Under this scenario, annual total generation equals 20 cy or 20 tons (18.2 metric) per year. Those generating greater than this quantity of solids are assumed to ship bulk..

**Table 4-4b. RCRA 3007 Survey Data for Wastewater Generation (Proposed as K180)**
**1998 Data from the Paints and Coatings Industry**

| | Solvent Cleaning Liquids | | Caustic Cleaning Liquids | | Aqueous Cleaning Liquids | |
|---|---|---|---|---|---|---|
| | Non-Hazardous | Hazardous | Non-Hazardous | Hazardous | Non-Hazardous | Hazardous |
| No. of Survey Respondents with Wastes of Concern | 1 | 97 | 3 | 6 | 70 | 16 |
| Total Reported Generation (metric tons) | 3.5 | 9,804 | 61 | 524 | 15,465 | 260 |
| Total Reported Generation (gallons) | 937 | 2,750,687 | 15,930 | 134,850 | 4,008,046 | 68,418 |
| Number Surveyed | 1 | 195 | 3 | 6 | 154 | 38 |
| Total Weighted Generation (metric tons) | 3.7 | 14,216 | 66 | 526 | 31,036 | 393 |
| Total Weighted Generation (gallons) | 984 | 4,009,226 | 17,276 | 135,210 | 8,066,196 | 101,288 |
| Avg. Weighted Generation (metric tons/generator/yr) | 3.7 | 72.9 | 22.0 | 87.7 | 201.5 | 10.3 |
| Avg. Weighted Generation (gal/generator/yr) | 984 | 20,560 | 5,759 | 22,535 | 52,378 | 2,665 |
| No. Shipping <15.18 metric tons* | 1 (100%) | 101 (53%) | 1 (31%) | 3 (53%) | 61 (41%) | 31 (81%) |
| Estimated Number of Generators in Universe of 972 | 2 | 335 | 5 | 10 | 265 | 65 |
| Total Universe Generation (metric tons) | 6 | 24,413 | 113 | 903 | 53,299 | 675 |
| Total Universe Generation (gallons) | 1,690 | 6,885,102 | 29,668 | 232,198 | 13,852,195 | 173,943 |

*Source:* RCRA 3007 Survey - Paint Manufacturing Waste (data for 1998).

*Note:* Universe based on scaling factor of 972/566.

* Shipping costs for liquids vary between bulk and drum shipments. For our transportation cost analysis we need to estimate the number of generators who are likely to ship in bulk vs. drum. We have assumed that a tanker truck transporting liquids has 4,000 to 6,000 gallon capacity. We have also assumed drum pickup instead of bulk pickup if a facility's generated 90-day accumulation is < 1,000 gallons (4.17 tons assuming 8.34 lbs/gallon). Under this scenario, annual total generation equals 4,000 gallons or 16.68 tons (15.18 metric) per year. Those generating greater than this quantity of liquids are assumed to ship bulk..

## 4.2 Baseline Management Practices and Costs

Baseline management practices are presented in Tables 4-5a and 4-5b and management unit cost estimates are included in Appendix Tables D and E. Incremental cost estimates presented in Chapter 5 are derived primarily from the information presented in these tables. Baseline management waste quantities examined in this section will not directly correlate with generation quantities presented in the previous section due to waste storage and alternative accounting periods for waste generation vs management. In addition, various facilities responding to our survey reported waste management but failed to report or fully report quantities managed. We were able to some obtain additional information and clarifications through our follow-up telephone communications. However, in some cases, facility waste consolidation, storage, and carryover practices did not allow for clear documentation of waste management vs generation within the time frame requested. *[Note: The totals presented in the paragraphs below refer to the column, "Universe Excluding Intermediate Steps" in Tables 4-5a and 4-5b.]*

### 4.2.1 Equipment (Solvent, Water or Caustic) Cleaning Wastes

**Solvent Cleaning Wastes**

Solvent cleaning wastes are typically managed by either reuse in subsequent comparable batches as part of the formulations, collected and distilled either on or off site, or reused as washwater following settling until spent, while settled solids are drummed and disposed.[26]

Based on 1997 BRS data, several solvent cleaning wastes are currently being managed under the Subtitle C program by solvent recovery, fuel blending, aqueous treatment, energy recovery (i.e., cement kiln or boiler or industrial furnace (BIF)), and incineration. The 3007 Survey data are consistent with our assumption that nearly all solvent cleaning sludge and liquid wastes already are currently managed as hazardous waste.

The extrapolated RCRA 3007 Survey data (Table 4-5a) suggest that the paint industry manages approximately 1,029,886 gallons (see note above) of ***solvent cleaning sludges***, of which, 1.4 percent is managed as nonhazardous waste and 98.6 percent is managed as hazardous waste. Nonhazardous wastes are managed in a Subtitle D landfill. Hazardous wastes are managed by Subtitle D landfill, fuel blending, incineration, cement kiln, and by other methods.

The extrapolated RCRA 3007 Survey data (Table 4-5b) suggest that the paint industry manages approximately 3,919,029 gallons (see note above) of ***solvent cleaning liquids***, of which, 0.04 percent is managed as nonhazardous waste and 99.96 percent is managed as hazardous waste. Nonhazardous wastes are managed through fuel blending. Hazardous wastes are managed by Subtitle D landfill, fuel blending, incineration, cement kiln, BIF, light-weight aggregate kiln, and by other methods.

[26] ibid.

**Water Cleaning Wastes**

Water cleaning wastes are typically managed by either reuse in subsequent comparable batches as part of the formulations, reused as washwater following settling until spent, while settled solids are drummed and disposed, or drummed without reuse, treated and disposed. Based on professional judgement, we estimate that about 40 percent of the water washes are reused in subsequent paint batches.[27] The wastewater treatment plant typically involves chemical addition and gravity settling of suspended solids. It is a batch operation with pH adjustment, coagulant and/or coagulant aid addition, settling, and discharge or reuse of supernatant. The wastewater treatment sludge is evaluated as a separate waste stream.[28]

Based on 1997 Biennial Report data, we believe some water cleaning wastes are currently being managed under the RCRA Subtitle C program by incineration, fuel blending, solvent recovery, energy recovery, fuel blending, aqueous treatment, direct discharge to surface water/POTW, and stabilization (i.e., mixing into cement mixture) and landfill.

The extrapolated RCRA 3007 Survey data (Table 4-5a) suggest that the paint industry manages approximately 910,440 gallons of ***water cleaning sludges***, of which, 99.7 percent is managed as non-hazardous waste and 0.3 percent is managed as hazardous waste. Nonhazardous wastes are managed by Subtitle D landfill, Subtitle C landfill, fuel blending, incineration, and other. Hazardous wastes are managed by fuel blending.

The extrapolated RCRA 3007 Survey data (Table 4-5b) suggest that the paint industry manages approximately 15,775,381 gallons of ***water cleaning liquids***, of which, 98.9 percent is managed as nonhazardous waste and 1.1 percent is managed as hazardous waste. Nonhazardous wastes are managed by Subtitle D landfill, on-site treatment tanks, POTW, NPDES, on- and off-site wastewater treatment, fuel blending, incineration, cement kiln, and by other methods. Hazardous wastes are managed by off-site wastewater treatment, fuel blending, incineration, and by other methods.

**Caustic Cleaning Wastes**

Caustic cleaning wastes are typically reused until they lose their cleaning ability when they are drummed and sent off site for treatment/disposal or neutralized and sent to a treatment facility. The water rinse following a caustic wash is rarely used in subsequent batches. It is typically reused as caustic makeup waste (possibly involving evaporation) until they lose their cleaning ability followed by treatment (neutralization) and discharge or disposal. The wastewater treatment plant typically involves chemical addition and gravity settling of suspended solids. It is a batch operation with pH adjustment, coagulant and/or coagulant aid addition, settling, and discharge or reuse of supernatant.[29]

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27 ibid.

28 ibid.

29 ibid.

Based on 1997 Biennial Report data, we believe that some caustic cleaning wastes are currently being managed under the RCRA Subtitle C program by incineration, fuel blending, energy recovery, direct discharge to surface water/ POTW, and aqueous treatment.

The extrapolated RCRA 3007 Survey data (Table 4-5a) suggest that the paint industry manages approximately 38,361 gallons of ***caustic cleaning sludges***, of which, 5.9 percent is managed as non-hazardous waste and 94.1 percent is managed as hazardous waste. Nonhazardous wastes are managed by incineration. Hazardous wastes are managed by Subtitle D landfill, off-site wastewater treatment, fuel blending, incineration, and by other methods.

The extrapolated RCRA 3007 Survey data (Table 4-5b) suggest that the paint industry manages approximately 261,866 gallons of ***caustic cleaning liquids***, of which, 11.4 percent is managed as non-hazardous waste and 88.6 percent is managed as hazardous waste. Nonhazardous wastes are managed by on-site treatment tanks, POTW and by other methods. Hazardous wastes are managed by off-site wastewater treatment, incineration, and by other methods.

### 4.2.2 Wastewater Treatment Sludge

Wastewater treatment sludges are recycled back into the production line or more commonly disposed as nonhazardous solid waste in a Subtitle D landfill. Some facilities that specialize in solvent-based products and generate little wastewater dispose of the sludge as hazardous waste along with other process waste such as spent solvents and spent caustic.[30]

Based on 1997 Biennial Report data, we believe that some wastewater treatment sludges are currently being managed under the RCRA Subtitle C program by fuel blending or stabilization and landfill.

The extrapolated RCRA 3007 Survey data (Table 4-5a) suggest that the paint industry manages approximately 369,886 gallons of **wastewater treatment sludge**, of which 100 percent is managed as nonhazardous waste. Nonhazardous wastes are managed by Subtitle D landfill, on-site treatment tanks, nonhazardous fuel blending, off-site wastewater treatment facility, and incineration.

### 4.2.3 Emission Control Dust

Emission control dust is reused in the formulation of low-grade paint products or disposed as a nonhazardous waste in a Subtitle D landfill. Some facilities may also solidify the waste prior to disposal in either a Subtitle C or D landfill.

Based on 1997 Biennial Report data, we believe that some emission control dust wastes are currently being managed under the RCRA Subtitle C program by incineration, fuel blending, energy recovery, landfill, and stabilization and landfill.

[30] ibid.

The extrapolated RCRA 3007 Survey data (Table 4-5a) suggest that the paint industry manages approximately 1,056,052 gallons of **emission control dust**, of which, 97.3 percent is managed as non-hazardous waste and 2.7 percent is managed as hazardous waste. Nonhazardous wastes are managed by Subtitle D landfill, Subtitle C landfill, on-site treatment tanks, incineration and by other methods. Hazardous wastes are managed by Subtitle D landfill, Subtitle C landfill, incineration, and BIF.

### 4.2.4 Off-Specification Production Wastes

Off-specification products are usually reworked into saleable materials because of their high value. Other options include sale in a new market, rework into a primer or undercoat, sale to waste exchangers, donation to volunteer organization, and Subtitle D landfill.[31] Some facilities may also solidify the waste prior to disposal in either a Subtitle C or D landfill.

Based on 1997 Biennial Report data, we believe that several off-specification production wastes are currently being managed under the RCRA Subtitle C program by solvent recovery, incineration, fuel blending, energy recovery, aqueous treatment, landfill, and stabilization and landfill.

The extrapolated RCRA 3007 Survey data (Table 4-5a) suggest that the paint industry manages approximately 2,264,339 gallons of **off-specification production waste**, of which, 28.4 percent is managed as nonhazardous waste and 71.6 percent is managed as hazardous waste. Nonhazardous wastes are managed by Subtitle D landfill, Subtitle C landfill, fuel blending, off-site wastewater treatment, incineration, cement kiln, BIF, and by other methods. Hazardous wastes are managed by Subtitle D landfill, fuel blending, incineration, cement kiln, BIF, and by other methods.

[31] ibid.

**Table 4-5a:**
**Paint Production Waste Baseline Management Practices**
**Proposed K179 - Nonwastewater (Solids And Sludges)**

| Waste | Reported Management Practice | Total Quantity Managed, Based on Extrapolated Survey Data | | |
|---|---|---|---|---|
| | | **Weighted (gallons)+** | **Universe (gallons)++** | **Universe Excluding Intermediate Steps (gallons)++** |
| **Solvent Cleaning Sludge** | ***Non-Hazardous Waste Stream Management*** | | | |
| | Subtitle D Landfill | 8,682 | 14,910 | 14,910 |
| | Container Storage* | 582 | 999 | |
| | Waste Pile* | 7,969 | 13,685 | |
| | Sub-Total and (percent): | 17,233 | 29,594 (1.4%) | 14,910 (1.4%) |
| | ***Hazardous Waste Stream Management*** | | | |
| | Subtitle D Landfill | 2,067 | 3,550 | 3,550 |
| | On-Site Storage Tanks* | 416,273 | 714,872 | |
| | Fuel Blending | 523,154 | 898,420 | 898,420 |
| | Incineration | 46,344 | 79,587 | 79,587 |
| | Cement Kiln | 18,540 | 31,839 | 31,839 |
| | Containers* | 193,884 | 332,960 | |
| | Other | 920 | 1,580 | 1,580 |
| | Sub-Total and (percent): | 1,201,182 | 2,062,807 (98.6%) | 1,014,976 (98.6%) |
| *TOTAL -* | | *1,218,415* | *2,092,402* | *1,029,886* |

**Table 4-5a:**
**Paint Production Waste Baseline Management Practices**
**Proposed K179 - Nonwastewater (Solids And Sludges)**

| Waste | Reported Management Practice | Total Quantity Managed, Based on Extrapolated Survey Data | | |
|---|---|---|---|---|
| | | **Weighted (gallons)+** | **Universe (gallons)++** | **Universe Excluding Intermediate Steps (gallons)++** |
| **Water Cleaning Sludge** | ***Non-Hazardous Waste Stream Management*** | | | |
| | Subtitle D Landfill | 451,838 | 775,948 | 775,948 |
| | Subtitle C Landfill | 66,700 | 114,545 | 114,545 |
| | On-site Storage Tanks* | 324,149 | 556,666 | |
| | Fuel Blending | 893 | 1,534 | 1,534 |
| | Incineration | 9,043 | 15,530 | 15,530 |
| | Containers* | 200,309 | 343,994 | |
| | Other | 102 | 175 | 175 |
| | Sub-Total and (percent): | 1,053,034 | 1,808,391 (99.7%) | 907,732 (99.7%) |
| | ***Hazardous Waste Stream Management*** | | | |
| | Fuel Blending | 1,577 | 2,708 | 2,708 |
| | Containers* | 1,577 | 2,708 | |
| | Sub-Total and (percent): | 3,154 | 5,416 (0.3%) | 2,708 (0.3%) |
| *TOTAL -* | | *1,056,188* | *1,813,807* | *910,440* |
| **Caustic Cleaning Sludge** | ***Non-Hazardous Waste Stream Management*** | | | |
| | Incineration | 1,329 | 2,282 | |
| | Containers* | 1,329 | 2,282 | 2,282 |
| | Sub-Total and (percent): | 2,658 | 4,565 (5.9%) | 2,282 (5.9%) |
| | ***Hazardous Waste Stream Management*** | | | |
| | Fuel Blending | 1,106 | 1,899 | 1,899 |
| | Off-Site Wastewater Treat. Fac. | 2,145 | 3,684 | 3,684 |

**Table 4-5a:**
**Paint Production Waste Baseline Management Practices**
**Proposed K179 - Nonwastewater (Solids And Sludges)**

| Waste | Reported Management Practice | Total Quantity Managed, Based on Extrapolated Survey Data | | |
|---|---|---|---|---|
| | | **Weighted (gallons)+** | **Universe (gallons)++** | **Universe Excluding Intermediate Steps (gallons)++** |
| | Incineration | 17,700 | 30,396 | 30,396 |
| | Containers* | 21,009 | 36,079 | |
| | Other | 58 | 100 | 100 |
| | Sub-Total and (percent): | 42,018 | 72,158 (94.1%) | 36,079 (94.1%) |
| *TOTAL -* | | *44,676* | *76,723* | *38,361* |
| **Wastewater Treatment Sludge** | ***Non-Hazardous Waste Stream Management*** | | | |
| | Subtitle D Landfill | 204,214 | 350,700 | 350,700 |
| | On-Site Treatment Tanks* | 74,320 | 127,631 | |
| | Fuel Blending | 4,640 | 7,968 | 7,968 |
| | Off-Site Wastewater Treat. Fac. | 1,250 | 2,147 | 2,147 |
| | Incineration | 5,282 | 9,071 | 9,071 |
| | Containers* | 139,025 | 238,750 | |
| | *TOTAL -* | *428,731* | *736,266 (100.0%)* | *369,886 (100.0%)* |
| | ***Hazardous Waste Stream Management*** | | | |
| | No Haz. Waste Mgmt. Reported | None Reported | None Reported | None |
| **Emission Control Dust** | ***Non-Hazardous Waste Stream Management*** | | | |
| | Subtitle D Landfill | 587,268 | 1,008,524 | 1,008,524 |
| | Subtitle C Landfill | 4,728 | 8,119 | 8,119 |
| | On-Site Treatment Tanks* | 93,995 | 161,419 | |
| | Incineration | 1,370 | 2,353 | 2,353 |

**Table 4-5a:**
**Paint Production Waste Baseline Management Practices**
**Proposed K179 - Nonwastewater (Solids And Sludges)**

| Waste | Reported Management Practice | Total Quantity Managed, Based on Extrapolated Survey Data | | |
|---|---|---|---|---|
| | | **Weighted (gallons)+** | **Universe (gallons)++** | **Universe Excluding Intermediate Steps (gallons)++** |
| | Containers* | 691,980 | 1,188,347 | |
| | Other | 4,709 | 8,087 | 8,087 |
| | Sub-Total and (percent): | 1,384,050 | 2,376,849 (97.6%) | 1,027,083 (97.3%) |
| | ***Hazardous Waste Stream Management*** | | | |
| | Subtitle D Landfill | 18 | 31 | 31 |
| | Subtitle C Landfill | 11,520 | 19,783 | 19,783 |
| | Incineration | 5,250 | 9,016 | 9,016 |
| | Boiler or Industrial Furnace | 81 | 139 | 139 |
| | Containers* | 16,869 | 28,969 | |
| | Sub-Total and (percent): | 33,738 | 57,939 (2.4%) | 28,969 (2.7%) |
| *TOTAL -* | | *1,417,788* | *2,434,788* | *1,056,052* |
| **Off-specification Production Waste** | ***Non-Hazardous Waste Stream Management*** | | | |
| | Subtitle D Landfill | 199,205 | 342,098 | 342,098 |
| | Subtitle C Landfill | 16,700 | 28,679 | 28,679 |
| | On-Site Storage Tanks* | 12,500 | 21,466 | |
| | Fuel Blending | 82,429 | 141,557 | 141,557 |
| | Off-site Wastewater Treat. Fac. | 12,293 | 21,111 | 21,111 |
| | Incineration | 18,397 | 31,593 | 31,593 |

**Table 4-5a:**
**Paint Production Waste Baseline Management Practices**
**Proposed K179 - Nonwastewater (Solids And Sludges)**

| Waste | Reported Management Practice | Total Quantity Managed, Based on Extrapolated Survey Data | | |
|---|---|---|---|---|
| | | **Weighted (gallons)+** | **Universe (gallons)++** | **Universe Excluding Intermediate Steps (gallons)++** |
| | Cement Kiln | 12,976 | 22,284 | 22,284 |
| | Boiler or Industrial Furnace | 844 | 1,449 | 1,449 |
| | Containers* | 457,880 | 786,324 | |
| | Other | 31,130 | 53,460 | 53,460 |
| | Sub-Total and (percent): | 844,354 | 1,450,021 (30.9%) | 642,231 (28.4%) |
| | ***Hazardous Waste Stream Management*** | | | |
| | Subtitle D Landfill | 4,048 | 6,952 | 6,952 |
| | On-Site Storage Tanks* | 441,550 | 758,280 | |
| | Fuel Blending | 442,571 | 760,034 | 760,034 |
| | Incineration | 108,732 | 186,727 | 186,727 |
| | Cement Kiln | 34,290 | 58,887 | 58,887 |
| | Boiler or Industrial Furnace | 534 | 917 | 917 |
| | Containers* | 499,857 | 858,412 | |
| | Other | 354,386 | 608,592 | 608,592 |
| | Sub-Total and (percent): | 1,885,968 | 3,238,800 (69.1%) | 1,622,108 (71.6%) |
| *TOTAL -* | | *2,730,322* | *4,688,822* | *2,264,339* |

**Table 4-5a:**
**Paint Production Waste Baseline Management Practices**
**Proposed K179 - Nonwastewater (Solids And Sludges)**

| Waste | Reported Management Practice | Total Quantity Managed, Based on Extrapolated Survey Data | | |
|---|---|---|---|---|
| | | Weighted (gallons)+ | Universe (gallons)++ | Universe Excluding Intermediate Steps (gallons)++ |

* *These are intermediate steps - waste volumes are also added in final destinations.*
\+ *Totals based on the total number of facilities surveyed in the RCRA 3007 Survey, weighted to adjust for survey representation.*
++ *Totals for the total Universe of 972 paint manufactures derived by scaling the weighted generation total by 972/566.*

*Source:* U.S. Environmental Protection Agency, Office of Solid Waste, *Paint Manufacturing Wastes - RCRA 3007 Survey Database* ,management and quantity information obtained from a table (MgtUnitVSWasteStream8_31.WK4) prepared by Dynamac Corporation, Contract No. 68-W-98-231, August 31, 2000.

Note: The quantities and percentages presented reflecting management as hazardous or nonhazardous waste differ from those presented in Section 4.1 reflecting the amount generated characterized as hazardous or nonhazardous waste. The difference is that all respondents to the RCRA 3007 survey reported a generation quantity, but, not all respondents reported how they managed their waste. In addition, given the RCRA 3007 survey was limited to the 1998 calendar year, not all waste generated in 1998 was managed in 1998. Some quantities were in storage awaiting management in calendar year 1999. The ultimate dispositions of these wastes are unknown. Finally, there may be some reporting error.

**Table 4-5b**
**Paint Production Waste Baseline Management Practices**
**Proposed K180 - Wastewater (Liquids)**

| Waste | Reported Management Practice | Total Quantity Managed, Based on Extrapolated Survey Data | | |
|---|---|---|---|---|
| | | **Weighted (gallons)+** | **Universe (gallons)++** | **Universe Excluding Intermediate Steps (gallons)++** |
| **Solvent Cleaning Liquids** | ***Non-Hazardous Waste Stream Management*** | | | |
| | Fuel Blending | 984 | 1,690 | 1,690 |
| | Container Storage* | 984 | 1,690 | |
| | Sub-Total and (percent): | 1,968 | 3,380 (0.04%) | 1,690 (0.04%) |
| | ***Hazardous Waste Stream Management*** | | | |
| | Subtitle D Landfill | 394 | 677 | 677 |
| | On-Site Storage Tanks* | 1,349,113 | 2,316,851 | |
| | Fuel Blending | 649,887 | 1,116,060 | 1,116,060 |
| | Incineration | 116,192 | 199,538 | 199,538 |
| | Cement Kiln | 107,278 | 184,230 | 184,230 |
| | Boiler or Industrial Furnace | 2,671 | 4,587 | 4,587 |
| | Light-Weight Aggregate Kiln | 23,985 | 41,190 | 41,190 |
| | Containers* | 1,635,356 | 2,808,421 | |
| | Other | 1,380,677 | 2,371,057 | 2,371,057 |
| | Sub-Total and (percent): | 5,265,553 | 9,042,610 (99.96%) | 3,917,339 (99.96%) |
| *TOTAL -* | | *5,267,521* | *9,045,990* | *3,919,029* |

**Table 4-5b**
**Paint Production Waste Baseline Management Practices**
**Proposed K180 - Wastewater (Liquids)**

| Waste | Reported Management Practice | Total Quantity Managed, Based on Extrapolated Survey Data | | |
|---|---|---|---|---|
| | | Weighted (gallons)+ | Universe (gallons)++ | Universe Excluding Intermediate Steps (gallons)++ |
| **Water Cleaning Liquids** | ***Non-Hazardous Waste Stream Management*** | | | |
| | Subtitle D Landfill | 656 | 1,127 | 1,127 |
| | On-Site Storage Tanks* | 3,825,413 | 6,569,437 | |
| | Off-Site Storage Tanks* | 197 | 338 | |
| | On-Site Treatment Tanks* | 2,019,960 | 3,468,907 | |
| | Fuel Blending | 93,039 | 159,777 | 159,777 |
| | POTW | 7,105,520 | 12,202,412 | 12,202,412 |
| | On- and Off-Site Wastewater Treatment Facility | 1,640,372 | 2,817,035 | 2,817,035 |
| | NPDES | 20,238 | 34,755 | 34,755 |
| | Incineration | 14,089 | 24,195 | 24,195 |
| | Cement Kiln | 12,976 | 22,284 | 22,284 |
| | Containers* | 386,260 | 663,330 | |
| | Other | 200,492 | 344,308 | 344,308 |
| | Sub-Total and (percent): | 15,319,212 | 26,307,915 (98.7%) | 15,605,893 (98.9%) |
| | ***Hazardous Waste Stream Management*** | | | |
| | On-Site Storage Tank* | 43,320 | 74,394 | |
| | Fuel Blending | 35,373 | 60,747 | 60,747 |

**Table 4-5b**
**Paint Production Waste Baseline Management Practices**
**Proposed K180 - Wastewater (Liquids)**

| Waste | Reported Management Practice | Total Quantity Managed, Based on Extrapolated Survey Data | | |
|---|---|---|---|---|
| | | **Weighted (gallons)+** | **Universe (gallons)++** | **Universe Excluding Intermediate Steps (gallons)++** |
| | Off-Site Wastewater Treatment Facility | 15,042 | 25,832 | 25,832 |
| | Incineration | 29,133 | 50,031 | 50,031 |
| | Containers* | 55,374 | 95,095 | |
| | Other | 19,145 | 32,878 | 32,878 |
| | Sub-Total and (percent): | 197,387 | 338,976 (1.3%) | 169,488 (1.1%) |
| *TOTAL -* | | *15,516,599* | *26,646,890* | *15,775,381* |
| **Caustic Cleaning Liquids** | ***Non-Hazardous Waste Stream Management*** | | | |
| | On-Site Storage Tanks* | 8,730 | 14,992 | |
| | On-Site Treatment Tanks* | 7,286 | 12,512 | |
| | POTW | 8,546 | 14,676 | 14,676 |
| | Other | 8,730 | 14,992 | 14,992 |
| | Sub-Total and (percent): | 33,292 | 57,172 (11.4%) | 29,668 (11.3%) |
| | ***Hazardous Waste Stream Management*** | | | |
| | On-Site Storage Tanks* | 9,814 | 16,854 | |
| | Off-Site Wastewater Treatment Facility | 8,814 | 15,136 | 15,136 |
| | Incineration | 126,396 | 217,062 | 217,062 |
| | Containers* | 2,130 | 3,658 | |
| | Other* | 112,162 | 192,617 | |

**Table 4-5b**
**Paint Production Waste Baseline Management Practices**
**Proposed K180 - Wastewater (Liquids)**

| Waste | Reported Management Practice | Total Quantity Managed, Based on Extrapolated Survey Data | | |
|---|---|---|---|---|
| | | Weighted (gallons)+ | Universe (gallons)++ | Universe Excluding Intermediate Steps (gallons)++ |
| | Sub-Total and (percent): | 259,316 | 445,327 (88.6%) | 232,198 (88.7%) |
| *TOTAL -* | | *292,608* | *502,499* | *261,866* |

* *These are intermediate steps - waste volumes are also added in final destinations.*
\+ *Totals based on the total number of facilities surveyed in the RCRA 3007 Survey, weighted to account for survey representation.*
++ *Totals for the Universe of paint manufactures derived by scaling the weighted total by 972/566.*

*Source:* U.S. Environmental Protection Agency, Office of Solid Waste, *Paint Manufacturing Wastes, RCRA 3007 Survey Database* ,management and quantity information obtained from a table (MgtUnitVSWasteStream8_31.WK4) prepared by Dynamac Corporation, Contract No. 68-W-98-231, August 31, 2000.

Note: The quantities and percentages presented reflecting management as hazardous or nonhazardous waste differ from those presented in Section 4.1 reflecting the amount generated characterized as hazardous or nonhazardous waste. The difference is that all respondents to the RCRA 3007 survey reported a generation quantity, but, not all respondents reported how they managed their waste. In addition, given the RCRA 3007 survey was limited to the 1998 calendar year, not all waste generated in 1998 was managed in 1998. Some quantities were in storage awaiting management in calendar year 1999. The ultimate dispositions of these wastes are unknown. Finally, there may be some reporting error.

## 4.3 Compliance Management Practices and Costs

Under RCRA Subtitle C regulation, most reuse, recycle, and reclamation management/reuse practices are already exempt from RCRA regulation and therefore, can be continued without an increase in cost. For other baseline management practices, see Appendix D and E for listings of the assumed regulatory compliance management practices and unit costs. Given available average unit costs and varying waste specific gravities (i.e., densities) applied to these average unit costs, some compliance unit costs are lower than baseline unit costs. In this case, no incremental savings are anticipated as a result of the proposed concentration-based listing. The compliance unit cost should likely be higher for wastes with "non-average" characteristics, such as incineration of water cleaning sludge and caustic cleaning sludge with low Btu values that currently are managed in off-site Subtitle C wastewater treatment facilities under baseline.

### 4.3.1 Solvent Cleaning Wastes

For solvent cleaning sludges, the assumed regulatory compliance management practice is Subtitle C incineration followed by stabilization and Subtitle D landfill of the incinerator ash if the waste tests hazardous. The waste is ultimately disposed at a Subtitle D facility, post treatment to LDR standards. The waste is assumed to contain 25 percent ash. Compliance unit cost estimates vary depending if the waste is shipped in bulk or drums. The unit cost is estimated to range from $740/bulk metric ton to $926/drummed metric ton.

For solvent cleaning liquids, one assumed regulatory compliance management practice is Subtitle C incineration followed by stabilization and Subtitle C landfill of the incinerator ash if the waste tests hazardous and is proposed for listing. The waste is ultimately disposed at a Subtitle C facility, post treatment to LDR standards. The waste is assumed to contain 5 percent ash. Compliance unit cost estimates vary depending if the waste is shipped in bulk or drums. The unit cost is estimated to range from $165/bulk metric ton to $604/drummed metric ton. Another alternative is off-site activated sludge biological treatment and metals precipitation with solidification and Subtitle C landfill of residual sludge. The waste is assumed to generate 5 percent residual sludge by volume. The unit cost is estimated to be $1,197/drummed metric ton.

For both solvent cleaning sludge and solvent cleaning liquid, the Agency believes that waste going to hazardous waste fuel blending/cement kiln is likely to continue, thus no cost impact, except for testing. The ash at cement kilns is currently recycled into the cement product. The ash would receive a Bevell exemption from RCRA Subtitle C requirements. As a sensitivity analysis (i.e., Bevell exemption is not applied), a compliance management practice of commercial Subtitle C incineration followed by stabilization and Subtitle D landfill (Subtitle C landfill for K180) of the incinerator ash is assumed. For the proposed K179 waste, the sensitivity unit cost is estimated to range from $740/bulk metric ton to $926/drummed metric ton. For the proposed K180 waste, the sensitivity unit cost is estimated to range from $165/bulk metric ton to $604/drummed metric ton.

Based on the extrapolated RCRA 3007 Survey data 98.6 percent of solvent cleaning sludges and 99.96 percent of solvent cleaning liquids are currently managed in RCRA Subtitle C regulated disposal units.[32] In a sample of 50 LQG paint manufactures reporting hazardous waste generation quantities in the 1995 Biennial Reporting System (BRS) database, 50 out of 50 (100%) report generating a hazardous waste that was ignitable (D001), 36 out of 50 (72%) report generating methyl ethyl ketone waste (D035), 39 out of 50 (78%) reported generating F003 spent solvents, and 36 out of 50 (72 %) reported generating F005 spent solvents.[33]

### 4.3.2 Water Cleaning Wastes

For water cleaning sludges the assumed regulatory compliance management practice is Subtitle C incineration followed by stabilization and Subtitle D landfill of the incinerator ash. The waste is ultimately disposed at a Subtitle D facility, post treatment to LDR standards. The waste is assumed to contain 25 percent ash. Compliance unit cost estimates vary depending if the waste is shipped in bulk or drums. The unit cost is estimated to range from $733/drummed metric ton to $740/bulk metric ton.

For water cleaning liquid, one assumed regulatory compliance management practice is Subtitle C incineration followed by stabilization and Subtitle C landfill of the incinerator ash if the waste tests hazardous and is proposed for listing. The waste is ultimately disposed at a Subtitle C facility, post treatment to LDR standards. The waste is assumed to contain 5 percent ash. Compliance unit cost estimates vary depending if the waste is shipped in bulk or drums. The unit cost is estimated to range from $165/bulk metric ton to $604/drummed metric ton. Another alternative is off-site activated sludge biological treatment and metals precipitation with solidification and Subtitle C landfill of residual sludge. The waste is assumed to generate 5 percent residual sludge by volume. The unit cost is estimated to be $1,197/drummed metric ton.

Water cleaning liquids currently managed in RCRA-regulated or RCRA-exempt wastewater treatment tank units are assumed to continue to be managed in this manner. However, wastewater treatment sludge generated by Subtitle D wastewater treatment facilities may be subject to Subtitle C requirements because of the derived-from rule.[34] It is assumed the Subtitle C wastewater treatment facilities already manage their wastewater treatment sludge appropriately.

For both water cleaning sludge and water cleaning liquid, the Agency believes that waste going to hazardous waste fuel blending/cement kiln should continue, thus no cost (regulatory impact), except for testing, if appropriate. The ash at cement kilns is currently recycled into the cement product. The ash would receive a Bevell exemption from RCRA Subtitle C requirements. As a sensitivity analysis (i.e., Bevell exemption is not applied), a compliance management practice of commercial Subtitle C incineration followed by stabilization and Subtitle D landfill (Subtitle C

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32 U.S. Environmental Protection Agency, Office of Solid Waste, *Paint Manufacturing Industry RCRA 3007 Survey Database*, management and quantity information obtained from electronic file (MgtUnitVSWaste Stream8_31.WK4) prepared by Dynamac Corporation, Contract No. 68-W-98-231, August 31, 2000.

33 U.S. Environmental Protection Agency, Office of Solid Waste, *Draft Strategy Document for the Determination of Potential Constituents of Concern Paint Wastes*, prepared by Dynamac Corporation, Contract No. 68-W-98-231, August 11, 1999, pp. 6.

34 Assumed 0.3 percent of the wastewater will become wastewater treatment sludge. Source: U.S. EPA, Office of Solid Waste, *Assessment of the Potential Costs and Benefits of the Hazardous Waste Identification Rule for Industrial Process Wastes, as Proposed*, footnote on Exhibit 3-2, May 25, 1995.

landfill for K180) of the incinerator ash is assumed. For water cleaning sludge waste, the sensitivity unit cost is estimated to range from $733/drummed metric ton to $740/bulk metric ton. For water cleaning liquid waste, the sensitivity unit cost is estimated to range from $165/bulk metric ton to $604/drummed metric ton.

Based on the extrapolated RCRA 3007 Survey data 0.3 percent of water cleaning sludges and 1.1 percent of water cleaning liquids are currently managed in RCRA Subtitle C regulated disposal units.[35]

### 4.3.3 Caustic Cleaning Wastes

For caustic cleaning sludges, we assumed that the regulatory compliance management practice is Subtitle C incineration followed by stabilization and Subtitle D landfill of the incinerator ash if the waste tests hazardous. The solid waste is ultimately disposed at a Subtitle D facility, post treatment to LDR standards. The waste is assumed to contain 25 percent ash. Compliance unit cost estimates vary depending if the waste is shipped in bulk or drums. The unit cost is estimated to range from $740/bulk metric ton to $926/drummed metric ton.

For caustic cleaning liquid, one assumed regulatory compliance management practice is Subtitle C incineration followed by stabilization and Subtitle C landfill of the incinerator ash if the waste tests hazardous and is proposed for listing. The liquid waste ash is ultimately disposed at a Subtitle C facility, post treatment to LDR standards. The waste is assumed to contain 5 percent ash. Compliance unit cost estimates vary depending if the waste is shipped in bulk or drums. The unit cost is estimated to range from $165/bulk metric ton to $604/drummed metric ton.

Caustic cleaning wastes currently managed in RCRA-regulated or RCRA-exempt wastewater treatment tank units are assumed to continue to be managed in this manner.

For caustic cleaning sludge, the Agency believes that waste going to hazardous waste fuel blending/cement kiln should continue, thus this waste should experience no cost impact, except for testing, if appropriate. The ash at cement kilns is currently recycled into the cement product. The ash would receive a Bevell exemption from RCRA Subtitle C requirements. As a sensitivity analysis (i.e., Bevell exemption is not applied), a compliance management practice of commercial Subtitle C incineration followed by stabilization and Subtitle D landfill of the incinerator ash is assumed. For this waste, the sensitivity unit cost is estimated to range from $740/bulk metric ton to $926/drummed metric ton.

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[35] U.S. Environmental Protection Agency, Office of Solid Waste, *Paint Manufacturing Industry RCRA 3007 Survey Database*, management and quantity information obtained from electronic file (MgtUnitVSWaste Stream8_31.WK4) prepared by Dynamac Corporation, Contract No. 68-W-98-231, August 31, 2000.

Based on the extrapolated RCRA 3007 Survey data, we estimate that 94.0 percent of caustic cleaning sludges and 88.7 percent of caustic cleaning liquids are currently managed in RCRA Subtitle C regulated disposal units.[36] In a sample of 50 LQG paint manufactures reporting hazardous waste generation quantities in the 1995 BRS database, 28 out of 50 (56%) report generating corrosive waste (D002).[37]

### 4.3.4 Wastewater Treatment Sludge

For wastewater treatment sludge, the assumed regulatory compliance management practice is Subtitle C incineration followed by stabilization and Subtitle D landfill of the incinerator ash if the waste tests hazardous. The waste is ultimately disposed at a Subtitle D facility, post treatment to LDR standards. The waste is assumed to contain 25 percent ash. Compliance unit cost estimates vary depending if the waste is shipped in bulk or drums. The unit cost is estimated to range from $685/drummed metric ton to $740/bulk metric ton.

The Agency believes that waste going to hazardous waste fuel blending/cement kiln should continue, thus should experience no cost impact, except for testing, if appropriate. The ash at cement kilns is currently recycled into the cement product. The ash would receive a Bevell exemption from RCRA Subtitle C requirements. As a sensitivity analysis (i.e., Bevell exemption is not applied), a compliance management practice of commercial Subtitle C incineration followed by stabilization and Subtitle D landfill of the incinerator ash is assumed. The sensitivity unit cost is estimated to range from $685/drummed metric ton to $740/bulk metric ton.

Based on the extrapolated RCRA 3007 Survey data, no wastewater treatment sludges are currently managed in RCRA Subtitle C regulated disposal units.[38] In a sample of 50 LQG paint manufactures reporting hazardous waste generation quantities in the 1995 BRS database, 24 out of 50 (48%) report generating ignitable waste (D004), 17 out of 50 (34%) report generating cadmium waste (D005), 38 out of 50 (76%) reported generating chromium waste (D007, and 34 out of 50 (68 %) reported generating lead waste (D008).[39]

### 4.3.5 Emission Control Dust

For emission control dust, we assumed the regulatory compliance management practice to be Subtitle C incineration followed by stabilization and Subtitle D landfill of the incinerator ash if the waste tests hazardous. The waste is ultimately disposed at a Subtitle D facility, post treatment to

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36 U.S. Environmental Protection Agency, Office of Solid Waste, *Paint Manufacturing Industry RCRA 3007 Survey Database,* management and quantity information obtained from electronic file (MgtUnitVSWaste Stream8_31.WK4) prepared by Dynamac Corporation, Contract No. 68-W-98-231, August 31, 2000.

37 U.S. Environmental Protection Agency, Office of Solid Waste, *Draft Strategy Document for the Determination of Potential Constituents of Concern Paint Wastes,* prepared by Dynamac Corporation, Contract No. 68-W-98-231, August 11, 1999, pp. 43-47.

38 U.S. Environmental Protection Agency, Office of Solid Waste, *Paint Manufacturing Industry RCRA 3007 Survey Database,* management and quantity information obtained from electronic file (MgtUnitVSWaste Stream8_31.WK4) prepared by Dynamac Corporation, Contract No. 68-W-98-231, August 31, 2000.

39 U.S. Environmental Protection Agency, Office of Solid Waste, *Draft Strategy Document for the Determination of Potential Constituents of Concern Paint Wastes,* prepared by Dynamac Corporation, Contract No. 68-W-98-231, August 11, 1999, pp. 43-47.

LDR standards. The waste is assumed to contain 25 percent ash. Compliance unit cost estimates vary depending if the waste is shipped in bulk or drums. The unit cost is estimated to range from $733/drummed metric ton to $740/bulk metric ton.

The Agency believes that waste going to hazardous waste fuel blending/cement kiln should continue, thus should experience no cost impact, except for testing, if appropriate. The ash at cement kilns is currently recycled into the cement product. The ash would receive a Bevell exemption from RCRA Subtitle C requirements. As a sensitivity analysis (i.e., Bevell exemption is not applied), a compliance management practice of commercial Subtitle C incineration followed by stabilization and Subtitle D landfill of the incinerator ash is assumed. The sensitivity unit cost is estimated to range from $733/drummed metric ton to $740/bulk metric ton.

Based on the extrapolated RCRA 3007 Survey data 2.7 percent of emission control dusts are currently managed in RCRA Subtitle C regulated disposal units.[40] In a sample of 50 LQG paint manufactures reporting hazardous waste generation quantities in the 1995 Biennial Reporting System (BRS), 24 out of 50 (48%) report generating arsenic waste (D004), 17 out of 50 (34%) report generating cadmium waste (D005), 38 out of 50 (76%) reported generating chromium waste (D007), and 34 out of 50 (68 %) reported generating lead waste (D008).[41]

### 4.3.6 Off-Specification Production Wastes

For off-specification production waste, we assumed the regulatory compliance management practice is Subtitle C incineration followed by stabilization and Subtitle D landfill of the incinerator ash if the waste tests hazardous. The waste is ultimately disposed at a Subtitle D facility, post treatment to LDR standards. The waste is assumed to contain 25 percent ash. Compliance unit cost estimates vary depending if the waste is shipped in bulk or drums. The unit cost is estimated to range from $740/bulk metric ton to $926/drummed metric ton.

The Agency believes that waste going to hazardous waste fuel blending/cement kiln should continue, thus should experience no cost impact, except for testing, if appropriate. The ash at cement kilns is currently recycled into the cement product. The ash would receive a Bevell exemption from RCRA Subtitle C requirements. As a sensitivity analysis (i.e., Bevell exemption is not applied), a compliance management practice of commercial Subtitle C incineration followed by stabilization and Subtitle D landfill of the incinerator ash is assumed. The sensitivity unit cost is estimated to range from $740/bulk metric ton to $926/drummed metric ton.

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40 U.S. Environmental Protection Agency, Office of Solid Waste, *Paint Manufacturing Industry RCRA 3007 Survey Database*, management and quantity information obtained from electronic file (MgtUnitVSWaste Stream8_31.WK4) prepared by Dynamac Corporation, Contract No. 68-W-98-231, August 31, 2000.

41 U.S. Environmental Protection Agency, Office of Solid Waste, *Draft Strategy Document for the Determination of Potential Constituents of Concern Paint Wastes*, prepared by Dynamac Corporation, Contract No. 68-W-98-231, August 11, 1999, pp. 43-47.

Based on the extrapolated RCRA 3007 Survey data 71.6 percent of off-specification production wastes are currently managed in RCRA Subtitle C regulated disposal units.[42]

## 4.4 Other Compliance Costs

### 4.4.1 Sampling and Analysis Costs

Under the proposed rule, each facility would potentially test their wastes to determine if one or more of the constituents of concern (see Chapter 2 of this report). Testing will determine if the constituent concentrations in the waste equal or exceed the concentration-based listing standard. The percentages of wastes assumed to test hazardous are estimated at 50 percent for solid wastes and 80 percent for liquid wastes. These percentages are based on an analysis of RCRA 3007 data, and the percentage of waste streams which were reported to have at least one of the constituents of concern.[43]

Paint manufacturers produce several different product lines during a year. Each changeover between product lines typically requires a clean-out of the production equipment. These multiple clean-outs conducted annually result in multiple waste streams being produced that are likely to require sampling and analyses. Multiple wastestreams are often consolidated into single "batches." These batches are what are assumed to be analyzed. The number of different batches requiring testing may significantly impact a facility's analytical costs. However, information obtained from site visits, and our RCRA 3007 survey data indicate that most wastestreams are consolidated.

For small (<40 metric tons per year) nonwastewater generators, we assumed zero (operator knowledge) samples for the first and out years. For large (40 or greater metric tons/year) nonwastewater generators we assumed 40 waste samples being tested initially in the first year and 10 in subsequent years. For small (<100 metric tons per year) wastewater generators, we assumed zero (operator knowledge) samples for the first and out years. For large (100 or greater metric tons/year) wastewater generators we assumed 40 waste samples being tested initially in the first year and 10 in subsequent years.

The Agency assumed that the "appropriate number" of samples per batch of waste is four in order to accurately characterize the waste based on the requirements specified in 40 CFR 260.22(h) to petition for exclusion of a waste from being listed. The Agency also assumed a large facility will need to test 10 batches of waste in the first year resulting in a total of 40 samples. In subsequent years only one sample per batch of waste is assumed. It should be noted that this level of sampling is based on "EPA's methods experts" and historical listing determinations for costing purposes only. However, facilities are not required to take four samples per batch.

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[42] U.S. Environmental Protection Agency, Office of Solid Waste, *Paint Manufacturing Industry RCRA 3007 Survey Database (File Name: Paint RedidualMasterNoZeroes0815.mdb)* ,management and quantity information obtained from electronic file (MgtUnitVSWasteStream.WK4) prepared by Dynamac Corporation, Contract No. 68-W-98-231, August 15, 2000.

[43] The RCRA 3007 survey data had only limited observations regarding the concentrations of the constituents in the waste streams; concentrations were not examined because of the limited number of observations. Accordingly, the estimates used in this analysis (50 percent solid, 80 percent liquid cited above) are likely worst case estimates, as some of the wastes may not have the constituents of concern at concentrations sufficient to trigger the hazardous waste designation.

The prorated and non-prorated unit sampling and analytical costs are estimated to be $131/non-wastewater sample and $502/non-wastewater sample, respectively, based on the need to test for 5 priority pollutants.[44] Similarly, the prorated and non-prorated unit sampling and analytical costs are estimated to be $162/wastewater sample and $502/wastewater sample, respectively, based on the need to test for 12 priority pollutants.[45] While we have examined analytical costs based on both a prorated and non-prorated scenario, some labs may charge a fixed fee for analysis of a predetermined group of chemicals.

The requirement to test for acrylamide and formaldehyde are likely to require somewhat new or special procedures that most labs are not currently set up to do. New testing requirements for these constituents coming from several hundred paint manufacturers throughout the country may result in higher costs due to a demand crunch, lack of lab availability, and the lab's need to implement some new procedures for these chemicals. At this time, the Agency has no actual documentation as to how much, if any, testing costs may actually go up due to these two chemicals; therefore testing costs have not been modified.

### 4.4.2 RCRA Administrative Costs

Facilities generating the proposed waste listings may be subject to Parts 262, 264, 266, and 270 of RCRA. Compliance activities for each of these parts are briefly described below.

RCRA Part 262 standards regulate generators of hazardous waste. All facilities producing a newly listed waste would be subject to this part. There are four subparts to the Part 262 standards. First, those plants generating hazardous waste must obtain an EPA identification

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44 Sampling costs include ½-hour of labor ($78.50 * 0.5 = $39.25), an ice chest for packaging used 10 times ($32.63/10 = $3.26), shipping ($31.62), and blank and sample preparation ($25.00) for a total of $99.13/sample. Sampling unit costs were obtained from Environmental Cost Handling Options and Solutions (ECHOS), *1999 Environmental Remediation Cost Data - Unit Price*, 5th Annual Edition, published by R.S. Means, 1999. Analytical costs for semi-VOCs and VOCs were derived from a vendor quote of $389.00 to analyze one sample for the 88 semi-VOCs and VOCs on the priority pollutant list including one blank. The unit cost per constituent prorated is $4.42 ($389.00/88 = $4.42). Analytical costs for metals were obtained from 1999 R.S. Means ($14.00/metal). The 5 priority pollutants included in the paint wastes include 4 semi-VOCs and VOCs (acrylamide, acrylonitrile, methyl isobutyl ketone and methyl methacrylate) and 1 metal (antimony). Total analytical costs equal $31.68/sample (4 * $4.42 + 1 * $14.00 = $31.68). Total sampling and analytical costs are estimated to be $131/sample. Assuming no prorating of the $389 unit cost for analyzing 88 semi-VOCs and VOCs results in a non-prorated unit sampling and analytical cost of $502/sample.

45 Sampling costs include ½-hour of labor ($78.50 * 0.5 = $39.25), an ice chest for packaging used 10 times ($32.63/10 = $3.26), shipping ($31.62), and blank and sample preparation ($25.00) for a total of $99.13/sample. Sampling unit costs were obtained from Environmental Cost Handling Options and Solutions (ECHOS), *1999 Environmental Remediation Cost Data - Unit Price*, 5th Annual Edition, published by R.S. Means, 1999. Analytical costs for semi-VOCs and VOCs were derived from a vendor quote of $389.00 to analyze one sample for the 88 semi-VOCs and VOCs on the priority pollutant list including one blank. The unit cost per constituent prorated is $4.42 ($389.00/88 = $4.42). Analytical costs for metals were obtained from 1999 R.S. Means ($14.00/metal). The 12 priority pollutants included in the paint wastes include 11 semi-VOCs and VOCs (acrylamide, acrylonitrile, dichloromethane (i.e., methylene chloride), ethylbenzene, formaldehyde, methyl isobutyl ketone, methyl methacrylate, n-butyl alcohol, styrene, toluene, and xylene) and 1 metal (antimony). Total analytical costs equal $62.62/sample (11 * $4.42 + 1 * $14.00 = $62.62). Total sampling and analytical costs are estimated to be $161.75/sample. Assuming no prorating of the $389 unit cost for analyzing 88 semi- VOCs and VOCs results in a non-prorated unit sampling and analytical cost of $502/sample.

number. Second, an approved manifest system must be established for those facilities shipping wastes off site. Third, before transporting hazardous waste off site, a series of pre-transport requirements must be satisfied such as labeling, marking, and placarding. Fourth, specified record keeping and reporting rules are applicable.

The incremental costs for this listing associated with RCRA Part 262 are estimated based on the conservative assumption that the facilities are not currently hazardous waste generators and no facility will permit a TSD. As presented earlier in Section 4.1, we assume that a high percentage of the waste is currently hazardous because of a hazardous characteristic or previous listing. We estimate that the following percentage of each total waste quantity is currently hazardous: solvent cleaning sludge (99.2%), water cleaning sludge (1.0%), caustic cleaning sludge (94.4%), wastewater treatment sludge (0%), emission control dust (1.9%), off-specification production waste (60.9%), solvent cleaning liquid (99.98%), water cleaning liquid (1.3%), and caustic cleaning liquid (88.9%).

The initial (one-time) costs to review and understand responsibilities under regulations, assess current waste generation and management practices, obtain EPA ID number, review and determine applicable DOT requirements, develop procedures for manifesting, packaging, and labeling, and purchase file cabinet for storing manifests and reports are estimated to be $2,550 per facility. The annual costs associated with completing manifests, packaging and labeling of hazardous waste for off-site shipment, completing the annual portion of biennial report, and filing exception report are estimated to be $1,600 per year. Initial costs are annualized assuming a discount rate of 7 percent over three years (i.e., using a capital recovery factor (CRF) of 0.38105) to reflect a shorter borrowing period for operating capital (i.e., line of credit). The annualized costs associated with RCRA Part 262 are therefore estimated to be $2,600 per year, per facility ($972 in annualized costs [$2,550 at 7% over 3 years] or ~ $1,000 + $1,600 in annual costs = $2,600)[46].

In completing this analysis we assumed that RCRA Parts 264, 266 and 270 would not apply. Part 264 addresses standards for owners and operators of hazardous waste treatment, storage and disposal facilities. The assumption is made in completing this assessment that all facilities will be following the hazardous waste accumulation regulations from CFR Part 262.34 (i.e., accumulation time) and therefore Part 264 does not apply. Part 266 applies to permitting on-site boilers and industrial furnaces (BIFs). It is assumed that all waste affected by this ruling will continue to be managed off site or in RCRA-exempt wastewater treatment tanks. Part 270 (i.e., permitting) applies to facilities with on-site treatment units subject to Part 264. It is assumed that all waste affected by this ruling would continue to be managed off site or in RCRA-exempt wastewater treatment tanks. Therefore, no permitting would be required for existing or future units.

[46] Administrative costs derived and updated from: *Estimating Costs for the Economic Benefits of Noncompliance*, EPA Office of Regulatory Enforcement. September 1997.

# 5.0 ECONOMIC IMPACT ANALYSIS

The estimated economic impacts from the proposed rule are presented in this chapter. The first section describes the methodology, which is followed by the cost and economic impacts estimates.

## 5.1 Methodology

### General

We conducted an economic assessment of the proposed rulemaking by using the unit management costs presented in Section 4.0 of this report in conjunction with waste generation data from the RCRA 3007 survey, employment data, and average sales per employee data from the Dun and Bradstreet data. All estimates are based on the RCRA 3007 responses indicating the types of wastes facilities generate. The cost estimates for these facilities are then adjusted by the weighting factors described in Section 3, and the extrapolation factor to arrive at aggregate costs for the industry.

### Production of Product

Information on sales (value of shipments) and employment size were derived from Dun and Bradstreet data. We divided the value of shipments data by employment to estimate average sales value for each employee and model plant (representative of the size range of each model plant). The sales per employee information was then divided by average industry paint price/unit (derived from the Census Current Industrial Reports). This per employee figure was then multiplied by the reported number of employees per facility to derive total estimated model facility product production. For example, if Duns reported Facility *X* had $1,000 annual sales and employed 10 persons, we estimated revenues to average $100 per employee. If the average product price was estimated at $5 per gallon, the $100 per employee would be divided by the $5 per gallon of product to derive average production per employee of 20 gallons. This figure would then be multiplied by the total reported number of employees per facility. Lacking more detailed industry data, we believe that this approach reflects the most up-to-date average production estimates.

### Number of Facilities and Size Distribution

The size distribution of facilities (as proxied by the number of employees), obtained from the Dun and Bradstreet data, is presented in Table 5-1. The facility sizes indicate the overall size distribution of paint manufacturing facilities. Based on the results of the RCRA 3007 survey of the industry, we assume that many of these facilities do not generate the wastes under consideration for this listing. We estimate that a total of 615 facilities[47] could be directly affected by the rule, as proposed.

[47] The 615 is derived by summing the facility weighting factors for each of the models/facilities generating waste. This totals 358.4. Thus the 151facilities represent 358.4 facilities within the population of facilities from which Dynamac drew their sample. The 358.4 is then scaled up to the whole industry using the 972/566 scaling factor. This results in 614.8 facilities.

| Table 5-1. Derived Distribution of the Total Number of Facilities, by Employment | | |
|---|---|---|
| **Employees Per Facility** | **Number of Facilities** | **Percent of Facilities** |
| 1-19 | 592 | 61% |
| 20-49 | 194 | 20% |
| 50-99 | 97 | 10% |
| 100-249 | 68 | 7% |
| 250-499 | 10 | 1% |
| > 500 | 10 | 1% |
| **Total** | **972** | 100% |

*Note:* The total number of facilities may not add due to rounding within cells

*Sources:* U.S. Census and RCRA 3007 Survey Data

### Waste Generation Rates

Waste generation quantities derived from our RCRA 3007 Survey are summarized in Tables 5-2a and 5-2b below and presented in detail in Appendix F, Tables 1 and 2. These tables indicate the amount of waste generated for each of the facilities. In total, the 151 facilities that responded to the survey reported generating approximately 37,628 metric tons of waste in 1998. Applying the weighting and scaling factors to this quantity results in an estimated Universe total of 106,763 metric tons of waste for all paint manufacturers potentially subject to ruler requirements. These waste quantities were applied in the development of facility and Universe cost and economic impact estimates.

**TABLE 5-2A. FACILITY WASTE GENERATION (K180 WASTEWATERS; METRIC TONS)**

| Waste Generation | HCL | HSL | HWL | NCL | NSL | NWL | Unweighted Total [1] | Weighted Total [2] | Universe Total [3] |
|---|---|---|---|---|---|---|---|---|---|
| Total | 524 | 9,805 | 260 | 61 | 4 | 15,465 | 26,118 | 46,237 | 79,403 |

[1] Numbers may not add due to rounding
[2] Unweighted total times weighting factor to arrive at the sampling universe
[3] Weighted total times extrapolation factor 1.7173 (972/566) to arrive at the industry total

**Table 5-2b. Facility Waste Generation (K179 Nonwastewaters; Metric Tons)**

| Waste Generation | HCS | HED | HOR | HSS | HWS | NCS | NED | NOR | NSS | NWS | NWTS | Unweighted Total [1] | Weighted Total [2] | Universe Total [3] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total | 98 | 38 | 2,341 | 3,336 | 25 | 1 | 1,163 | 965 | 32 | 2,585 | 927 | 11,510 | 15,932 | 27,360 |

[1] Numbers may not add due to rounding
[2] Unweighted total times weighting factor to arrive at the sampling universe
[3] Weighted total times extrapolation factor 1.7173 (972/566) to arrive at the industry total

## Estimated Annual Sales

Census data from 1997 were used to derive average annual sales per employee for facilities listed under NAICS 325510; estimates were then updated to 1999 dollars using the GNP implicit price deflator. Estimated average sales per employee is estimated at $370,000[48]. Sales for each facility were subsequently estimated by multiplying the average sales per employee by the number of employees at each facility. It is important to note that some facilities (six) did not report employment, consequently no sales data were derived for these facilities.[49]

## Calculation of Baseline and Compliance Waste Management Costs

Baseline and compliance waste management costs were calculated using the unit costs from Appendices D and E. The unit cost data was multiplied by waste generation rates presented in Appendix F Tables F-1 and F-2 to arrive at total costs. It is important to note that many of the facilities reported unidentified waste management codes. For example the ultimate waste management code was frequently reported as "other"; in instances where this occurred, it was assumed that the default management code was the most predominant for that particular waste.

## Compliance Transportation Costs

Environmental Cost Handling Options and Solutions (ECHOS)[50] data were used to estimate transportation costs for the compliance management scenario. Based on this information, transportation costs were assumed to be $0.13/metric ton/mile to a Subtitle C landfill (200 miles average distance) and $0.12/metric ton/mile to a Subtitle C incinerator (300 miles average distance) with a minimum of $300 for each shipment[51]. A minimum charge of $300 is assumed per quarterly (90 day) shipment. Many facilities generate waste in small enough amounts on a quarterly basis to incur a minimum charge; it is important to note that many of these facilities are assumed to incur minimum charges in the baseline, since many are already managing at least some of their wastes as hazardous.

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48 Census reports employment of approximately 53,000 and value of shipments of $19.2 billion, for an average of approximately $362,000 per employee. This estimate was updated to 1999 dollars using the GDP implicit price deflator, a factor of 1.03, and then rounded to the nearest $10,000.

49 Sales information was available for a number of facilities from Dun & Bradstreet. However these data appeared to represent total corporate sales, as opposed to facility sales.

For the six facilities for which we had no employment data we assumed the cost impacts as a percent of sales were equivalent to the other 145 facilities. We do not have adequate data to estimate the magnitude (positive or negative) of this limitation (Please see Appendix for facilities without employment data).

50 Environmental Cost Handling Options and Solutions (ECHOS), *Environmental Remediation Cost Data-Unit Price*, 5th Annual Edition, published by R.S. Means, 1999, Assembly #33 19 7205

51 ECHOS reported transportation costs to be $0.01875/drum/mile and $0.09/metric ton/mile with a minimum of $683 per shipment; however this minimum charge appears unrepresentative based on contacts with industry and a minimum charge of $300 is applied.

The same trucking company is assumed to be under contract to ship wastes to the nearest Subtitle C incinerator, cement kiln, fuel blender, and landfill. The quantities to be disposed are combined to calculate if a minimum charge will be incurred. ECHOS data reflects costs associated with remediation. Paint manufacturers may sign contracts that agree to a lower minimum charge given the guarantee of regular shipments (i.e., cash flow) to the transporter. The minimum charge reported in ECHOS is used as a conservative approximation of such an agreement because remediation transport costs generally reflect single source costs.

Facilities generating less than 12 metric tons per year are assumed to be small quantity generators with a 180-day waste accumulation period. It also was assumed that the maximum truck load is 20 short tons (18.1 metric tons).[52]

**Compliance Analytical Costs**

As discussed in Chapter 4, we assume that multiple waste streams from multiple different product runs are combined into single waste "batches." These batches may require sampling and analyses for adequate characterization. However, facilities may also segregate their wastes, if such an action helps to ensure greater certainty of waste characterization. The number of different batches requiring testing will impact a facility's analytical costs. However, information obtained from site visits, and our RCRA 3007 survey data indicate that most wastestreams are consolidated.

For small (<40 metric tons per year) nonwastewater generators, we assumed zero (operator knowledge) samples for the first and out years. For large (40 or greater metric tons/year) nonwastewater generators we assumed 40 waste samples being tested initially in the first year and 10 in subsequent years, up to the three-year limit (if no process change). For small (<100 metric tons per year) wastewater generators, we assumed zero (operator knowledge) samples for the first and out years. For large (100 or greater metric tons/year) wastewater generators we assumed 40 waste samples being tested initially in the first year and 10 in subsequent years, up to the three-year limit (if no process change).

The Agency assumed that the "appropriate number" of samples per batch of waste is four in order to accurately characterize the waste based on the requirements specified in 40 CFR 260.22(h) to petition for exclusion of a waste from being listed. The Agency also assumed a large facility will need to test 10 batches of waste in the first year resulting in a total of 40 samples. In subsequent years only one sample per batch of waste is assumed. It should be noted that this level of sampling is based on "EPA's methods experts" and historical listing determinations for costing purposes only. However, facilities are not required to take four samples per batch.

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[52] M. Lee Rice, World Resources Company, letter to RCRA Docket Information Center (Docket Number – F-1999-F06P-FFFFF) presenting comments on the proposed rule "180-day Accumulation Time for Waste Water Treatment Sludges from the Metal Finishing Industry," March 22, 1999, pp. 4.

The prorated and non-prorated unit sampling and analytical costs are estimated to be $131/non-wastewater sample and $502/non-wastewater sample, respectively, based on the need to test for 5 priority pollutants (see Chapter 4).[53] Similarly, the prorated and non-prorated unit sampling and analytical costs are estimated to be $162/wastewater sample and $502/wastewater sample, respectively, based on the need to test for 12 priority pollutants.[54] While we have examined analytical costs based on both a prorated and non-prorated scenario, some labs may charge a fixed fee for analysis of a predetermined group of chemicals.

Under the traditional and no-list options there are no analytical requirements and costs are zero. Under our proposed approach, the 30 additional samples in the first year for the large facility are annualized using a capital recovery factor of 0.38105 (based on a 7 percent discount rate over 3 years[55]), and a prorated unit sampling cost is assumed. We also examined a high-cost analytical scenario where the 30 additional samples are not annualized and a non-prorated unit sampling cost is used.

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53 Sampling costs include ½-hour of labor ($78.50 * 0.5 = $39.25), an ice chest for packaging used 10 times ($32.63/10 = $3.26), shipping ($31.62), and blank and sample preparation ($25.00) for a total of $99.13/sample. Sampling unit costs were obtained from Environmental Cost Handling Options and Solutions (ECHOS), *1999 Environmental Remediation Cost Data - Unit Price*, 5th Annual Edition, published by R.S. Means, 1999. Analytical costs for semi-VOCs and VOCs were derived from a vendor quote of $389.00 to analyze one sample for the 88 semi-VOCs and VOCs on the priority pollutant list including one blank. The unit cost per constituent prorated is $4.42 ($389.00/88 = $4.42). Analytical costs for metals were obtained from 1999 R.S. Means ($14.00/metal). The 5 priority pollutants included in the paint wastes include 4 semi-VOCs and VOCs (acrylamide, acrylonitrile, methyl isobutyl ketone and methyl methacrylate) and 1 metal (antimony). Total analytical costs equal $31.68/sample (4 * $4.42 + 1 * $14.00 = $31.68). Total sampling and analytical costs are estimated to be $131/sample. Assuming no prorating of the $389 unit cost for analyzing 88 semi-VOCs and VOCs results in a non-prorated unit sampling and analytical cost of $502/sample.

54 Sampling costs include ½-hour of labor ($78.50 * 0.5 = $39.25), an ice chest for packaging used 10 times ($32.63/10 = $3.26), shipping ($31.62), and blank and sample preparation ($25.00) for a total of $99.13/sample. Sampling unit costs were obtained from Environmental Cost Handling Options and Solutions (ECHOS), *1999 Environmental Remediation Cost Data - Unit Price*, 5th Annual Edition, published by R.S. Means, 1999. Analytical costs for semi-VOCs and VOCs were derived from a vendor quote of $389.00 to analyze one sample for the 88 semi-VOCs and VOCs on the priority pollutant list including one blank. The unit cost per constituent prorated is $4.42 ($389.00/88 = $4.42). Analytical costs for metals were obtained from 1999 R.S. Means ($14.00/metal). The 12 priority pollutants included in the paint wastes include 11 semi-VOCs and VOCs (acrylamide, acrylonitrile, dichloromethane (i.e., methylene chloride), ethylbenzene, formaldehyde, methyl isobutyl ketone, methyl methacrylate, n-butyl alcohol, styrene, toluene, and xylene) and 1 metal (antimony). Total analytical costs equal $62.62/sample (11 * $4.42 + 1 * $14.00 = $62.62). Total sampling and analytical costs are estimated to be $161.75/sample. Assuming no prorating of the $389 unit cost for analyzing 88 semi- VOCs and VOCs results in a non-prorated unit sampling and analytical cost of $502/sample.

55 The three year amortization period is based on common industry practice of maintaining a three-year revolving line-of-credit which is accessed for unexpected single-year expenses that are larger than normal, but not in the realm of capital costs (new equipment, buildings, etc.). While the interest rate for this type of credit may be higher than 7 percent, we have applied this rate to be consistent with OMB suggestions.

## 5.2 Estimated Economic Costs

We have estimated cost impacts under the proposed concentration-based listing approach, two different scenarios related to this approach, and two alternative regulatory options. These are as follows: Proposed Concentration-Based Listing Approach, Proposed Concentration-Based Approach with Sensitivity Analysis Scenario (i.e., waste going to fuel blending in the baseline is diverted to commercial incineration), Proposed Concentration-Based Approach excluding Liquids, A Traditional or Standard Listing Option (not concentration-based), and the No-List - Status Quo option.

The first analysis presented below (5.2.1) discusses impacts associated with our proposed regulatory approach. Under this section we discuss compliance waste management costs, transportation costs, analytical and administrative costs, and finally, model facility and aggregate compliance cost impacts. Section 5.2.2 discusses impacts of the proposed approach under the sensitivity analysis scenario. The proposed approach excluding liquids is next examined (Section 5.2.3). Regulation under a standard or non-concentration-based approach is examined in Section 5.2.4. We have also considered the option of no regulation. Beyond some minor costs to facilities to read the final regulation, this would be a no-cost option and is not examined further in this Chapter.

### 5.2.1 Proposed Listing Approach

The impacts presented in this section depict costs which are expected under the Agency's proposed concentration-based listing approach. Detailed tables presenting waste management (treatment and disposal), transportation, analytical, and administrative costs for each model (representative) facility are presented in the Appendices.

**Waste Management Costs (Treatment and Disposal)**

Waste management costs in this section refer to waste treatment and disposal only. Waste transport, analysis, and related administrative costs are discussed in a later section. Waste management cost impacts for the 151 model facilities (see Section 3.4.2) were estimated based on current (baseline) waste management practices. These costs, along with compliance and incremental costs, are presented in Tables 5-3 and 5-4 for nonwastewaters and wastewaters, respectively. As mentioned above, more detailed costs are presented for each model facility in the Appendix.

Total unweighted baseline waste management costs for the model facilities are estimated at $3.8 million/year for nonwastewaters and $5.1 million/year for wastewaters. The compliance waste management costs for the proposed approach are also presented in Tables 5-3 and 5-4. Annual compliance costs for the model facilities are estimated at $7.2 and $5.1 million for nonwastewaters and wastewaters, respectively. Compliance costs are only modestly higher than baseline costs for wastewaters because of two factors: 1) much of the waste is managed as hazardous in the baseline and 2) much of the waste managed as nonhazardous is treated at offsite wastewater treatment facilities with only a modest increase in cost associated with the management of sludge.

The incremental unweighted waste management costs for the model facilities are estimated at $3.5 and $.05 million per year for nonwastewaters and wastewaters, respectively. Aggregate weighted and scaled costs for the entire paints industry are estimated at $4.3 and $0.1 million for nonwastewaters and wastewaters, respectively (Tables 5-3, and 5-4).

Tables 5-3 and 5-4 show the model facility waste management cost multiplied by the facility weighting factor, the result of which is adjusted to account for the quantity of waste which is estimated to actually test as hazardous (50 percent for solids, and 80 percent for liquids, as previously discussed). This result is then multiplied by 1.72 (972/566) to arrive at industry costs. Note that for the waste that is assumed to test as nonhazardous, baseline waste management costs (excluding analytical and administrative) are included in the compliance cost estimate, resulting in no incremental costs for waste treatment and/or disposal.

**Transportation Costs**

Transportation costs under baseline and compliance were estimated as previously described in Section 5-1[56]. Transportation costs were assumed to be $0.13/metric ton/mile to a Subtitle C landfill (200 miles average distance) and $0.12/metric ton/mile to a Subtitle C incinerator (300 miles average distance) with a minimum of $300 for each shipment. A minimum charge of $300 is assumed per quarterly (90 day) shipment. Facilities generating only small quantities of waste on a quarterly basis are assumed to incur a minimum charge. Facilities generating less than 12 metric tons per year are assumed to be small quantity generators with a 180-day waste accumulation period. Transportation costs are summarized in Table 5-5 below, and presented in detail in the Appendix.

Incremental transportation charges are estimated at only $0.19 million for the model facilities and $0.5 million for the entire industry. These estimates assume 100 percent of the waste is hazardous and thereby are slightly overstated. As discussed earlier, for the waste management cost estimates we have estimated that 50 percent of the solids and 80 percent of the liquids are likely to contain constituents of concern and may become hazardous waste. The remaining waste may never become hazardous, and may be transported accordingly. Of the wastes that contain constituents of concern, some portion may not exceed the proposed listing concentrations and, therefore, would also not become hazardous.

**Analytical and Administrative Costs**

Analytical and administrative costs are estimated for three scenarios and summarized in Table 5-6, which are the proposed analytical requirements (see discussion above), high-end analytical requirements, and requirements associated with the traditional or straight listing (non-concentration based). In subsequent presentations for the listing alternatives, only the proposed analytical requirements are included -- except for the non-concentration based or traditional listing, where analytical costs are assumed to be zero. Detailed analytical costs for each representative facility are presented in the Appendix.

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[56] See footnotes to Appendix Tables D and E for discussion of baseline cost assumptions and additional discussion of compliance assumptions..

**TABLE 5-3. BASELINE, COMPLIANCE AND INCREMENTAL COSTS FOR NONWASTEWATERS BASED ON THE AGENCY'S PREFERRED APPROACH**
*(ANNUAL 1999 DOLLARS)*

| Item | HCS | HED | HOR | HSS | HWS | NCS | NED | NOR | NSS | NWS | NWTS | Unweighted Total [1] | Weighted Total [2] | Universe Total [3] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Baseline | 76,805 | 15,454 | 1,280,801 | 1,731,053 | 12,845 | 570 | 104,222 | 252,351 | 2,382 | 216,577 | 84,175 | 3,777,234 | 5,036,606 | 8,649,440 |
| Compliance | 78,846 | 28,171 | 1,283,936 | 1,736,940 | 12,845 | 585 | 860,150 | 626,416 | 23,705 | 1,911,621 | 683,891 | 7,247,107 | 7,566,504 | 12,994,100 |
| Incremental | 2,042 | 12,718 | 3,135 | 5,886 | 0 | 15 | 755,928 | 374,065 | 21,323 | 1,695,044 | 599,716 | 3,469,876 | 2,529,899 | 4,344,620 |

The solid waste generated/facility included in the above table are as follows: Hazardous Caustic Cleaning Residual Sludge (HCS), Hazardous Emission Control Dust (HED), Hazardous Off-Specification Production Residual (HOR), Hazardous Solvent Cleaning Residual Sludge (HSS), Hazardous Water Cleaning Residual Sludge (HWS), Nonhazardous Caustic Cleaning Residual Sludge (NCS), Nonhazardous Emission Control Dust (NED), Nonhazardous Off-Specification Production Residual (NOR), Nonhazardous Solvent Cleaning Residual Sludge (NSS), Nonhazardous Water Cleaning Residual Sludge (NWS), Nonhazardous Wastewater Treatment Sludge (NWTS).
[1] Numbers may not add due to rounding
[2] Weighted total times extrapolation factor 1.7173 (972/566) to arrive at the industry total
[3] To extrapolate from the facilities represented by the RCRA 3007 survey (566) to the industry total (972), a factor of 1.7173 (972/566) is used.
*Source:* RCRA 3007 Survey

**Table 5-4. Baseline, Compliance and Incremental Costs for Wastewaters BASED ON THE AGENCY'S PREFERRED APPROACH**
***(ANNUAL 1999 DOLLARS)***

| Item | HCL | HSL | HWL | NCL | NSL | NWL | Unweighted Total [1] | Weighted Total [2] | Universe Total [3] |
|---|---|---|---|---|---|---|---|---|---|
| Baseline | 80,764 | 4,835,829 | 72,558 | 0 | 1,787 | 99,490 | 5,090,428 | 7,511,500 | 12,899,600 |
| Compliance | 83,202 | 4,837,654 | 73,211 | 0 | 1,787 | 139,337 | 5,140,491 | 7,580,160 | 13,017,540 |
| Incremental | 4,898 | 3,699 | 1,217 | 0 | 0 | 40,249 | 50,065 | 68,659 | 117,930 |

The wastewaters generated/facility included in the above table are as follows: Hazardous Caustic Cleaning Residual (HCL), Hazardous Solvent Cleaning Residual (HSL), Hazardous Water Cleaning Residual (HWL), Nonhazardous Caustic Cleaning Residual (NCL), Nonhazardous Solvent Cleaning Residual (NSL), Nonhazardous Water Cleaning Residual (NWL).
[1] Numbers may not add due to rounding
[2] Weighted total times extrapolation factor 1.7173 (972/566) to arrive at the industry total
[3] To extrapolate from the facilities represented by the RCRA 3007 survey (566) to the industry total (972), a factor of 1.7173 (972/566) is used.
*Source:* RCRA 3007 Survey

**TABLE 5-5. ESTIMATED TRANSPORTATION COSTS (1999$/YEAR)**

| Facility | TRANSPORTATION COSTS | | | Weighted Total [1] | Universe Total [2] |
|---|---|---|---|---|---|
| | Baseline | Compliance | Incremental | | |
| Totals | 646,100 | 832,881 | 186,785 | 297,240 | 509,930 |

[1] Unweighted total times weighting factor (for each representative facility) to arrive at the sampling universe

[2] Weighted total times extrapolation factor 1.7173 (972/566) to arrive at the industry total

**TABLE 5-6. Summary of Estimated Analytical Costs**

| Analytical Scenario | Aggregate Annual Analytical Cost Impacts Under Proposed Listing *(Annual 1999 dollars)* |
|---|---|
| Proposed Analytical Requirements | $220,530 |
| High-End Cost Estimate for Analytical requirements | $1,425,680 |
| Traditional or Straight Listing (No analytical Requirements) | $0 |

**Model Facility and Aggregate Waste Listing Costs - Agency Preferred Approach**

Table 5-7 shows the summary of the expected total costs of the preferred approach waste listing for the model facilities and the industry as a whole. Costs for each model facility are presented in Appendix F, Table F-10. Assuming 100 percent of all targeted waste is hazardous as generated, impacts as a percent of sales for the model facilities are estimated to range from only 0.01 percent to just over 4.0 percent, with an unweighted average of 0.12 percent. The average weighted cost per facility is estimated at 0.07 percent of sales (Table 5-7). Within the four primary facility size ranges, incremental costs as a percent of gross sales are estimated to average 0.11 percent facilities with less than 20 employees, 0.05 percent for facilities with twenty to forty-nine employees, 0.11 percent for facilities with fifty to 149 employees, and 0.17 percent for facilities employing 150 or more persons (see Table 1-1).

These estimates can be considered a worst case scenario, since an estimated 50 percent of the nonwastewaters and 20 percent of the wastewaters are anticipated to test as nonhazardous, based on RCRA 3007 survey results. Aggregate costs for the preferred approach option, after adjusting for the nonhazardous component, are estimated at $7.3 million per year. The average weighted cost per facility is less than 0.07 percent of sales.

**TABLE 5-7. MODEL FACILITIES COSTS AND AGGREGATE INDUSTRY COSTS**
**- THE AGENCY'S PREFERRED LISTING APPROACH -**

| Facility | Estimated Sales ($1000) * | Waste Mgmt. Costs | Transportation Costs | Analytical Costs | Administrative Costs | Total Model Facility Costs ** | Model Facility Costs as Percent of Sales ** | Universe Total Cost *** | Industry Costs as Percent of Sales **** |
|---|---|---|---|---|---|---|---|---|---|
| Total | 3,296,700 | 3,519,941 | 186,785 | 220,534 | 392,600 | 4,319,860 | 0.12% | 7,271,519 | 0.07% |

All costs expressed in million 1999 dollars
* Total does not include sales for six facilities which were not reported.
** Estimates are for the model facilities, assuming a worst case condition that all waste generated is hazardous.
*** Model facility costs are adjusted to reflect the fact that 20 percent of the wastewaters and 50 percent of the solids are not hazardous; these costs are then weighted as per the weighting factors for each facility (shown on Appendix Table F-10) and subsequently extrapolated to the entire industry using the extrapolation factor 1.717 (972/566).
**** Estimates for the paint industry as a whole are adjusted, on a facility by facility basis, to account for the fact that 20 percent of the wastewaters and 50 percent of the solids are not hazardous under the preferred listing option.

### 5.2.2 Proposed Listing Sensitivity Analysis (APA 1)

We also evaluated a scenario where wastes currently going to hazardous fuel blenders and/or directly to hazardous waste burning cement kilns will be forced to discontinue this practice and ship the waste directly to commercial incineration, at the resulting higher cost. Total compliance costs under this scenario are estimated at $18.1 million per year, up from $7.3 million/year under the anticipated impacts of the proposed approach. This scenario is only feasible should blenders and kilns previously accepting the newly listed paint waste refuse this waste due to the new listing for antimony.

### 5.2.3 Non-Wastewaters Only Listing (APA 2)

Another alternative listing approach that we evaluated assumes that the proposed listing is limited to only nonwastewaters. All liquids would be excluded under this scenario. The aggregate incremental costs under this scenario are estimated at $6.7 million per year, or $600,000 less than the proposed option..

### 5.2.4 Traditional or Standard Listing - Alternative Option

We also examined a traditional or straight listing approach. Under this option, no consideration is provided for the concentration of the various hazardous constituents of concern. One effect of this approach is to eliminate the need for sampling (analytical) of the waste streams. However, all generated wastes that meet the listing definition are defined as hazardous. Total incremental costs associated with this option are estimated at $10.9 million per year[57]. Cost impacts associated with the Agency Preferred Approach, the two alternative scenarios to this approach, and the analytical options, are presented in Table 5-8 below.

### 5.2.5 No Listing

Zero costs would generally be associated with a no list option, except for any potential minor burden to read the final regulation.

[57] While cost estimates under the Agency Preferred Approach (APA) represent only 50 percent of total nonhazardous solids and 80 percent of the nonhazardous liquids, aggregate impacts do not directly reflect this difference. The unweighted and unscaled waste management costs under the APA are estimated at $1.8 million. The unweighted and unscaled waste management costs under the Traditional Listing Option are estimated at $3.5 million. Applying the weighting and scaling factors, plus transportation, administrative, and analytical (APA only) costs results in aggregate annual nationwide compliance costs of $7.3 million for the APA and $10.9 million for the Traditional Option.

**TABLE 5-8 SUMMARY OF COSTS IMPACTS FOR ALL REGULATORY OPTIONS**

| Regulatory Option | Waste Mgmt. Costs ** | Transport Costs** | Analytical Costs * | Admin Costs ** | Unweighted Costs ** | Total Industry Cost *** | Ave. Annual Compliance Costs as Percent of Annual Gross Sales *** |
|---|---|---|---|---|---|---|---|
| Preferred Approach | 3.5 | 0.2 | 0.2 | 0.4 | 4.3 | 7.3 | 0.07% |
| Sensitivity (APA 1) | 5.7 | 0.2 | 0.2 | 0.4 | 6.5 | 18.1 | 0.19% |
| No Liquids (APA 2) | 3.5 | 0.2 | 0.1 | 0.4 | 4.1 | 6.7 | 0.06% |
| Traditional Listing | 3.5 | 0.2 | 0.0 | 0.4 | 4.1 | 10.9 | 0.10% |
| No Listing | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00% |

All costs expressed in million 1999 dollars

* Analytical costs based on the Agency's proposed analytical requirements
** Costs are unweighted and are not adjusted for component of waste streams assumed to be nonhazardous (i.e., 20 percent of liquid and 50 percent of solid wastes).
*** All except the traditional listing option are weighted and aggregated to industry level. Costs adjusted as per nonhazardous components of waste streams (i.e., 20 percent of liquid and 50 percent of solid wastes).

To extrapolate from the facilities represented by the RCRA 3007 survey (566) to the industry total (972), a factor of 1.7173 (972/566) is used.

Note1: There may be some minor costs associated with the no list option for facilities to read the final rule.
Note2: The waste management costs for the traditional and proposed options assume all waste is hazardous. Appropriate adjustments are made in the aggregate.

# 6.0 SMALL BUSINESS IMPACT ANALYSIS

The Office of Solid Waste (OSW) is required to make an initial determination if any regulatory action may have a "significant economic impact on a substantial number of small entities." Small entities include small businesses, small organizations, and small governmental jurisdictions. OSW generally conducts a Regulatory Flexibility Screening Analysis (RFSA) to make this determination. The purpose of this chapter is to present the methodology and findings for the RFSA conducted in support of the proposed paint waste listing determination. This analysis was conducted per the requirements of the Regulatory Flexibility Act (RFA) as amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA).

A series of questions regarding potential impacts of the proposed paint waste listing on small paint manufacturing entities must be answered in development of this analysis. These include:

1. Is the rule subject to SBREFA notice-and-comment rulemaking requirements?
2. What types of entities will be subject to the rule?
3. What types of small entities will be subject to the rule, if any?
4. Will small entities be adversely affected by the rule?
5. Will the rule have a significant economic impact on a substantial number of small entities?

## 6.1 Effects on Small Business

This section briefly outlines the types of entities affected. It also presents summary impacts data for all model paint producers, and characterizes small entities according to size criteria set by the Small Business Administration (SBA)[58]. The number of small entities potentially affected are estimated. We also present estimated impacts under the alternative scenarios and options.

### 6.1.1 Type and Number of Entities Affected

The proposed listing could potentially affect an estimated 780 paint manufacturing companies operating 972 paint manufacturing facilities.[59] However, based on the Agency's analysis, a number of these 972 facilities do not actually generate the wastes in question.[60] Consequently we estimate that only approximately 615 of the 972 facilities will actually be impacted by the proposed waste listing.[61] The 615 facilities are represented by an estimated 494 different companies. We have not identified any State, local or Tribal governmental entities (small or large) that own or operate paint manufacturing facilities.

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58 *Small Business Size Standards Match to North American Industry Classification System (NAICS),* October 1, 2000, Small Business Administration (SBA).

59 Relationship between facilities and companies is based upon 1997 Census data, which reported 1206 companies operating 1495 facilities. This estimate likely overstates the number of companies, due to a significant number of corporate mergers, some of which are highlighted in Appendix A.

60 Dynamac Corporation. July 12, 2000. Paint Manufacturing Hazardous Waste Listing Determination Support.

61 Estimated using the weighting factor for each facility reporting waste generation in the survey multiplied by the scaling factor (972/566).

We have found that between 93 percent and 95 percent of all paint and coatings manufacturing companies are estimated to be "small," based on the SBA definition of 500 or fewer employees at the corporate level[58]. Census data from 1997 indicate a total of 95 percent are small companies, while our research based on the RCRA 3007 survey data for representative facilities indicates that approximately 91 percent of all companies may be small (137/151 - see table 6-1). An average of these sources indicates approximately 93 percent, or about 460 out of the total of 494 different companies potentially subject to rule requirements may be considered small for purposes of this analysis. We have determined that paint manufacturing facilities are not owned or operated by small (or large) entities (not-for-profits, local governments, tribes, etc.), other than businesses.

### 6.1.2 Economic Effect on Small and Large Entities

We estimate that, under the proposed or preferred regulatory approach, impacts on small entities would average about 0.06 percent of annual gross revenues (Table 6-1). Only three small companies (operating four facilities) out of the total of 460 small companies potentially subject to rule requirements, were found to experience annual compliance cost impacts greater than 1.0 percent of annual gross revenues. The highest impacts to a single representative facility were found to be approximately 4 percent of annual gross revenues (see Appendix). We also examined potential economic impacts to small businesses under three alternative regulatory options. Impacts to small businesses under these options all averaged less than 0.5 percent of annual gross revenues. Some portion of these projected impacts may be expected to be passed on to consumers in the form of higher prices, while the remaining portion would be absorbed by the manufacturers.

**Table 6-1: Summary of Estimated Impacts from All Waste Listing Options Small and Large Facilities***

| Listing Option | Entity Size | Number of Unweighted Model Facilities ** | Average Incremental Cost as a Percent of Sales | Aggregate Annual Cost Impacts (Million 1999$/year) |
|---|---|---|---|---|
| No List Option | Large | 14 | 0.00 | $0.0 |
| | Small | 137 | 0.00 | $0.0 |
| Traditional or Standard Listing | Large | 14 | 0.16 | $3.6 |
| | Small | 137 | 0.08 | $7.4 |
| ***Agency Preferred Approach (APA)*** | Large | 14 | 0.09 | $2.1 |
| | ***Small*** | ***137*** | ***0.06*** | ***$5.2*** |
| Agency Preferred Approach (Sensitivity Analysis Scenario APA1) | Large | 14 | 0.42 | $9.4 |
| | Small | 137 | 0.11 | $8.7 |
| Agency Preferred Approach (Scenario to List Solids Only APA2) | Large | 14 | 0.09 | $2.0 |
| | Small | 137 | 0.05 | $4.7 |

* Large entities include all facilities which could be identified as being owned by companies with more than 500 employees. The small entity category contains all other facilities.

** The weighted total estimated number of small FACILITIES affected by the rule industry-wide is 572; there are an estimated 43 large facilities affected. The total number of small companies is estimated at 460. Because the survey data were presented at the facility level, we do not have directly comparative data at the company level. However, we assume that most small companies are singly facility operations. Thus, our small impacts estimates are believed to be generally consistent with company level impacts (accounting for stated limitations).

*Source:* See Chapter 4, 5, and Appendices.

### 6.1.3 Potential for Significant Impacts on Small Entities

The paint and coatings industry is dominated by small entities. Accordingly it may be argued that there could be a substantial number of small entities impacted. However our analysis suggests that the impacts on these small entities are modest. Overall, weighted cost impacts are estimated to average 0.07 percent of sales for the entire industry (see Table 1-2), and 0.06 percent for entities identified as small (Table 6-1). Impacts in excess of 1.0 percent of sales are anticipated for less than 1.0 percent of all small entities. Based on these findings, we do not believe that this rule, as proposed, will result in significant economic impacts on a substantial number of small business paint and coatings manufacturers.

# Bibliography

*Chemical & Engineering News*, "Paints and Coatings," p.56, October 12, 1998.

*Chemical Market*, "Akzo Nobel Buys Coatings." August 7, 2000.

*Chemicalweek*, "Valspar to acquire Lilly Industries" 7 July 2000.

Environmental Cost Handling Options and Solutions (ECHOS), *Environmental Remediation Cost Data-Unit Price*, 5th Annual Edition, published by R.S. Means, 1999, Assembly #33 19 7205

Dynamac Corporation, Paint Manufacturing Hazardous Waste Listing Determination Support, July 12, 2000.

Hazardous Waste Resource Center - January 2000 Incinerator and Landfill Cost Data, http://www.etc.org/costsurvey3.cfm;

Hume, Claudia. "Paints and Coatings: Who is Making the Numbers." *Chemical Week.* October, 2000. http://206.0.199.2/cw/mag/cwcover.html.

Modern Paint and Coatings Red Book, 1999.

National Paint and Coating (no date) "100+ Pollution Prevention Ideas–from NPCA", http://www.paint.org/ind_issue/pollu.htm

National Paint and Coatings Association, 1999, "Paint & Coatings Industry Facts," http://www.paint.org.

National Paint and Coatings Association, 1999, "Economic Value of Paints and Coatings," http://www.paint.org.

*Paint and Coatings*, "Scanning Kelvin Probe Promises Corrosion Revolution" 22 August 2000.

*Paint and Coatings*, "ICI Canada Partners with EnviroCoatings, Inc." 4 August 2000.

*Pittsburgh Post Gazette* "PPG, EPA to speed product approvals."15 September 2000.

Randall, P.M. (1993) Pollution Prevention Opportunities in the Manufacture of Paint and Coatings, Pollution Prevention Conference on the Low- and No-VOC Coating Technologies, May 25-27, 1993, San Diego, CA. EPA Report No. EPA/600/A-94/069, NTIS No. PB 94-162690.

Rice, M. Lee, World Resources Company, letter to RCRA Docket Information Center (Docket Number – F-1999-F06P-FFFFF) presenting comments on the proposed rule "180-day Accumulation Time for Waste Water Treatment Sludges from the Metal Finishing Industry," March 22, 1999.

R.S. Means, Environmental Remediation Cost Data, 4th Annual Edition (1998).

R.S. Means, Site Work and Landscape Cost Data, 16th Annual Edition (1997).

SRI International (September 1992) U.S. Paint Industry Data Base. Published by National Paint and Coatings Association, Washington, DC.

Tullo, A. "Paint and Coatings." *Chemical and Engineering News*. Volume 78, Number 41, October 9, 2000.

U.S. Department of Commerce, Bureau of the Census, Current Industrial Reports, *Paint and Allied Products-Annual Report 2000, MQ* 325F(00)-1, June 2000, *and 1998*, MA325F(98)-1, February 2000.

United States Department of Commerce,1997 Census of Manufacturers, 1999.

U.S. Department of Commerce, Bureau of the Census, Current Industrial Reports, *Paint and Allied Products-Annual Report 1997*, MA28F(97)-1, August 26, 1998, and 1998, MA325F(98)-1, February 2000.

U.S. Department of Commerce, Bureau of the Census, Current Industrial Reports, *Paint and Allied Products-Annual Report 1997*, MA28F(97)-1, August 26, 1998.

U.S. Department of Commerce, Bureau of the Census. 1996. *Survey of Plant Capacity: 1994.* Washington, DC: Government Printing Office.

U.S. Environmental Protection Agency, Office of Solid Waste, *Damage Incident Compendium and Report*, Draft Report Rev 1A, prepared by Dynamac Corporation Inc., July 27, 2000.

U.S. Environmental Protection Agency, Office of Solid Waste, *Draft Paint Production Wastes Industry Overview*, prepared by Dynamac Corporation, Contract No. 68-W-98-231, July 15, 1999.

U.S. Environmental Protection Agency, Office of Solid Waste, *Draft Paint Production Wastes Industry Overview*, prepared by Dynamac Corporation, Contract No. 68-W-98-231, July 15, 1999.

U.S. Environmental Protection Agency, Office of Solid Waste, *Paint Manufacturing Wastes - RCRA 3007 Survey Database* (Data are for the 1998 calendar year).

U.S. Environmental Protection Agency, Office of Solid Waste, *Draft Paint Production Wastes Industry Overview*, prepared by Dynamac Corporation, Contract No. 68-W-98-231, July 15, 1999.

U.S. Environmental Protection Agency, Office of Solid Waste, *Draft Strategy Document for the Determination of Potential Constituents of Concern Paint Wastes,* prepared by Dynamac Corporation, Contract No. 68-W-98-231, August 11, 1999.

U.S. Environmental Protection Agency, Office of Solid Waste, *Paint Manufacturing Industry RCRA 3007 Survey Database,* prepared by Dynamac Corporation, Contract No. 68-W-98-231, August 31, 2000.

U.S. Environmental Protection Agency, Office of Solid Waste, *Assessment of the Potential Costs and Benefits of the Hazardous Waste Identification Rule for Industrial Process Wastes, as Proposed*, May 25, 1995.

U.S. Environmental Protection Agency, Office of Solid Waste, *Draft Strategy Document for the Determination of Potential Constituents of Concern Paint Wastes*, prepared by Dynamac Corporation, Contract No. 68-W-98-231, August 11, 1999.

U.S. Environmental Protection Agency, Office of Solid Waste, *Draft Strategy Document for the Determination of Potential Constituents of Concern Paint Wastes*, prepared by Dynamac Corporation, Contract No. 68-W-98-231, August 11, 1999, pp. 43-47.

U.S. Environmental Protection Agency, Office of Solid Waste, *Background Documents for the Cost and Economic Impact Analysis of Listing Four Petroleum Refining Wastes as Hazardous Under RCRA Subtitle C*, January 10, 1998

U.S. Environmental Protection Agency, Economic Impact and Regulatory Flexibility Analyses of the Final Architectural Coatings VOC Rule. EPA-452/D-96-005. July 1998.

U.S. Environmental Protection Agency, Office of Solid Waste, 1997 Biennial Report.

U.S. Environmental Protection Agency, Office of Solid Waste, 1995 Biennial Report.

U.S. Environmental Protection Agency, Office of Solid Waste, *Additional Listing Support Analysis for the Petroleum Listing Determination*, February 26, 1998

U.S. Environmental Protection Agency, Office of Solid Waste, *Cost and Economic Impact Analysis of Listing Hazardous Wastes from the Organic Dye and Pigment Industries*, November 28, 1994.

U.S. Environmental Protection Agency, "National Survey of Solid Waste (Municipal) Landfill Facilities", EPA/530-SW88-034, September 1988.