

SECTION 6  
SMALL BUSINESS IMPACT ANALYSIS

The Regulatory Flexibility Act (RFA) of 1980 (5 U.S.C. 601, et seq.), as amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), requires the EPA to give special consideration to the effect of federal regulations on small entities and to consider regulatory options that might mitigate any such impacts. The EPA is required to prepare a regulatory flexibility analysis, including consideration of regulatory options for reducing any significant impact, unless the Agency determines that a rule will not have a significant economic impact on a substantial number of small entities.

The Agency prepared analyses to support both the proposed and final rules to meet the requirements of the RFA as modified by SBREFA. The Agency undertook these analyses because of the large presence of small entities in the architectural coatings industry and because the initial impact analysis indicated that there could be a significant economic impact on a substantial number of small entities if mitigating regulatory options were not adopted for the rule. The analysis supporting the proposed rule was published in the report titled, "Economic Impact and Regulatory Flexibility Analysis of Air Pollution Regulations: Architectural and Industrial Maintenance Coatings" (June 1996). The proposed rule contained a number of provisions to mitigate the rule's

impact on small businesses, and the Agency requested comment on additional measures to reduce the impacts.

This section presents the small business impacts and the final regulatory flexibility analysis, including responses to significant issues raised by public comments on proposed compliance options to mitigate the rule's impact on small entities. After evaluating public comment on the proposed mitigating options, EPA made a number of changes to the proposed rule to further mitigate the rule's small business impacts. As a result, the Agency believes that it is highly unlikely that the rule will have a significant economic impact on a substantial number of small entities. However, in light of the Agency's inability to quantify the effect of the mitigating options, the EPA has elected to conduct a regulatory flexibility analysis and to prepare a SBREFA compliance guide to eliminate any potential dispute on whether EPA has fulfilled SBREFA requirements.

## 6.1 BACKGROUND AND AFFECTED ENTITIES

Small businesses can be defined using the criteria prescribed in the RFA or some other criteria identified by EPA. The SBA's general size standard definitions for Standard Industrial Classification (SIC) codes is one way to define small businesses. These size standards are presented either by number of employees or by annual receipt levels, depending on the SIC code. For SIC 2851, Paint and Allied Products (of which architectural manufacturers represent approximately 40 percent), the SBA defines small business as fewer than 500 employees. The coatings manufacturing industry, however, is not labor-intensive. For example, given the average value of shipments per employee (based on data presented in Sections 1 and 3), a firm with 400 employees might have close to

\$100 million in sales (1991 \$). Therefore, use of this SBA definition would result in almost all firms in the architectural coatings industry being classified as small, which does not appear appropriate given the sales level of many firms. Alternatively, based on input from the regulatory negotiation process, the EPA has defined small businesses as having less than \$10 million in annual architectural coatings sales and less than \$50 million in total annual sales of all products. Using this definition, the section assesses the baseline presence of small producers in specific architectural coatings markets. The distribution of small producers by market segment is important because impacts vary substantially by market segment. After the baseline assessment, an analysis is performed to estimate the extent to which specialization in higher VOC products causes small companies to incur disproportionate impacts. This is followed by an estimate of the average impacts of regulatory compliance on small architectural coatings companies, as measured by the ratio of compliance costs to sales. The role of special provisions such as the fee and small tonnage exemption allowance are also examined in terms of their mitigating impacts on small producers.

#### 6.1.1 Potentially Affected Entities

A regulatory action to reduce VOC emissions from architectural coatings products will potentially affect the business entities that produce the products. Firms, or companies, that produce architectural coatings are legal business entities that have the capacity to conduct business transactions and make business decisions. Figure 6-1 shows the chain of ownership may be as simple as one facility owned by one company (firm) or as complex as multiple facilities owned by subsidiary companies.

**Contains Data for  
Postscript Only.**

Figure 6-1. Chain of ownership.

Determining the total number of firms that will be affected by the regulation is difficult because most of the available Census data are reported at the four-digit SIC code, and architectural coatings manufacturers, for whom this regulation applies, are a subset of the entire coatings industry represented by SIC 2851. The 1987 Census of Manufactures, Industry Series: Paint and Allied Products identified 530 companies with shipments of \$100,000 or more

that manufacture architectural and special purpose coatings.<sup>a,67</sup> For the purpose of this analysis, 500 architectural coating manufacturers were assumed to exist. Data from the Architectural and Industrial Surface Coatings VOC Emissions Inventory Survey (the survey) conducted by the National Paint and Coatings Association provided data for 116 firms, 36 of which identified themselves as having under \$10 million in annual net sales.<sup>b,68</sup> While small businesses represent about 31 percent of the firms in the survey, a larger share of nonsurveyed firms appear to fall in the small business category.<sup>c</sup>

#### 6.1.2 Regulatory Requirements

As discussed in Section 2, the regulation constrains firms that produce architectural coatings products over the VOC content limits in one of three ways:

- requires they produce products with VOC content under the established set of limits,
- imposes a fee on each unit of product that exceeds the limits established in the regulation, or
- requires they withdraw the product from the market.

Thus, absent the small tonnage exemption, firms with a heavy (baseline) concentration of products above the limit for their respective product categories are more tightly constrained by

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<sup>a</sup>These are the two Census categories within SIC 2851 where most of the architectural coatings products are represented, and this figure includes companies that produce architectural products, whether or not it is their primary product.

<sup>b</sup>Twelve survey respondents did not indicate company size.

<sup>c</sup>The 116 survey respondents comprise about one-fifth of the firms making architectural coatings products but account for about three-fourths of industry output. Thus the nonsurveyed firms are relatively numerous but produce relatively little volume.

the regulation than those with a lighter concentration of above-limit products, all else equal.

## 6.2 ANALYSIS

The quantitative analysis of small business impacts draws from the NPCA survey data for the 36 companies classified as small (less than \$10 million in architectural sales and \$50 million in total sales). While this is a relatively small sample of all potentially impacted small companies (less than 10 percent), it is assumed that the surveyed small companies are fairly representative of the nonsurveyed small companies. As described below, efforts were made to expand the sample beyond the 36 surveyed small companies, but the inability to estimate firm-specific costs made such an extension problematic. Therefore the results of this analysis should be interpreted with the usual caution surrounding small samples.

### 6.2.1 Baseline Market Presence of Small Architectural Coatings Producers

Small business presence in specific coatings markets indicates one dimension of how small firms may be affected by the regulation. For certain product markets, small businesses predominate and thus may be disproportionately affected if limits are particularly restrictive on those categories. Table 6-1 lists the coatings product categories provided in the survey.<sup>69</sup> The survey data represent producers that account for approximately three-quarters of the total industry product volume.<sup>d</sup>

Small companies produce more than 20 percent of the products in the survey, but these products account for just 3.6 percent of total coatings volume and 3.7 percent of total

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<sup>d</sup>This is based on the ratio of Census product volume (part of the total SIC 2851 volume) to the survey product volume.

TABLE 6-1. SMALL BUSINESS PRESENCE IN THE ARCHITECTURAL COATINGS MARKET<sup>a</sup>:  
SURVEY POPULATION

Market Segment Number	Regulation Category	Total Survey Population (116 respondents) <sup>b</sup>				Small Business (36 respondents)				
		Sales (10 <sup>3</sup> L)	Imputed Revenues <sup>c</sup> (10 <sup>3</sup> \$1991)	Number of Products	Average Volume per Product (10 <sup>3</sup> L)	Sales (10 <sup>3</sup> L)	Imputed Revenues (10 <sup>3</sup> \$1991)	Number of Products	Average Volume per Product (10 <sup>3</sup> L)	
1,2	Bond breakers	NR	NA	1	NA	NR	100.0	1	100.0	NA
1,3	Magnesite cement coatings	NR	NA	2	NA	0.0	NA	0	0.0	0.0
3,4	Flat, interior	440,498	973,502	391	1,126.6	4,214	1.0	9,313	81	20.7
3,4	Nonflat, interior	316,786	700,097	529	598.8	2,802	0.9	6,192	87	16.4
1,2	Flat, exterior	188,764	473,799	344	548.7	3,320	1.8	8,334	92	26.7
1,2	Nonflat, exterior	152,705	383,290	494	309.1	4,765	3.1	11,960	155	31.4
5,6	Primers	109,850	268,034	634	173.3	2,780	2.5	6,782	137	21.6
1,3	Industrial maintenance coatings	92,412	318,820	652	141.7	2,603	2.8	8,980	78	12.0
1,2	Roof coatings	89,515	224,683	80	1,118.9	19,939	22.3	50,046	20	25.0
1,2	Bituminous coatings and mastics	79,051	198,418	34	2,325.0	4,450	5.6	11,170	22	64.7
7,8	Stains, semitransp.	53,057	141,131	205	258.8	602	1.1	1,601	18	8.8
7,8	Stains, opaque	47,168	125,466	125	377.3	39	0.1	103	11	8.8
1,1	Traffic marking paints	46,886	67,985	85	551.6	5,649	12.0	8,192	21	24.7
7,8	Waterproofing sealers, clear	37,393	99,464	71	526.7	318	0.9	846	14	19.7
7,8	Varnishes	26,184	69,649	215	121.8	3,177	12.1	8,452	48	22.3

TABLE 6-1. SMALL BUSINESS PRESENCE IN THE ARCHITECTURAL COATINGS MARKET<sup>a</sup>: SURVEY POPULATION  
(CONTINUED)

Market Segment Number	Regulation Category	Total Survey Population (116 respondents) <sup>b</sup>					Small Business (36 respondents)				
		Sales (10 <sup>3</sup> L)	Imputed Revenues <sup>c</sup> (10 <sup>3</sup> \$1991)	Number of Products	Average Volume per Product (10 <sup>3</sup> L)	Sales (10 <sup>3</sup> L)	Share of Total Sales Volume (%)	Imputed Revenues (10 <sup>3</sup> \$1991)	Number of Products	Share of Total Products (%)	Average volume per Product (10 <sup>3</sup> L)
12	Metallic pigmented coatings	22,163	90,868	128	173.1	2,390	10.8	9,798	50	39.1	47.8
1,2	High-performance	19,233	48,274	186	103.4	145	0.8	364	23	12.4	6.3
9	Lacquers	17,351	36,090	65	266.9	4,384	25.3	9,118	13	20.0	337.2
7,8	Sealers	15,375	40,898	100	153.8	350	2.3	932	9	9.0	38.9
10	Clear wood preservatives	15,064	21,843	15	1,004.3	0	0.0	0	0	0.0	0.0
12	Dry fog coatings	14,107	57,837	68	207.4	63	0.4	259	7	10.3	9.0
5,6	Quick dry primers, undercoaters	13,612	33,212	40	340.3	0.0	0.0	0	0.0	0.0	0.0
7,8	Waterproofing sealers, opaque	10,214	27,169	29	352.2	17	0.2	44	2	6.9	8.4
10	Semitransp. wood preservatives	8,902	12,909	32	278.2	0.0	0.0	0.0	0.0	0.0	0.0
5,6	Undercoaters	7,096	17,313	43	165.0	66	0.9	162	7	16.3	9.5
13	Mastic texture coatings	6,443	22,230	42	153.4	2,637	40.9	9,096	10	23.8	263.7
3	Quick dry enamels	6,390	20,321	85	75.2	280	4.4	890	14	16.5	20.0
7	Shellacs, clear & opaque solventborne	3,937	12,047	11	357.9	0.0	0.0	0.0	0.0	0.0	0.0
10	Opaque wood preservatives	2,974	4,312	8	371.7	0.0	0.0	0.0	0.0	0.0	0.0

See notes at end of table.

(continued)

TABLE 6-1. SMALL BUSINESS PRESENCE IN THE ARCHITECTURAL COATINGS MARKET<sup>a</sup>: SURVEY POPULATION (CONTINUED)

Market Segment Number	Regulation Category	Total Survey Population (116 respondents) <sup>b</sup>					Small Business (36 respondents)				
		Sales (10 <sup>3</sup> L)	Imputed Revenues <sup>c</sup> (10 <sup>3</sup> \$1991)	Number of Products	Average Volume per Product (10 <sup>3</sup> L)	Share of Total sales Volume (%)	Sales (10 <sup>3</sup> L)	Imputed Revenues (10 <sup>3</sup> \$1991)	Number of Products	Share of Total Products (%)	Average Volume per Product (10 <sup>3</sup> L)
13	Sanding sealers	2,796	9,648	41	68.2	80	277	8	19.5	10.0	
12	Multicolor coatings	1,613	6,614	4	403.3	0	0	0	0	0	
12	Concrete curing compounds	1,256	5,148	6	209.3	NR	NA	1.0	16.7	NA	
12	Form release compounds	1,026	4,206	5	205.2	0	0	0	0	0	
12	Graphic arts coatings	994	4,075	30	33.1	251.3	1,030.5	20.0	66.7	12.6	
12	Pretreatment wash primers	668	2,739	18	37.1	11.3	46.2	4.0	22.2	2.8	
12	Swimming pool coatings	656	2,689	27	24.3	126.4	518.1	14.0	51.9	9.0	
10	Below ground wood preservatives	507	736	8	63.4	0	0	0	0	0	
13	High temperature coatings	483	1,665	44	11.0	4.4	15.1	9.0	20.5	0.5	
13	Appurtenances	205	707	7	29.3	200.5	691.6	5.0	71.4	40.1	
12	Antigraffiti coatings	42	172	8	5.3	40.1	164.2	6.0	75.0	6.7	
Sums/averages		1,853,623 <sup>d</sup>	4,528,916	4,920	376.8	65,914	166,022	992	20.2	66.4	

See notes at end of table. (continued)

TABLE 6-1. SMALL BUSINESS PRESENCE IN THE ARCHITECTURAL COATINGS MARKET<sup>a</sup>: SURVEY POPULATION  
(CONTINUED)

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<sup>a</sup> Small businesses are defined as producing less than \$10 million in architectural coatings products or less than \$ million in total sales.

<sup>b</sup> The survey had 116 respondents and 36 of those identified themselves as having under \$10 million in annual sales. Twelve survey respondents did not report company size.

<sup>c</sup> Revenues were imputed using average prices taken from Section 2. A weighted average was used when the product category belongs in two market segments.

<sup>d</sup> The actual total volume reported in the survey is 1,853,658,716 L. The difference here, 35,677 L, is attributed bond breakers and magnesite cement coatings, and waterborne quick dry enamels, which are not reported. The quant reported here is slightly greater than the total survey quantity used in the market analysis because quantities i the survey that were identified as either "exempt" or "unknown" (with respect to solventborne or waterborne) were included in the total for the market analysis.

NR = Not reported due to disclosure of individual companies.

NA = Not available.

Source: Industry Insights. Architectural and Industrial Maintenance Surface Coatings VOC Emissions Inventory Surve Prepared for National Paint and Coatings Association in cooperation with the AIM Regulatory Negotiation Industry Caucus. Final Draft Report. 1993.

revenue. This is evidence that small businesses tend to produce lower volumes per product. The average price per product in the small business segment is \$2.52/L, compared to \$2.44/L for the industry. The largest volume category for small producers is roof coatings, at 19.9 million L/yr. Small producers comprise just over 22 percent of the volume in that category. Small businesses produce over 95 percent of the total volume of antigraffiti coatings, but the volume is quite low, with six products totaling about 40,060 L.

Other categories in which small producers comprise more than 20 percent of the market volume are lacquers, mastic texture coatings, graphic arts coatings, bond breakers, and appurtenances. In addition to roof coatings, small producers collectively produce over 4 million L in the following categories: traffic marking paints, exterior nonflats, bituminous coatings, lacquers, and interior flats.

#### 6.2.2 VOC Content of Small Business Products: Technology and Specialization Effects

The extent to which small businesses are affected by the architectural coatings regulation will depend partly on the average VOC content of small business products relative to the industry average. Table 6-2 presents the average baseline VOC content for products manufactured by small businesses as compared with those manufactured by the industry as a whole.<sup>70</sup> Small business products generate approximately 6.2 percent of total VOC emissions in the survey, which is substantially greater than their output share. The average VOC content for small business products, 325 g/L, is almost 75 percent higher than the average VOC content for all surveyed products combined, 186 g/L.

Small business products have a higher VOC content than the industry average for two possible reasons. First, small businesses specialize in products that tend to be higher in

TABLE 6-2. BASELINE VOC CONTENT

Size Category <sup>a</sup>	VOC Emissions (Mg)	Sales (kL)	Average VOC Content (g/L)
All products	344,059	1,853,623	186
Small business products	21,431	65,914	325

<sup>a</sup> The survey had 116 respondents and 36 of those identified themselves as having under \$10 million in annual sales. Twelve survey respondents did not report company size.

Source: Industry Insights. Architectural and Industrial Maintenance Surface Coatings VOC Emissions Inventory Survey. Prepared for National Paint and Coatings Association in cooperation with the AIM Regulatory Negotiation Industry Caucus. Final Draft Report. 1993.

VOCs because of fundamental performance requirements of the products. Second, small businesses tend to produce higher VOC-content products regardless of the product category. The first reason can be called a specialization effect and the second reason a technology effect.

Some further clarification may be in order. Many of the small companies in the architectural coatings industry are regional firms whose product line is tailored to the region in which they operate and may tend to focus on smaller "niche" markets for which larger manufacturers may not choose to devote manufacturing and marketing resources. Thus small businesses may "specialize" in higher VOC coatings within categories. Therefore, what is referred to here as a technology effect (higher VOC within categories in which small and large manufacturers compete) may be caused by specialization strategies. In other words, some technology effect may actually be due to specialization within a category. With that caveat in mind, this report refers to across-category factors as the specialization effect and within-category factors as the technology effect.

Distinguishing between specialization and technology factors underlying small companies' higher VOC content is important in terms of the scope for regulatory flexibility. To the extent that the specialization effect dominates, small business impacts can potentially be addressed by modifying the VOC limits in the high VOC categories where small companies specialize. If the technology effect dominates, there is less scope for modifying category limits to reduce impacts.

The observed difference in average VOC content of small businesses and all products was separated into the specialization and technology effects using a simple procedure. First, a measure of the *projected* average VOC content of small business products was computed. The projected value was based on the distribution of small business products among the different product groups, weighted by the average VOC content of each group. This is a measure of its specialization-based VOC content:

$$V^S = \sum_{i=1}^N V_i^I \cdot S_i^B . \quad (6.1)$$

Here,  $V_i^I$  is the industry average VOC content for all products in product category  $i$ ,  $S_i^B$  is the share of total small business product quantity attributable to product category  $i$ , and  $N$  is the total number of product categories.<sup>e</sup> The separation of the average VOC content difference into the two component effects derives from the following equation:

$$\begin{aligned} (V^B - V^I) &= (V^B - V^S) + (V^S - V^I) && (6.2) \\ \text{Difference} &= \text{Technology} + \text{Specialization} \\ \text{in Average} &= \text{Effect} + \text{Effect} \\ \text{Content} &&& \end{aligned}$$

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<sup>e</sup> $S_i^B$  is not the small business share of total production in category  $I$ , but rather the contribution of category  $I$  to total small business production.

$V^B$  and  $V^I$  are, respectively, the small business and industrywide VOC content averages. The technology effect quantifies the difference between the actual average VOC content for small businesses and the specialization-adjusted average. The specialization effect quantifies the difference between the specialization-adjusted average for small businesses and the overall industry average.

Table 6-3 yields the computation of the  $V^S$  measure for the small business products in the survey.<sup>71</sup> The computed  $V^S$  value is 261, meaning that one would expect an average VOC content of 261 g/L for the small business sector, based purely on the way their products are distributed among product groups (i.e., their specialization). Placing this value into Eq. (6.2), along with the values for  $V^B$  and  $V^I$  given above (325 and 186), the breakdown is computed as follows:

$$\begin{aligned}
 (V^B - V^I) &= (V^B - V^S) + (V^S - V^I) \\
 (325 - 186) &= (325 - 261) + (261 - 186) \\
 139 &= 64 + 75
 \end{aligned}$$

Approximately 54 percent of the 139 g/L difference between the small business sector's VOC content average and the industrywide average can be attributed to greater specialization in high-VOC product categories (specialization effect), and the remaining 46 percent can be attributed to the disproportionate presence of small business products in the high-VOC end of the respective product categories (technology effect).

As indicated above, this finding has implications for the feasibility of designing a TOS to minimize small business impacts. Since small business producers are somewhat concentrated in the higher VOC categories, as indicated by the

TABLE 6-3. SPECIALIZATION-BASED AVERAGE VOC CONTENT:  
SMALL BUSINESS PRODUCTS<sup>a</sup>

Market Segment Number	Regulation Category	All Products Average VOC (g/L)	Share of Total Small Business Volume	Share-Weighted Content Factor (g/L)
12	Bond breakers	NA	NA	NA
12	Concrete curing compounds	621	NA	NA
1,2	Roof coatings	239	0.3025	72.20
11	Traffic marking paints	369	0.0857	31.66
1,2	Nonflat, exterior	173	0.0723	12.49
1,2	Bituminous coatings and mastics	23	0.0675	1.54
9	Lacquers	657	0.0665	43.72
3,4	Flat, interior	52	0.0639	3.30
1,2	Flat, exterior	79	0.0504	3.99
7,8	Varnishes	474	0.0482	22.84
3,4	Nonflat, interior	134	0.0425	5.71
5,6	Primers	172	0.0422	7.23
13	Mastic texture coatings	146	0.0400	5.85
13	Industrial maintenance coatings	374	0.0395	14.78
12	Metallic pigmented coatings	459	0.0363	16.66
7,8	Stains, semitransparent	475	0.0091	4.34
7,8	Sealers	312	0.0053	1.66
7,8	Waterproofing sealers, clear	632	0.0048	3.05
3	Quick dry enamels	461	0.0042	1.96
12	Graphic arts coatings	366	0.0038	1.40
7	Shellacs, clear & opaque solventborne	539	0.0032	1.72
13	Apurtenances	411	0.0030	1.25
1,2	High performance	335	0.0022	0.74

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TABLE 6-3. SPECIALIZATION-BASED AVERAGE VOC CONTENT:  
SMALL BUSINESS PRODUCTS<sup>a</sup> (CONTINUED)

Market Segment Number	Regulation Category	All Products Average VOC (g/L)	Share of Total Small Business Volume	Share-Weighted Content Factor (g/L)
12	Swimming pool coatings	552	0.0019	1.06
13	Sanding sealers	525	0.0012	0.64
5,6	Undercoaters	206	0.0010	0.21
12	Dry fog coatings	300	0.0010	0.29
12	Antigraffiti coatings	397	0.0006	0.24
7,8	Stains, opaque	257	0.0006	0.15
7,8	Waterproofing sealers, opaque	239	0.0003	0.06
12	Pretreatment wash primers	706	0.0002	0.12
13	High-temperature coatings	561	0.0001	0.04
10	Below ground wood preservatives	541	0.0000	0.00
10	Clear wood preservatives	419	0.0000	0.00
10	Opaque wood preservatives	362	0.0000	0.00
10	Semitransparent wood preservatives	548	0.0000	0.00
12	Form release compounds	599	0.0000	0.00
12	Multicolor coatings	321	0.0000	0.00
13	Fire-resistant/retardant coatings	16	0.0000	0.00
13	Magnesite cement coatings	NA	0.0000	NA
5,6	Quick dry primers, undercoaters	439	0.0000	0.00
Sums/averages			1.0000	260.87 <sup>b</sup>

<sup>a</sup> Small businesses are defined as producing less than \$10 million in architectural coatings products or less than \$50 million in total sales.

<sup>b</sup> Specialized average VOC content equals the sum of share-weighted content factors.

NA = Not available

Source: Industry Insights. Architectural and Industrial Maintenance Surface Coatings VOC Emissions Inventory Survey. Prepared for National Paint

and Coatings Association in cooperation with the AIM Regulatory  
Negotiation Industry Caucus. Final Draft Report. 1993.

empirically sizable specialization effect, the regulation can be designed to be somewhat less restrictive in categories with high small business presence. However, the effectiveness of such an approach in mitigating small business impacts will be limited by the fact that small business producers are also concentrated in the high-VOC range of each product category. An additional approach taken by the EPA was to evaluate requests for additional categories to determine if a breakout category for products in the higher-VOC range of a category was needed.

In 1993, the National Paint and Coatings Association (NPCA) analyzed the VOC content limits that were under discussion during the regulatory negotiation and found that the projected emissions reduction from the small business sector would be 19.65 percent of baseline emissions, compared to a projected 25 percent reduction for the industry.<sup>72</sup> This estimate provides some evidence of relief for small business products under the standards under consideration at the time. Moreover, the final regulation is less stringent than the form provided to NPCA in 1993. Unfortunately, data were not available to recompute these estimates based on the *current* content limits to see whether the proportional reduction from the small business sector is still less than the current overall reduction target of 20 percent.

### 6.2.3 Costs Associated With Regulatory Compliance

As discussed in Section 2, compliance options that can be quantitatively evaluated include product reformulation and the payment of an exceedance fee. The cost of a typical reformulation is estimated at \$87,000 per reformulation.<sup>73</sup> This initial cost is converted to an annualized cost of

\$14,573.<sup>f</sup> The per-unit fee that producers can use as an alternative compliance mechanism is computed as follows:

$$\text{fee} = (\text{VOC content} - \text{VOC limit}) \cdot \text{rate}. \quad (6.3)$$

VOC content is measured in grams per liter, and the fee rate is paid on the grams per liter in excess of the limit. The fee rate is \$2,500 per ton or \$0.0028 per excess g/L (in 1996 dollars, \$0.0024 when converted to 1991 dollars). Total fee payment per product simply equals the per-liter fee multiplied by total liters of production.

#### 6.2.4 Reformulation Cost Impact Estimates

Given the data from the survey and the VOC content limits set by the standard, the number of products produced by small businesses that exceed the VOC limits were identified. The number of potential reformulations was estimated by applying the content limits to the number of products reported by category and VOC content in the survey to determine the number exceeding the limit for each category. Results are reported in Table 6-4.<sup>74</sup> An estimated 421 small business products in the survey (42 percent) exceed the VOC content limits. This figure is slightly higher than the proportion of all surveyed products that exceed the limit (36 percent). As established in Section 2, approximately one-third of products over the VOC limit can costlessly comply with the regulation because of their similarity to the remaining over-the-limit products that are being reformulated. The remaining over-the-limit products are referred to as "constrained" by the regulation and the sum of the costless compliance products and under-the-limit products as "unconstrained" by the regulation.

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<sup>f</sup>Details of the derivation of these estimates are presented in Section 2 of this report.

TABLE 6-4. SMALL BUSINESS COSTS BY MARKET SEGMENT: REFORMULATION OPTION ONLY<sup>a</sup>

Market Segment Number	Regulation Category	Sales (L)	Average Price <sup>b</sup> (\$/L)	Imputed Revenues (\$1991)	Number of Products over VOC Limit	Number of Constrained Products <sup>c</sup>	Total Cost of Reformulating		Reformulation Cost/Revenues (%)
							Reform Cost per Unit (\$/L)	Products <sup>a</sup> (\$1991)	
1,2	Bondbreakers	NA	\$4.10	NA	0	0	\$0	NA	NA
1,2	Concrete curing compounds	NA	\$4.10	NA	0	0	\$0	NA	NA
1,2	Roof coatings	19,938,649	\$2.51	\$50,046,010	13	9	\$126,273	\$0.01	0.3%
1,1	Traffic marking paints	5,649,468	\$1.45	\$8,191,729	14	9	\$135,987	\$0.02	1.7%
1,2	Nonflat, exterior	4,764,963	\$2.51	\$11,960,057	70	47	\$679,933	\$0.14	5.7%
1,2	Bituminous coatings and mastics	4,450,233	\$2.51	\$11,170,084	1	1	\$9,713	\$0.00	0.1%
9	Lacquers	4,383,825	\$2.08	\$9,118,356	5	3	\$48,567	\$0.01	0.5%
3,4	Flat, interior	4,214,045	\$2.21	\$9,313,039	13	9	\$126,273	\$0.03	1.4%
1,2	Flat, exterior	3,320,278	\$2.51	\$8,333,897	34	23	\$330,253	\$0.10	4.0%
7,8	Varnishes	3,177,311	\$2.66	\$8,451,646	33	22	\$320,540	\$0.10	3.8%
3,4	Nonflat, interior	2,801,665	\$2.21	\$6,191,679	26	17	\$252,547	\$0.09	4.1%
5,6	Primers	2,779,526	\$2.44	\$6,782,044	79	53	\$767,353	\$0.28	11.3%
1,3	Mastic texture coatings	2,636,665	\$3.45	\$9,096,494	1	1	\$9,713	\$0.00	0.1%
1,3	Industrial maintenance coatings	2,602,918	\$3.45	\$8,980,067	33	22	\$320,540	\$0.12	3.6%
1,2	Metallic pigmented coatings	2,389,690	\$4.10	\$9,797,729	19	13	\$184,553	\$0.08	1.9%
7,8	Stains, semitransparent	601,978	\$2.66	\$1,601,261	12	8	\$116,560	\$0.19	7.3%
7,8	Sealers	350,434	\$2.66	\$932,155	2	1	\$19,427	\$0.06	2.1%

(continued)

TABLE 6-4. SMALL BUSINESS COSTS BY MARKET SEGMENT: REFORMULATION OPTION ONLY<sup>a</sup>  
(CONTINUED)

Market Segment Number	Regulation Category	Sales (L)	Average Price <sup>b</sup> (\$/L)	Imputed Revenues (\$1991)	Number of Products over VOC Limit	Number of Constrained Products <sup>c</sup>	Total Cost of Reformulating Constrained Products <sup>a</sup> (\$1991)	Reform Cost per Unit (\$/L)	Reformulation Cost/Revenues (%)
7, 8	Waterproofing sealers, clear	318,046	\$2.66	\$846,002	9	6	\$87,420	\$0.27	10.3%
3	Quick dry enamels	279,893	\$3.18	\$890,060	9	6	\$87,420	\$0.31	9.8%
12	Graphic arts coatings	251,343	\$4.10	\$1,030,506	8	5	\$77,707	\$0.31	7.5%
7	Shellacs, clear & opaque solventborne	210,817	\$3.06	\$645,100	0	0	\$0	\$0.00	0.0%
13	Apurtenances	200,473	\$3.45	\$691,630	5	3	\$48,567	\$0.24	7.0%
1,2	High performance	144,958	\$2.51	\$363,844	12	8	\$116,560	\$0.80	32.0%
12	Swimming pool coatings	126,358	\$4.10	\$518,070	0	0	\$0	\$0.00	0.0%
13	Sanding sealers	80,170	\$3.45	\$276,587	1	1	\$9,713	\$0.12	3.5%
5,6	Undercoaters	66,427	\$2.44	\$162,081	3	2	\$29,140	\$0.44	18.0%
12	Dry fog coatings	63,187	\$4.10	\$259,066	6	4	\$58,280	\$0.92	22.5%
12	Antigraffiti coatings	40,060	\$4.10	\$164,248	1	1	\$9,713	\$0.24	5.9%
7, 8	Stains, opaque	38,668	\$2.66	\$102,856	6	4	\$58,280	\$1.51	56.7%
7, 8	Waterproofing sealers, opaque	16,726	\$2.66	\$44,491	2	1	\$19,427	\$1.16	43.7%
12	Pretreatment wash primers	11,272	\$4.10	\$46,214	4	3	\$38,853	\$3.45	84.1%
13	High-temperature coatings	4,383	\$3.45	\$15,121	0	0	\$0	\$0.00	0.0%

(continued)

TABLE 6-4. SMALL BUSINESS COSTS BY MARKET SEGMENT: REFORMULATION OPTION ONLY<sup>a</sup>  
(CONTINUED)

Market Segment Number	Regulation Category	Sales (L)	Average Price <sup>b</sup> (\$/L)	Imputed Revenues (\$1991)	Number of Products over VOC Limit	Number of Constrained Products <sup>c</sup>	Total Cost of Reformulating			Reformulation Cost/Revenues (%)
							Reform Cost per Unit (\$/L)	Constrained Products <sup>d</sup> (\$1991)	Reform Cost per Unit (\$/L)	
10	Below ground wood preservatives	0	\$1.45	\$0	0	0	\$0	\$0.00	\$0	0.0%
10	Clear wood preservatives	0	\$1.45	\$0	0	0	\$0	\$0.00	\$0	0.0%
10	Opaque wood preservatives	0	\$1.45	\$0	0	0	\$0	\$0.00	\$0	0.0%
10	Semitransparent wood preservatives	0	\$1.45	\$0	0	0	\$0	\$0.00	\$0	0.0%
12	Form release compounds	0	\$4.10	\$0	0	0	\$0	\$0.00	\$0	0.0%
12	Multicolor coatings	0	\$4.10	\$0	0	0	\$0	\$0.00	\$0	0.0%
13	Fire-resistant/retardant coatings	0	\$3.45	\$0	0	0	\$0	\$0.00	\$0	0.0%
13	Magnesite coatings	0	\$3.45	\$0	0	0	\$0	\$0.00	\$0	0.0%
5,6	Quick dry primers, undercoaters	0	\$2.44	\$0	0	0	\$0	\$0.00	\$0	0.0%
Total/Average		65,914,429	\$2.52	\$166,022,123	421	281	\$4,089,313	\$0.06	\$0.06	2.5%

NA = not available

<sup>a</sup> Small businesses are defined as producing less than \$10 million in architectural coatings products or less than \$50 million in total sales.

<sup>b</sup> Average prices are taken from Section 2, and a weighted average is used when the product category belongs in two market segments.

<sup>c</sup> Number of products over the limit multiplied by two-thirds to represent the portion that potentially undergo major reformulation. Numbers in table are rounded.

<sup>d</sup> Annualized cost of reformulations is the number of products facing reformulation multiplied by the annualized major reformulation cost estimate per product of \$14,573 (details in Section 2).

Source: Industry Insights. Architectural and Industrial Maintenance Surface Coatings VOC Emissions Inventory Survey. Prepared for National Paint and Coatings Association in cooperation with the AIM Regulatory Negotiation Industry Caucus. Final Draft Report. 1993.

Less than 10 percent of the small business products in the sanding sealers, mastic texture coatings, and bituminous categories will be constrained by the regulation. Swimming pool coatings, shellacs, and high-temperature coatings produced by the small business sector will require no reformulations. Traffic paints, roof coatings, and varnishes are all relatively high-volume categories in which over 40 percent of the surveyed small business products are constrained by the VOC limits.

6.2.4.1 Small Business Impacts Under "Reformulation-Only" Option. In this section, the estimation of the total and per-unit annualized compliance costs for small producers in each product category with reformulation as the only compliance option is described. As with the impacts presented in Section 2, the "reformulation-only" scenario gives the upper bound of regulatory costs. The effect of cost-reducing strategies (fee and withdrawal) is considered in the next subsection.

The annualized \$14,573 estimate of the cost per reformulation was multiplied by the number of products constrained by the regulation (all products over the limit less the one-third that can costlessly comply). Table 6-4 lists the cost estimates. These costs can be compared with revenue information to gauge the relative impact of the regulation on small businesses.

To compute product revenue, the analysis uses average price per liter for each category (see Sections 2 and 3) for the market segment in which the category is classified.<sup>9</sup> The cost of reformulation as a percentage of revenues was computed using the estimated cost of reformulation divided by the

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<sup>9</sup>Where a coating category could not be separated into waterborne and solventborne market segments (categories in market segments 1 through 8), a weighted average of the two prices was used.

imputed revenues for each product category. Ideally, costs would be calculated for each firm affected by the regulation and compared to the firm's revenues as a firm-specific measure of impacts. Then, these measures could be used to determine the number and percentage of firms exceeding certain cost/revenue threshold values, e.g., 1 percent or 3 percent. What constitutes a significant impact varies, depending on typical profit rates and other industry-specific factors.

Unfortunately, the product-level survey data used to estimate costs did not identify the firms that produced each surveyed product. Therefore, it was not possible to estimate costs at the firm level. In lieu of the firm-level measures, the analysis calculated cost/revenue affects per market segment (in Table 6-4) and the average cost/revenue ratio per small company using summary totals from the small business component of the survey (in Table 3-5).

#### 6.2.5 Cost Impacts Across Market Segments

The data presented in Table 6-4 illustrate a number of scenarios pertaining to potential small business impacts of the regulation under a reformulation-only response scenario. Key phenomena indicated by the data are examined below.

Based on the survey data, roof coatings is the largest quantity and highest revenue category for small businesses. For small business roof coatings, 43 percent of the individual products will be constrained; however, the cost of reformulation as a percentage of sales is relatively small, less than 1 percent.

Categories with cost/revenue ratios in excess of 10 percent are highlighted in bold in Table 6-4. The three highest impact categories are opaque waterproofing sealers (43.7 percent), opaque stains (56.7 percent), and pretreatment

wash primers (84.1 percent).<sup>h</sup> In each case, the large impacts result from the fact that the average product volumes are very small (e.g., just 2,800 liters per product in pretreatment wash primers). This provides further evidence of the point made throughout the report that the impact on small volume products is potentially large because of the fixed cost nature of reformulation. Obviously the impacts would be dramatic *if these products were forced to reformulate*. However, the fee option provides relief from these high impacts. Therefore, the highest proportional impacts estimated in Table 6-4 would not occur with the fee as a compliance option. If, for instance, an average size pretreatment wash primer (2,800 liters) were 100 g/L over the limit for the category, then the total fee payment would be  $(100 \text{ g/L}) \cdot \$0.0022/\text{g} \cdot 2,800 \text{ l} = \$616$ . Clearly the producer's cost-minimizing compliance option would be to choose the fee rather than incur the annualized reformulation cost of almost \$15,000. As a result, the 84.1 percent figure greatly overstates the true cost impact for the prototypical pretreatment wash primer product. Given the fee amount just computed, the figure would be closer to 5 percent of revenues for that category. Similar arguments can be made for the other categories representing the highest impacts in Table 6-4. Further quantitative evidence of the cost savings from the fee (and withdrawal) compliance options is presented below.

Antigraffiti coatings present quite a different small business impact outcome. Small businesses represent almost the entire market but produce small quantities in relation to other coating categories and generate lower revenues. Only one product requires reformulation under the VOC limits, but

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<sup>h</sup>This analysis is based on the interim standards presented in Section 2. As indicated in Section 7, the content limit for opaque waterproofing was raised in the final standards. Thus, the cost impact for that category would likely be lower than indicated here.

the cost of reformulating that product would represent about 6 percent of revenues in the category.

#### 6.2.6 Average Cost Impacts for Small Company

For the small business segment of the architectural coatings industry overall, 42 percent of the products are over the VOC content limits, and 28 percent are expected to undergo reformulation, pay an exceedance fee, or exit. The total annualized cost for the sample of small businesses in the survey under the reformulation-only scenario is \$4.1 million. The average cost per unit is \$0.06 per liter.

Table 6-5 compares small firm and industry averages for revenues, number of products, and reformulation costs.<sup>75</sup> Small businesses on average manufacture approximately one-third fewer products than the industry average. On average, small firms have fewer constrained products than the industry average, but they comprise a slightly larger percentage of total number of products, 28 percent, as compared to 23 percent for the industry. Similarly, small business reformulation costs as a percentage of revenues are higher at 2.5 percent than the industry at roughly 0.4 percent.

In response to concerns expressed in the public comment period about the limited coverage of firms used to assess small business impacts, EPA obtained a list identifying small businesses in the industry and gathered data on total revenues and employment for these firms. However, without specific information on the number of products produced and their VOC content, there is no method to determine the number of products for each firm that would incur reformulation costs. Unfortunately, assigning the average costs for a small firm presented here (based on 7.8 noncompliant products) cannot produce a meaningful evaluation of the distribution of small firms' impacts. This occurs because the calculation of cost/revenue ratios for these firms varies the denominator

TABLE 6-5. AVERAGE REGULATORY IMPACT BY FIRM SIZE—  
"REFORMULATION-ONLY" SCENARIO<sup>a</sup>

	Industry Average	Small Firm Average
Revenue <sup>b</sup> (\$1991)	38,990,000	4,614,000
Number of products <sup>b</sup>	42.4	27.5
Number of products facing major reformulation <sup>c</sup>	9.9	7.8
Annualized reformulation cost <sup>d</sup> (\$1991)	144,272	113,669
Ratio of annualized reformulation cost to revenues (percent)	0.4	2.5

<sup>a</sup> The survey has 116 respondents and 36 of those identified themselves as having under \$10 million in annual sales. Twelve survey respondents did not report company size.

<sup>b</sup> Data for revenues and products per firm were based on data reported in Table 6-1. The number of products per firm is based on the total number of products for which quantity data are available.

<sup>c</sup> This number represents two-thirds of the products over the 1998 TOS. Industry experts estimate that approximately two-thirds of the products with VOC contents exceeding the TOS limits face a "major" reformulation.

<sup>d</sup> Annualized cost of reformulation is the number of major reformulations multiplied by the annualized reformulation cost estimate per product of \$14,573 (\$1991).

Source: Industry Insights. Architectural and Industrial Maintenance Surface Coatings VOC Emissions Inventory Survey. Prepared for National Paint and Coatings Association in cooperation with the AIM Regulatory Negotiation Industry Caucus. Final Draft Report. 1993.

(revenues) by firm, but the numerator (compliance costs) remain fixed as those represented by the model (average) firm. Using this method, the estimated impacts would, by definition, be relatively larger for firms with smaller revenues. However, it does not necessarily follow that a firm with low revenues would have the same level of reformulation costs as a firm with larger revenues; such an analysis would therefore overstate impacts on the smallest firms. Therefore, for the final rule EPA uses the data from the 36 firms in the survey to provide a representative look at model company small business impacts as described above.

6.2.7 Potential Factors Mitigating Small Business Impacts:  
Exceedance Fee, Withdrawal, and Tonnage Exemption

6.2.7.1 Fee and Withdrawal Options. As discussed in Section 2, a product's output level affects the choice between reformulating the product and paying an exceedance fee. Since the cost of reformulation is a fixed cost (i.e., it is independent of output level), the average reformulation cost per unit of output falls as output levels increase. However, the exceedance fee per unit of output is constant with respect to the output levels and the fixed costs of the fee (recordkeeping) are relatively small. Thus, the fee is more likely to be chosen by small-volume producers, all else equal. Because the fee will be more cost-effective only for lower-volume products and lower-excess VOC categories, allowing the fee option should have a relatively small impact on variation from the aggregate emissions reduction targets as long as the fee assessment rate is not set at an inappropriately low level. The results presented in Section 2 support this point. Therefore, the fee option provides increased flexibility for small businesses by placing an upper limit on the per-unit costs of complying with the regulation, without significantly jeopardizing VOC emissions reduction targets.

It is not possible to directly conduct a best-response (least-cost) analysis of the fee/reformulation decisions for the small business segment of the survey because of insufficiently detailed VOC data on small businesses. However, the results of the best-response analysis in Section 2 can be employed to indirectly measure the effect of alternative compliance strategies on the relative size of small business impacts.

Based on survey data for the small business segment, the average small firm has 27.5 products, 7.8 of which would be

constrained by the regulation. Table 6-6 divides the average small company's number of constrained products into three compliance categories: reformulation, fee, and withdrawal. The average number of products selecting each strategy is based on the average percentage of all constrained products in the survey (small company and large) that select each option.

TABLE 6-6. AVERAGE REGULATORY IMPACT FOR SMALL COMPANIES—"BEST-RESPONSE" SCENARIO

Compliance Strategy	Percent of All Constrained Survey Products Selecting Option	"Expected" Number of Products Selecting Strategy <sup>a</sup>	Average Compliance Cost per Product (1991 \$)	Compliance Cost (1991 \$)
Reformulate	60.5%	4.7	14,573	68,767
Fee	35.5%	2.8	7,197 <sup>b</sup>	19,936
Withdrawal	4.0%	0.3	12,705 <sup>c</sup>	3,955
Total	100.0%	7.8	11,879	92,658
Average percent of sales				2.0%

<sup>a</sup> Equals average number of constrained products for small companies (7.8) multiplied by percentage of all constrained products in the survey selecting each strategy.

<sup>b</sup> Average fee cost computed by taking the average fee rate (\$0.084/L), multiplying by the average size per small company product (65,914 L), and adding the recordkeeping cost per product of \$590.

<sup>c</sup> Equals the average value of foregone profits for the 46 surveyed products that select the fee as the best-response strategy.

This is expected to be a conservative assumption because small volume products produced by small businesses are more likely to select the fee option to reduce regulation costs.

Compliance costs were estimated by multiplying the number of products in each category by the per-product cost of that strategy. Summed across all products, the per-company compliance costs fall to about \$88,000, which is about 23 percent less than the cost per company under the

reformulation-only scenario. The average cost ratio under the best-response scenario is 2.0 percent. Considering that small companies may be even more likely to select the fee than the survey population at large, the cost reductions may be even greater than those estimated in Table 6-6.

The results presented in Tables 6-5 and 6-6 together indicate that, while the average impact on small companies is expected to be larger than the average impact on all producers, the alternative strategies to reformulation, particularly the fee option, can reduce the small company impacts substantially.

6.2.7.2 Tonnage Exemption. As an alternative to the fee options of reformulation, fee, or withdrawal, the EPA will allow a phased tonnage exemption for architectural producers. Affected firms will be allowed to exempt a total of 23 Mg of VOC emissions from control responsibilities through December 31, 2000, 18 Mg in 2001, and 9 Mg in 2002 and beyond. These tonnage exemption levels differ from the fee in two ways. First, the exempt emissions can be applied across all noncompliant products a firm produces, whereas the fee is assessed individually for each noncompliant product for which the fee is selected. Second, the exempt emissions that are granted are the total emissions of the product rather than just those in excess of the content limit. Thus, a firm must coordinate the VOC levels and requirements of all facilities and products to determine which ones will be produced under the tonnage exemption.

The tonnage exemption allows some low-volume products relief from reformulation costs that can be difficult to recover from the small amount of revenue generated by a low-volume product. Both the exceedance fee alternative and the tonnage exemption are compliance options aimed at addressing the potential issue of "niche markets" in which

low-volume products exist for which it may not be cost-effective for either the manufacturer or resin supplier to develop a lower VOC formulation.

The EPA lacks data to directly evaluate the economic impact of the tonnage exemption. It is likely, however, that many of the products covered under the tonnage exemption might otherwise be subject to the exceedance fee because both provisions are most applicable to the smallest volume products<sup>i</sup>. Therefore, the tonnage exemption provision is not likely to further curtail emissions reductions much beyond what is curtailed by the fee option. However, to the extent that it supplants the fee as a firm's compliance option, it will reduce the financial impact of the regulation on that firm. For example, if 9 Mg of VOCs exempted from regulation represents 3.6 Mg of exceedance (assuming an exceedance rate on over-limit products of 40 percent), then the firm subject to the tonnage exemption can forego 3.6 Mg worth of fee payments which, at \$2,200 per MG (in 1991 dollars), translates to an impact reduction of \$7,920 per firm. If this is applied to the roughly 500 firms in the architectural coatings industry, the maximum potential reduction in aggregate producer impacts is estimated to be about \$4 million. However, it cannot be directly determined whether each firm would be able to take advantage of the tonnage exemption and incur these savings. One should also note that, while these represent potential savings to producers, these are offset by reductions in fee receipts by the government sector. Thus, to the extent that the tonnage exemption merely substitutes for the fee, the substitution has not affected the net social cost of the regulation.

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<sup>i</sup> EPA recognizes that a few products on the margin that would be reformulated if the fee was the only alternative option, may now use a combination of the tonnage exemption and fee if it is determined to be the firm's least-cost compliance option. To the extent that this will occur, there will be a minimal effect on additional foregone emission reductions when the exemption is considered as a compliance strategy.

The tonnage exemption may also serve in lieu of small product withdrawals. In this case, the tonnage exemption would curtail some emission reductions. However, given the relatively few products projected for withdrawal and the small volumes involved, the effect on VOC emissions would likely be small.

While seeking ways to mitigate the impacts of the regulation for small manufacturers, the EPA recognizes that the two different approaches discussed here, the fee option and small product tonnage exemption, have different implications for the marginal incentives for VOC reductions. Although the fee option continues to provide incentive to reformulate the small niche products because marginal reductions in VOC content will reduce the per-unit fee paid, a tonnage exemption would provide no such incentive.

### 6.3 REGULATORY ALTERNATIVES TO REDUCE IMPACTS

The Agency has engaged in extensive dialogue with both large and small businesses over the 8-year period of development of the final rule. The Agency has sought input from small businesses through a regulatory negotiation, meetings between EPA and small businesses, and SBA review of the proposal. Based on this involvement, the EPA incorporated many of the suggested changes and designed the proposed rule to address concerns about potential impacts on small businesses. Specifically, coating categories and VOC content limits were selected to account for niche products in which smaller manufacturers have a disproportionate presence. In addition, to evaluate whether further steps were still needed to accommodate niche market coatings, the Agency requested that commenters identify any additional specialty coatings that could not comply with the proposed VOC content

requirements. The Agency also requested comment on whether to include several other compliance options to provide flexibility and reduce the burden for small businesses. This section presents a summary of significant issues raised by public comment on those compliance options and the Agency's consideration of those compliance options as well as other provisions in the rule to mitigate rule impacts on small businesses and preservation of niche markets. The response to comments document entitled "National Volatile Organic Compound Emission Standards for Architectural Coatings—Background for Promulgated Standards," EPA-453/R-95-009b, contains more detailed summaries of the comments and the EPA's response.

The EPA considered the following compliance options and other measures to mitigate impacts of the rule on small businesses:

- selection of VOC content limits and coating categories;
- low-volume exemption option;
- exceedance fee compliance option;
- extended compliance time for small businesses;
- compliance variance for cases where compliance would result in economic hardship; and
- selection of recordkeeping and reporting requirements.

Based on review of comments and further analysis of the effects of the rule, the EPA has elected to incorporate a number of the above compliance options and other measures into the final rule to avoid unnecessary impacts on small businesses. This section presents the results of the EPA's final regulatory flexibility analysis, which evaluates the alternative measures considered to mitigate the impacts of the rule on small businesses. This discussion incorporates the

results of the economic impact analysis presented earlier in this section as well as the Agency's policy considerations and other information used in selecting the compliance options and other measures to mitigate the impacts of the rule on small businesses.

#### 6.3.1 Selection of VOC Content Limits and Coating Categories

In developing the proposed rule, the EPA recognized that it may not be economical for some manufacturers to reformulate certain lower-volume products. Rather than exempting these lower-volume products, the EPA proposed the VOC content limits in the upper range of VOC content limits in existing state rules for these categories. For categories for which no state standards exist, the EPA included the categories in the architectural coating rule based on discussions with industry representatives and end-user groups, petitions from stakeholders prior to proposal, and public comments from companies providing support for inclusion of the categories and a suggested VOC content limit. In discussion of the proposed low-volume exemption, the EPA also requested that commenters submit detailed information on any specialty coatings that would not comply with the proposed VOC content limits and that cannot be cost-effectively reformulated. The proposal indicated that the EPA would consider whether to develop additional categories for newly identified niche categories or to provide a categorical exemption for the specialty coating.<sup>76,77</sup>

As a result of information submitted by commenters, the Agency has added seven new categories to the final rule to address specific groups of specialty coatings that were identified through public comment. Also, based on new information the VOC content limits were increased in the final rule for four categories. Available information indicates that the final rule includes VOC content limits at levels that

recognize the limited potential for reformulation of specialty niche products and sets VOC contents at the upper range for the particular type of product. The EPA established special categories and limits for niche products and established higher-than-proposed VOC content limits for niche product categories where commenters submitted sufficient supporting information. As a result, the final VOC limits for these categories are unlikely to require manufacturers to reformulate many products. The specific changes are identified in Section 7 of this document.

### 6.3.2 Low-Volume Exemption Option

The Agency requested comment on the concept of a low-volume compliance exemption option.<sup>78</sup> In the proposal preamble this exemption was described as a compliance option under which "any manufacturer or importer may request an exemption from the VOC levels in table 1 for specialized coating products that are manufactured or imported in quantities less than a specified number of gallons per year." The Agency specifically requested comment on exemptions ranging from 1,000 to 5,000 gallons of product per year. The exemption, as described in the proposal, could be used by a manufacturer for multiple products, provided that each product was manufactured in quantities less than the cutoff level. As described in the proposal preamble, the manufacturer would be required to submit a request for the exemption and document that the product(s) for which the exemption was requested "served a specialized use which cannot be cost-effectively replaced with another, lower VOC product." The EPA recognizes that small businesses who produce products with limited volume will benefit most from an exemption of this type.

Seventeen commenters supported some form of a low-volume exemption, and four commenters opposed such an exemption. Commenters supporting the low-volume exemption suggested

cutoffs ranging from 100,000 gallons per product down to 1,000 gallons per product. Commenters opposed to the low-volume exemption argued that it was subject to abuse because of difficulty in defining what is a "product." These commenters believed that this compliance option would provide an incentive for companies to develop purportedly "new" specialty products to keep selling noncompliant coatings.

Based on the arguments presented by commenters about the need for some type of exemption for very low-volume specialty products for which it is not cost-effective for either the manufacturer or the resin supplier to devote time and resources to reformulation, an exemption is included in the final rule to accommodate these types of products. Although in the proposal preamble, the exemption was described in terms of a per-product exemption at a level between 1,000 and 5,000 gallons annually, commenters highlighted the potential problems with this type of provision. Therefore, the final rule contains a variation on the low-volume exemption approach described at proposal. Specifically, a VOC tonnage exemption is provided in the final rule. This approach continues to accommodate the needs of small businesses, niche markets, and specialty products, as did the proposed low-volume exemption; but it more effectively limits the VOC emissions resulting from the exemption. It is expected that this provision will provide more benefit to small businesses than large businesses.

Under the VOC tonnage exemption, each manufacturer can exempt a total of 23 megagrams (25 tons) of VOC in the period of time from the compliance date through December 31, 2000; 18 megagrams (20 tons) in the year 2001, and 9 megagrams (10 tons) for the year 2002 and for each year thereafter. Since some corporations have multiple companies and/or divisions, an architectural coatings manufacturer or importer

is defined in the rule to mean the parent company and not each individual company, subsidiary, or division. Thus, if a corporation (parent company) has several subsidiaries or divisions that manufacture coatings, only one exemption per parent company will be allowed annually. This provision is structured in this manner to avoid sacrificing VOC emission reductions and to be equitable to manufacturers. For the purposes of the tonnage exemption, the manufacturer or importer calculates VOC tonnage by multiplying the total sales volume in liters by the "in the can" VOC content of the coating in grams per liter of coating *including* any water or exempt compounds. The "in the can" VOC content must include consideration of the maximum thinning recommended by the manufacturer. In the following examples, g/L (or lb/gal) is an abbreviation for grams (or pounds) of VOC per liter (or gallon) of coating, including water and exempt compounds at the manufacturer's maximum recommendation for thinning. For example, under this exemption in the second year a manufacturer could exempt 38,300 liters (8,000 gallons) of a 600 g/L (5 lb/gal) coating.

$$5\text{lbs/gallon} * 8,000 \text{ gallons} = 40,000 \text{ lbs or } 20 \text{ tons}$$

*Alternatively*, a manufacturer could exempt 18,939 liters (4,000 gallons) of an 800 g/L (6.67 lb/gal) coating plus 13,731 liters (3,625 gallons) of a 550 g/L (4.58 lb/gal) coating.

$$[(6.67 \text{ lbs/gal} * 4,000) + (4.58 \text{ lbs/gal} * 2,900)] = 40,000 \text{ lbs or } 20 \text{ tons}$$

A manufacturer can exempt any combination of coatings and volumes as long as the total emissions from these products do

not exceed 23 Mg (25 tons) from the compliance date through December 31, 2000; 18 Mg (20 tons) in the year 2001; and 9 Mg (10 tons) in the year 2002 and each year thereafter.

The tonnage limits would exempt no more than 1.5 to 2 percent of the total expected emission reductions from architectural coatings in the first year the standard is in effect. The 9 Mg (10 ton) per-year exemption that goes into effect in the year 2002 will provide adequate flexibility for future needs, while effectively limiting emissions due to the exemption. For firms with VOC content around 600 g/l (5 lb/gal), the exemption could apply to 4,000 gallons total across all of the firm's products. As is demonstrated in the calculation of potential cost savings, the exemption can provide significant relief to small firms or niche market products by reducing possible fee payments. However, since it applies to all products of a firm, it is substantially lower than the 1,000 to 5,000 gallon per product exemption considered at proposal.

This exemption differs from the low-volume exemption in the proposal preamble in the following ways:

- (1) The EPA changed the exemption from a per-product basis to a per-manufacturer basis. This was done to avoid the difficulty of defining a "product" and to avoid the related potential for abuse by manufacturers in designating products for exemption.
- (2) The EPA changed the exemption level from gallons of coating to tons of VOC. This change was made for two primary reasons. First, it provides an incentive for manufacturers to reduce the VOC content of the coatings for which they claim this exemption. For example, with a 5,000 gallon exemption, the manufacturer could exempt 5,000 gallons whether the product was 850 g/L or 200 g/L. With a *tonnage* exemption, however, the VOC content in each can of coating counts toward the allotted exemption. Therefore, if the manufacturer reduces the VOC content of the coating it wishes to exempt, more gallons of that coating could be sold under the exemption. Second, the choice of VOC tonnage instead of gallons of coating for the exemption alters the exemption from an unknown loss of emission reductions to a cap on tons exempted per manufacturer. Therefore, this change serves to place an upper bound on the emission reductions that are lost through this

exemption, which allows the Agency to better estimate its anticipated impact.

- (3) The exemption is reduced over time. The ratcheting down of the tonnage exemption from 23 Mg (25 tons), to 18 Mg (20 tons), and then to 9 Mg (10 tons) provides a strong incentive to manufacturers using the exemption to continue to seek ways to reduce the VOC content of their coatings. This exemption is intended to provide additional time for manufacturers to reformulate coatings, and provide some relief in the long run for small volume producers.

### 6.3.3 Exceedance Fee Compliance Option

The EPA requested comment on whether to include an exceedance fee option for use as a compliance alternative to meeting the VOC content limits in the proposed rule.<sup>79</sup> This option was designed to provide compliance flexibility and set the fee rate high enough to provide an economic incentive for reformulation. The proposed fee rate was \$0.0028 per gram (\$2,500 per ton) of VOC in excess of the applicable VOC content limit multiplied by the amount of coating produced. The EPA also requested comment on the appropriateness of the proposed fee rate and the recordkeeping and reporting requirements associated with the exceedance fee compliance option.

Public comment on the concept of this option varied widely. Some commenters, including small businesses and national coating manufacturers trade associations, were supportive of the concept because it provided compliance flexibility. Some of these commenters supported the concept under the condition that the option would not be accompanied by burdensome recordkeeping requirements. Other groups of commenters opposed inclusion of this option because they thought that it could disrupt the market (increase prices), that it would be difficult to enforce, or that it was unnecessary because the proposed limits were not hard to achieve. For a more complete description of the comments on

this option, see Section 2.4.1 of the Architectural Coating Regulation BID.

Careful evaluation of all of the comments and discussions with the SBA led the Agency to include the exceedance fee option in the final rule. Under this approach, manufacturers and importers have the option of paying a fee, based on the extent to which VOC content limits are exceeded, instead of achieving the VOC content limits in the rule. The fee is calculated at a rate of \$0.0028 per gram (\$2,500 per ton), in 1996 dollars, of VOC in excess of the applicable VOC content limit, multiplied by the volume of coating produced. This option is included in the rule for several reasons. The exceedance fee option will provide transition time for those manufacturers that need additional time to obtain lower-VOC technologies. The exceedance fee option provides long-term flexibility and a less costly compliance option than reformulation for both small and large manufacturers selling very low-volume specialty coatings where the cost of reformulation may be prohibitive compared to the potential profit, thus enabling manufacturers to continue to make these products available to consumers. The exceedance fee option is significantly less burdensome for manufacturers than the proposed compliance variance provision, which has not been retained in the final rule. However, contrary to some comments received, costs resulting from the exceedance fees will likely generally motivate manufacturers over time to develop high performance products with low-VOC content.

Some commenters believed that the exceedance fee will disrupt the marketplace, shifting business among companies. However, since the fee will probably be used primarily for the manufacture of low-volume specialty coatings, which are driven by demand from consumers, it is not likely that the demand from these markets would be significant enough to provide any

incentive for manufacturers to shift to these products. The impacts to the market are lower with the fee than they would be if reformulation was the only option available for producers, because the fee reduces the number of potential product withdrawals and reduces the net social cost. Raising the VOC content limits, as suggested by some of the commenters, in lieu of offering the fee could significantly undermine the emissions reduction objectives of the rule. The fee provides some flexibility to producers of low-volume products, or products that are only slightly above the VOC content limit of the standard, who may find it prohibitive to incur the largely fixed cost of reformulation. Because products for which manufacturers will choose to pay the fee would tend to represent a small portion of the national VOC emissions from architectural coatings, the fee option itself would not significantly undermine emission reduction objectives. However, raising the VOC content limits in the rule to accommodate all low-volume products would negate the VOC emission reductions from all these products. The fee also provides continued incentive for producers to reduce VOC content until they achieve the VOC content limits in the rule.

With regard to concerns about enforcement of the exceedance fee, the recordkeeping and reporting requirements are designed to ensure compliance with this option. Any violations of the recordkeeping and reporting or any other requirements could result in enforcement actions and the possibility of penalties.

The estimated cost for reporting and recordkeeping of the fee provision at a small company using the exceedance fee provisions for eight products is approximately \$5,000 per year (see Table 6-5). This cost represents the cost to maintain the records of the VOC content and the total volume manufactured or imported for which the exceedance fee option

is used as well as the preparation of the annual report for payment of the exceedance fee. Assuming \$5 million of sales revenue as a midpoint estimate for small companies in the \$0 to 10 million range, fee recordkeeping costs would be approximately 0.1 percent of sales revenue, which is not a significant burden.

Price increases on fee-paying products will cause some consumer substitution to nonfee-paying (lower-VOC) products. For some products, it may not be profitable to reformulate or pay the fee, so firms may consider withdrawing the product from the market. These phenomena are explicitly modeled elsewhere in this document. However, the premise of the fee is that it internalizes the (public) environmental cost of VOC emissions into the private cost of the good. Therefore, if some consumers substitute away from the now higher-priced fee-paying product, it reflects the fact that they are not willing to pay the "full" cost of consuming the higher-VOC products. This is the fundamental purpose of market-based incentives for environmental protection.

6.3.3.1 Exceedance Fee Rate. Several commenters also submitted comments on the proposed exceedance fee rate of \$0.0028 per gram of VOC in excess of the applicable VOC content limit. Some of these commenters thought that the fee rate was too low to encourage development of compliant coatings. Other commenters thought that it was too high relative to the price of some products or in light of the additional costs associated with recordkeeping for this option. One commenter suggested a phase-in of the fee. For a more complete description of the comments on this option, see Section 2.4.2 of the Architectural Coatings Regulation BID.

Several factors affected the selection of fee level, including the benefit per ton of VOC reductions value historically used in analyses under the Clean Air Act, the

historical range of acceptable cost-effectiveness values for VOC, the magnitude of the loss in emission reductions, and the effect on the market model (price and output adjustments, distribution of welfare impacts across consumers and producers, and changes in social cost) as well as the effect of different exceedance fee rates on the industry cost-to-revenues ratio.

More specifically, the value chosen for analysis at proposal is slightly higher than the benefit transfer value (i.e., the benefit value per ton of VOC reduced) historically used in EPA analyses and is also slightly higher than historical cost-effectiveness values for VOCs. This was intended to provide incentive for manufacturers to continue to strive to find low-cost methods of reducing the VOC content in their products. Therefore, manufacturers that find the fee to be the lowest-cost option of compliance with the regulation (in comparison to reformulation or losing profits from product withdrawal) would pay the fee, but be encouraged to find an even lower-cost solution to reduce total production costs in the long run.

Another consideration was the amount of emission reductions lost at the selected fee level. This level also proved to provide only minor adjustments in market price and quantity in comparison to reformulation by itself, while providing substantial flexibility to manufacturers of small-volume products or products that exceed the standards by a small amount. The Agency also evaluated a higher fee rate prior to proposal and found that social cost increased with a relatively small change in lost emission reductions (as compared to the lower fee rate). The selected fee rate was thus set high enough to make reformulation attractive for the majority of producers, but low enough to allow a small sector of products to remain on the market in lieu of withdrawal.

Also, the lost emission reductions will be limited and the impact on the markets will be minor. The Agency also examined the effect of varying the fee rate on the fee adoption rates, social cost impacts, foregone emission reduction, and small business impacts. This analysis showed that at lower fee rates (e.g., \$1,500/ton and \$1,000/ton) there was a significant increase in the amount of foregone emission reductions and only a small decrease in the average cost-to-revenues ratio for small businesses.<sup>80</sup>

Based on the economic analysis, the EPA believes that the fee is set at an appropriate level. The economic model compares the cost of paying the fee to the cost of reformulation for surveyed products. While many products are projected to opt for the fee, these products are uniformly small in volume; thus, their contribution to total market output (and emission reduction) is relatively small. It generally would not be advantageous for producers of large-volume products, which generate a disproportionately large share of emissions, to opt for the fee over reformulation. Furthermore, the existence of the fee provides continued incentive for fee-paying firms to reduce VOC contents on the margin, because this will reduce the amount of fee they must pay.

Some commenters suggested that the EPA should base the fee on price, rather than the quantity of VOC emitted by the product. The premise is that only a large proportional price effect will induce large changes in behavior. The objective of a pollution fee, however, is to "charge" for the pollution generated. The only consistent way to accomplish this is to have the fee payment depend on the amount of pollution generated. It is not clear how a price-based fee would be tied to the amount of VOC emitted. For instance, a low-priced high-VOC product could have a fee per unit that is much lower

than a high-priced lower-VOC product. In this case, the fee mechanism would not work to ensure enough incentive for the higher-VOC product to reduce VOC content. In other words, a ton of extra emissions from one product would incur less of a fee than a ton of extra emissions from the other. For example, such a mechanism would favor very high-VOC content products that are very inexpensive. Alternatively, having one ton of exceeded emissions face the same fee, regardless of source is more efficient, and seemingly more fair.

The combination of the compliance options in the final rule provides the phase-in of the fee suggested by some commenters. Specifically, the phasing of the tonnage exemption in combination with the exceedance fee provision will operate to increase the fee for products that exceed the VOC content limits in the rule. In the time period from the compliance deadline through the year 2000, manufacturers may exempt from regulation 25 tons (23 Mg) of VOC, so total fee payments would be lower than in the second year. The following year, 2001, has a lower exemption level of 12 tons (11 Mg) of VOC, so fee payments would be slightly greater for those manufacturers who choose not to reformulate or otherwise reduce the VOC content of their products. In the next year and any subsequent year of compliance, the fee rate would become level because the exemption level remains the same at 5 tons (4.5 Mg) per year. The fee payments would also provide incentive for manufacturers to find lower-cost VOC technology to meet the standard and eliminate or reduce their fee payments.

#### 6.3.4 Extended Compliance Time for Small Businesses

At proposal the Agency requested comment on whether the final rule should include a compliance extension for small businesses.<sup>81</sup> In effect, this extension would have allowed small businesses 12 additional months to comply. Thirteen

commenters commented on the small business compliance extension concept. Two-thirds of the commenters providing comments on this provision were against special treatment for small businesses. The primary concern was that this provision would provide small businesses an unfair advantage in the marketplace. Some of the commenters opposing the extension noted that an extension should not be necessary because of the specialized coating categories and the VOC content limits for these categories, small volume exemption, the potential exceedance fee compliance option, and the variance provision.

After careful evaluation of the comments, the Agency has decided not to include a compliance extension specific to small businesses but has instead lengthened the compliance period for all regulated entities to 12 months. This time period was selected to balance the needs of the regulated entities, both large and small businesses, against the need for rapid implementation of the rule to achieve the required reductions of VOC emissions.

#### 6.3.5 Compliance Variances

In the proposal preamble the Agency requested comments from small businesses on their expected use of a compliance variance provision.<sup>82</sup> The proposed compliance variance provision would have allowed manufacturers and importers of architectural coatings to submit a written application to the Administrator requesting a variance if, for reasons beyond their reasonable control, they could not comply with the requirements of the proposed rule. In particular, the proposed variance provision allowed additional compliance time and was developed especially for small businesses, but would have been available to any size business.

Of the 22 commenters on this provision, only eight commenters supported the concept. The 14 commenters opposing the concept included some small businesses. Concerns

expressed by those commenters included concerns that it would impose such a heavy burden that businesses would choose to shut down rather than use the variance and that the variance requirements as proposed are unduly difficult to achieve. For example, one commenter noted that the variance provision as proposed required significant expense with little or no guarantee of approval. The commenter recommended an extended compliance period as a more effective option to alleviate the heavy burden upon small businesses.

Based on the comments received, the Agency concluded that the variance provision may not provide the intended additional compliance flexibility, especially for small businesses. Therefore, the variance provision has not been included in the final rule. Even though the proposed variance requirements were intended to be the minimum necessary to approve a coating variance, the requirements may have been burdensome, particularly for small businesses with limited or no regulatory compliance staff. It is also possible that the variance provision could create an uneven playing field because small businesses would not have the resources needed to pursue this option, thereby putting small businesses at a disadvantage compared to large businesses. Also, as one commenter pointed out, even with the investment of time and money, the Agency cannot guarantee approval of the variance application. In addition, review and approval of numerous variance applications would place a heavy burden on EPA's staff, thereby delaying implementation of the intended flexibility to the disadvantage of regulated entities.

Nevertheless, there is still value in providing additional compliance flexibility; therefore, new provisions have been incorporated into the final rule (i.e., the tonnage exemption that phases down over time and the exceedance fee option). These provisions provide even greater flexibility

than the variance provision and are less burdensome. Both of these compliance options are automatically available to all regulated entities and, thus, do not involve complex application and approval processes. However, these compliance options do require some minimal recordkeeping and reporting.

The tonnage exemption will allow each regulated entity to exempt from the VOC content limit anywhere from 7,000 to 30,000 gallons of coatings the first 15 months; 3,400 to 14,400 gallons the second year; and 1,400 to 6,000 gallons the third year and beyond (the actual amount exempted depends on the VOC content of the product(s)). Therefore, this exemption is ideal for low-volume products that cannot be reformulated in the foreseeable future.

The exceedance fee option is designed to give manufacturers additional time to develop lower-VOC technologies, if necessary. This option allows regulated entities to continue to sell coatings that exceed the VOC content limits in addition to the coatings for which they are claiming the low-volume exemption, provided they pay an exceedance fee. The amount of the fee is based on the volume of the product sold, the VOC content of the product, the VOC content applicable to the product, and the fee rate.

In addition to these provisions, the compliance time, which concerned some commenters, has been extended to 12 months, and the EPA added seven new specialty coatings categories (e.g., zone markings, concrete curing and sealing, conversion varnishes) to the final rule and increased the VOC content limits for four coating categories.

#### 6.3.6 Selection of Recordkeeping and Reporting Requirements

The EPA also selected the recordkeeping and reporting requirements of the rule, taking into consideration the impacts of the rule on small businesses. The EPA designed the proposed rule to require only those recordkeeping and

reporting requirements necessary to allow determination of compliance and enforcement, if necessary. The proposed rule required an initial report and labeling of containers for manufacturers who choose to demonstrate compliance by meeting the VOC content limits in the standard. There were no additional reports or records required from these manufacturers. Additional recordkeeping and reporting requirements were proposed for the recycled coatings option, the exceedance fee option, and the low-volume exemption option.

Two industry commenters requested even more limited recordkeeping and reporting requirements in the rule and several industry commenters noted the need to correct dates and clarify some of the labeling requirements in the proposed rule. In the final rule, the EPA has maintained the proposed recordkeeping and reporting requirements for manufacturers who choose to demonstrate compliance by meeting the VOC content limit in the standard. The EPA has also clarified the container labeling requirements and provided additional flexibility for labeling of VOC content of the coating as well as for placement of the date codes. In the final rule, the EPA required only those records and information necessary to determine compliance with the compliance alternatives of the exceedance fee, the tonnage exemption, and the credit for recycling of coatings. Specifically, the final rule only requires semiannual reporting from manufacturers who elect to use the exceedance fee compliance option and annual reporting from manufacturers who elect to use the tonnage exemption or the recycled coatings provision. These records and reports are essential for enforcing these provisions and the EPA believes that these records and reports do not represent an undue burden on manufacturers or importers who elect to use these optional compliance provisions. For example, as noted

earlier, the estimated cost for reporting and recordkeeping of the exceedance fee provision at a company with an average of eight reformulations would be approximately 0.1 percent of sales revenue, which is not a significant burden.

#### 6.4 SMALL BUSINESS IMPACT SUMMARY

The potential for significant impacts on small businesses of the regulation arise from two primary sources:

- Products made by small producers, on average, have a higher VOC content than the industry average.
- The costs of reformulating products to comply with the regulation are independent of product volume and thereby impose higher average costs per unit of product on small volume coatings.

The first problem is related to small producers' tendency to specialize in coatings categories that are naturally higher in VOC content and to their tendency to concentrate in the "high-VOC" end of the distribution of products within a given category. Thus the potential for disproportionate impacts of VOC reduction regulation on small businesses follows partly from the fact that small businesses contribute a disproportionate amount of the aggregate VOC emissions that are targeted for reduction.

The second problem follows from the nature of reformulation costs. A coating's formula is the product of an intellectual capital investment, much like the development of a drug or a computer software product. The cost of the investment follows directly from the level of effort necessary to revise the formula to meet both the VOC standards imposed by the regulation and performance standards imposed by the marketplace. This level of effort is essentially independent

of the quantity of the product that is eventually sold. Therefore, the relative impacts on smaller volume products is, by definition, greater.

The data used in this analysis suggest that these two primary factors are relevant in the case of small architectural coatings producers. The average VOC content of the products made by the small business producers in the survey is 75 percent higher than the average VOC content of all products combined. A little over half of the difference in the averages is attributed to the specialization of small producers in high-VOC content product categories, with the remainder attributed to the tendency for small businesses to produce higher VOC products within each product group. Moreover, the average product volume of products made by small businesses is less than 20 percent of the average product volume for the entire survey population, implying much larger average reformulation costs. Thus, without mitigating factors, the impacts on small businesses are potentially significant.

The regulation has been designed to mitigate small business impacts. Despite their inherently higher VOC content, the proportion of small business products exceeding the regulatory standards is not much higher than the corresponding proportion for the survey population at large (42 percent vs. 36 percent). In addition, the availability of the exceedance fee option is beneficial to small business producers because it places an upper bound on the per-unit costs of compliance. Data analyzed in this study indicate that small business producer costs are reduced by nearly one-quarter when the exceedance fee is introduced and the possibility of product withdrawal is considered in lieu of reformulation. The cost/revenue ratio exemplifies the advantages of the lower-cost compliance options (the fee and

withdrawal) in that the ratio for small businesses drops from 2.5 percent to 2.0 percent.

In addition to adding the exceedance fee and the tonnage exemption to the final rule, the EPA also increased the compliance time to 12 months and added seven new product categories and increased the VOC content limits for four categories. These changes were made in response to public comments to further mitigate the rule's small business impacts. The analysis of the impacts of the final rule shows that these provisions are likely to be used by small entities and the impact on a typical small firm is reduced without significant reduction in the emission reductions achieved by the rule. The EPA believes that these measures adopted in the final rule represent a significant mitigation of the economic impacts on small businesses compared to the impacts that might otherwise have occurred.

67. Ref. 3.
68. Ref. 2.
69. Ref. 2.
70. Ref. 2.
71. Ref. 2.
72. Memorandum. Nelson, Robert, National Paint & Coatings Association, to Madariaga, Bruce, EPA/OAQPS. October 14, 1993.
73. Ref. 51.
74. Ref. 2.
75. Ref. 2.
76. 61 FR 32740.
77. 61 FR 32741.
78. Ref. 77.
79. Ref. 76.
80. Memorandum from Murray, Brian, Research Triangle Institute, to Evans, Ron, Environmental Protection Agency. July 1, 1998. AIM SBREFA analysis.
81. 61 FR 32732.
82. 61 FR 32743.