



SOCIOECONOMIC IMPACT ANALYSIS FOR SMAQMD RULE 459 AMENDMENTS

Final Report

Sacramento Metropolitan
Air Quality Management District
Program Coordination Division
777 12th Street, 3rd Floor
Sacramento, CA 95814

July 25, 2011



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Air Quality Management District
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EXECUTIVE SUMMARY

Rule 459 (Automotive, Truck, and Heavy Equipment Refinishing Operations) is being proposed for amendment. SMAQMD is considering a decrease in the allowable VOC content of coatings used in the refinishing process. Compliance with the low VOC limits in the proposed amendment will require autobody shops to use water-based color coatings instead of the traditional solvent-based coatings.

ERG examined the potential impacts on manufacturers, distributors (jobbers), commercial facilities (permitted and unpermitted), non-commercial facilities, and consumers. Through the use of SMAQMD information and commercial financial databases, ERG identified 302 facilities potentially affected by the Rule 459 amendments. Of these, 63 have already converted to water-based coatings. The remaining 239 facilities (3 noncommercial permitted facilities, 68 commercial permitted facilities, and 168 commercial unpermitted facilities) are included in the cost analysis.

ERG developed equipment and costs based on the experience of Sacramento County facilities that have already converted to water-based coatings and information provided in industry articles and manufacturers' websites. SMAQMD staff supplied ERG with coating price information obtained from four coating manufacturers. ERG researched manufacturers' VOC compliance charts and developed "ready-to-spray" \$/gallon costs for water-based and solvent-based coatings based on usage data supplied to SMAQMD by commercial autobody shops. In addition, one manufacturer also calculated the \$/sq. ft. covered costs for water- and solvent-based coatings. Water-based coatings are more efficient at coverage than solvent-based coatings; that is, a smaller volume of water-based coating is needed to cover the same area covered by a unit of solvent-based coating. When improved coverage is taken into consideration, water-based coatings were about 11 percent **lower** in cost than solvent-based coatings. Based on this information, ERG developed two scenarios, both of which incorporate the assumption that no costs can be passed through to the consumer and that insurance companies make no adjustment in their reimbursement policies. The first scenario ("Low Cost") assumes \$0/gallon incremental coating cost (i.e., it does not consider potential cost savings). The second scenario ("High Cost") uses the highest price differential (\$25.17/gallon) between water-based and solvent-based coatings.

The cost analysis is based on facility-specific one-time and annual costs (based on reported coating usage) for permitted facilities. For unpermitted facilities, the cost assumptions include 1 spray booth, 1 person trained, and the average of the lowest 10 percent of coating use by permitted facilities. Under the Low Cost scenario, one-time costs of equipment and training total \$240,210 and total annualized costs is 34,161. Average annualized costs per facility range from \$127 to \$166 depending on the revenue category with an overall average of \$143 per facility. Under the High Cost scenario, the results are \$240,210 in one-time costs, \$509,919 in annual costs, and \$579,877. Average annualized costs per facility range from \$990 to \$14,071 depending on the revenue category with an overall average of \$2,426 per facility.

The added costs of the Low Cost scenario might lead to the loss of \$44,905 in output, \$43,528 in earnings, and 0 jobs. For perspective, this is 0.07 percent of the earnings in this industry in Sacramento County, and no discernable impact on output or employment. The added costs for the High Cost scenario might lead to the loss \$762,248 in output, \$738,705 in earnings, and 6 jobs. For perspective, this is 0.03 percent of the output, 1.25 percent of the earnings, and 0.37 percent of the employment in this industry in Sacramento County. Neither scenario has any discernable impact on the Sacramento County unemployment rate. On an industry-wide basis, return on equity (ROE) is projected to decline by 0.3 to 5.7 percent, depending on the scenario.

ERG examined a third scenario where a consumer had to pay for the cost increase associated with the switch to water-based coatings. Under the “High Cost” scenario, the consumer would spend up to an additional \$25 or about 1.1 percent of the average repair price of \$2,295 (Autobody Shop Business, 2010). Based on this small difference, ERG does not consider the Rule 459 amendments to pose an incentive to move business out of the county.

1.0 INTRODUCTION

The District is considering amendments to Rule 459—Automotive, Truck and Heavy Equipment Refinishing Operations. The purpose of the amendments is to reduce volatile organic compound (VOC) emissions from the refinishing of motor vehicles and mobile equipment. Emissions will be reduced by decreasing the allowable VOC content of coatings used in the refinishing process by changing from solvent-based coatings to water-based coatings.

This report presents the socioeconomic analysis for the amendments to Rule 459 conducted by Eastern Research Group, Inc. (ERG). ERG identified the equipment, one-time costs, and annual cost components to change to water-based coatings (Section 2); identified the universe of facilities to which Rule 459 amendments could apply (see Section 3); and calculated the estimated costs for the rule amendment (Section 4).

The socioeconomic analysis (Section 5) examines two scenarios to estimate the potential impact on the suppliers. Both scenarios incorporate the assumption that autobody shops are not able to raise prices. This approach maximizes the potential impacts on the shops while minimizing the impacts on the consumers. The first scenario is what is likely to happen (Low Cost scenario) given the price and coverage differences between water-based and solvent-based coatings. The second scenario examines the impacts of the highest incremental cost identified between water-based and solvent-based coatings (High Cost scenario). Another analysis examines the potential impact on a consumer should all incremental costs incurred to comply with Rule 459 amendments be passed on to the consumer; this minimizes impacts on the autobody shops but maximizes them for consumers.

2.0 OPTION CONSIDERED, COST COMPONENTS, AND CONVERSION COSTS

The socioeconomic analysis considers the change from solvent-based to water-based coatings. Section 2.1 examines the equipment, training, and material changes needed to comply with the Rule 459 amendments while Section 2.2 addresses the increased coating costs (“annual costs”). These data are combined with the industry profile (discussed in Section 3) to provide the estimated industry costs of the Rule 459 amendments presented in Section 4.

ERG found that there was a significant difference between the equipment that retailers would like to sell to the autobody shops to convert to water-borne coatings and the minimum amount of equipment that the shops actually use for the conversion. For example, information from the PPG website suggests several substantial pieces of equipment, such as booth blowers, fans, floor stands, or a waterborne downdraft booth, are likely to be needed in order to convert to water-borne coatings (see <http://www.ppg.com/coatings/refinish/en/products/waterborne/Pages/equipment.aspx>) while at the same time (also on their website) they suggest that the amount of new equipment needed may consist of only a spray gun, gun washing equipment, and possibly air movement equipment (see <http://www.ppg.com/coatings/refinish/en/products/waterborne/Pages/FAQ.aspx>). ERG developed costs for the minimum equipment needed to convert to water-based coatings (i.e., spray guns, gun washing equipment, and air movement equipment).

2.1 Equipment Costs

Several distributors provide lists of spray guns that are compatible with their water-borne products; ERG searched the Internet for vendor prices for these models. Spray gun prices ranged from \$99 to \$586, with an average price of \$368.

Prices for spray gun cleaning depend on whether the shop purchased a wash cabinet (\$563 to \$1,839) or used gun cleaning kits (\$11 to \$31). ERG assumed the shops used spray gun cleaning kits with an average price of \$21.

Prices for air drying equipment ranged from a low of \$80 for a hand-held dryer to as high as \$1,026 for a stand with two blower guns, air gauge and air drying desiccants. However, based on observations and information collected by SMAQMD staff, hand-held guns were the standard equipment; these ranged from \$80 to \$225 with an average price of \$160.

2.2 Training Costs

Based on information gathered from site visits conducted by SMAQMD and telephone calls made by SMAQMD and ERG with distributors, it was determined that most manufacturers provide training to shop personnel at autobody shops which they convert to water-borne coatings when the facility is likely to provide a sufficient volume in material purchases. For low-volume businesses, training costs were about \$250 per person. To the class cost, ERG added \$423 to

reflect 8 hours of training time at \$21.61/hour, the Level 3 wage rate for industry 40900-automotive body and related repairers for the Sacramento Metropolitan Statistical area (FLC, 2011).

2.3 Total One-Time Costs

Table 1 shows the equipment costs for a facility depending on the number of spray booths at a location. A facility is assumed to purchase one spray gun per booth. Locations with are assumed to purchase one spray gun cleaner per spray gun.

All jobbers indicated that training was necessary due to the differences between the types of coatings. A mobile operator with whom ERG spoke indicated that the training costs would be picked up by his manufacturer (Barkman, 2011). This is consistent with recommendations given in an industry journal (Clark, 2009a; Clark, 2009b; Clark, 2009c). It is likely that most permitted facilities have their training provided free of charge by the manufacturer while many small unpermitted facilities may be required to pay the cost of training one person. ERG used the conservative assumption that all unconverted shops would need to pay for training one person.

Table 1. Equipment and Training Costs

Description	Spray Gun	Spray Gun Cleaner	Hand-held Dryer	Training	Total	Total Rounded
1 booth	\$368.26	\$21.16	\$160.00	\$422.88	\$972.29	\$970
2 booths	\$736.51	\$42.32	\$320.00	\$422.88	\$1,521.71	\$1,520
3 booths	\$1,104.77	\$63.47	\$480.00	\$422.88	\$2,071.12	\$2,070
4 booths	\$1,473.02	\$84.63	\$640.00	\$422.88	\$2,620.53	\$2,620

2.4 Increased Coating Costs

The annual incremental cost incurred by a facility when it changes from solvent-based to water-based coatings depends on two parameters:

- Annual volume of coatings used
- Incremental cost per unit volume

2.4.1 Annual Coating Volumes

ERG analyzed data collected by SMAQMD on coating usage from 51 permitted autobody shops that had not converted to water-based coatings. ERG extrapolated quarterly volumes to annual volumes and the annual amounts ranged from 12 gallons/year to 1,596 gallons/year. The amounts used do not always correlate with the location revenues. Some shops whose primary business is not automobile refinishing (i.e., automobile dealers, businesses that maintain their own fleets, or those for which painting is subsidiary to the primary business of repairing vehicles) may have substantial revenues but low coating usage. Conversely, a relatively small shop for which automobile refinishing is the only business might show a much larger amount of coating usage but much smaller revenues.

As part of the socioeconomic analysis, ERG classified the autobody shops into six revenue categories. ERG calculated the median volume of coating use within each revenue category and used the median to impute the coating use for facilities in that category without data. Unpermitted facilities in the SMAQMD region will also incur the costs of changing to water-based coatings. Because such facilities do not spray enough coating to require a permit, ERG used the average of the lowest 10 percent of the coating volume data from the permitted facilities to estimate coating use for unpermitted facilities. Table 2 summarizes the coating volumes used to complete missing data.

2.4.2 Incremental Coating Costs

ERG used price lists obtained from four coating manufacturers, specifications (i.e., mixing ratios for the highest volume coatings: color coats, clear coats, primers, and primer sealers), and VOC compliance charts for the Sacramento, San Joaquin, and Yolo-Solano districts. The requirements considered for the Rule 459 amendments are already in effect in the San Joaquin and Yolo-Solano districts. Based on this information, ERG developed \$/gallon “ready to spray” costs for clear coats, primers, primer sealers, and a range of colors. ERG combined the costs according to the usage patterns provided to SMAQMD by some permitted facilities to create a “composite” cost for a gallon of solvent-based coatings (based on Sacramento County and Placer County VOC charts) and water-based-coatings (based on San Joaquin County and Yolo/Solano Counties VOC charts).

Table 2. Imputed Coating Volumes

Permit Status	Annual Revenues (2009\$)	Imputed Annual Coating Use by Facilities With Missing Data (gallons/year)
Permitted	Unknown	108
	<\$250,000	108
	\$250,000 - \$500,000	232
	\$500,000 - \$750,000	210
	\$750,000 - \$1,000,000	204
	>\$1,000,000	388
Unpermitted	all	18.4

On a percentage basis, water-based coatings ranged from 6 to 12 percent higher in price per gallon than solvent-based coatings for the manufacturers included in the analysis. However, one manufacturer took the initiative to provide dollars per square foot (\$/sq. ft.) covered values for water- and solvent-based coatings. Water-based coatings have higher coverages than solvent-based coatings; that is, a smaller volume of water-based coating is needed to cover the same area covered by a unit of solvent-based coating. When improved coverage is taken into consideration, water-based coatings were about 11 percent *lower* in cost than solvent-based coatings. ERG considers it likely that similar findings would result from the other three manufacturers.

In order not to underestimate impacts, ERG did not include cost savings from product substitution in the socioeconomic analysis but instead considered a \$0/gallon incremental coating cost as the Low Cost scenario. ERG used the highest incremental cost/gallon from the remaining manufacturers as the High Cost scenario. In absolute terms, water-based coatings are estimated to be \$25.17/gallon more expensive than solvent-based coatings.

2.5 Solvent Costs

The proposed amendments to Rule 459 will require a switch to very low VOC solvents for cleanup and surface preparation. Currently, Rule 459 requires surface preparation solvent to contain no more than 72 g/l VOC. The proposed amendments lower this limit to 25 g/l. ERG compared the prices for 72 g/l surface cleaners to cleaners that contain 25 g/l VOC or less. For all four manufacturers, the cleaners meeting the 25 g/l limit were less expensive than the 72 g/l cleaners.

Currently, Rule 459 requires that spray guns be cleaned with a solvent containing no more than 72 g/l VOC, or cleaned within an enclosed gun cleaner. Typically, facilities that use

solvent based coatings use high VOC solvents such as lacquer thinner to clean spray guns within an enclosed gun cleaner. Lacquer thinner can be purchased for approximately \$15/gallon in 5-gallon containers and \$9/gallon in 55-gallon drums. The cleaning solvent is recirculated within the system until it contains too much paint waste to be effective. At that point, the spent solvent is drained out and the gun cleaning system is refilled with fresh solvent. At the majority of shops, the spent solvent is put into a drum for disposal as hazardous waste. Disposal costs approximately \$2 to \$3 per gallon. Many shops contract with a service to maintain the gun cleaning systems and haul away hazardous waste. Some of the shops have solvent recycling systems, which allow recovery of a portion of the solvent from the paint solids by evaporation. With the recycling systems, there is a disposal cost associated with the paint solids, as well as a cost for fresh makeup solvent. However, the proposed VOC limit of 25 g/l would likely preclude the use of recycled solvent because an initially compliant solvent would gain VOC content from the coatings as they are cleaned from the spray guns. The material and disposal costs of discontinuing solvent recycling, however, may be offset by a decrease in the amount of cleanup material used to clean water based spray equipment, as discussed below.

In the proposed amendments, solvents used to clean application equipment must contain no more than 25 g/l VOC. For water based coatings, a spray gun can be cleaned primarily using only a few ounces of tap water (virtually no cost) followed by a final rinse with acetone from a squirt bottle. Acetone can be purchased for approximately \$16/gallon in 5-gallon containers and \$12/gallon in 55-gallon drums. The spent cleaning solution is disposed as hazardous waste. Some shops may choose to use flocculants that settle and separate the paint solids so that the cleaning solution can be reused several times before disposal. Flocculants can be purchased for approximately \$63 for a 2 kg container, which can treat 150 gallons of water.

In 2008, the Institute for Research and Technical Assistance (IRTA) conducted a study of cleaning solvents and other materials used in the autobody industry (Wolf 2008). One case study involved a facility that had recently converted from solvent based coatings to water based coatings. Prior to conversion, the total annual cost for application equipment cleaning, including material and disposal costs, was \$1,832. After conversion to water based coatings, the cost decreased to \$407. Most of the reduced cost was due to the fact that a much lower volume of

cleaning material was required to be purchased and less waste was generated during the cleanup of water based spray guns.

ERG concludes that the proposed amendments will not increase costs for solvent cleaning and associated disposal. For both the Low Cost and High Cost scenarios, ERG assumed no incremental costs.

3.0 SUPPLIER INDUSTRIES

3.1 Affected Sectors

Rule 459 amendments have the potential to affect a variety of sectors:

- Coatings manufacturers
- Coatings distributors (jobbers)
- Government entities that paint/repaint vehicles
- Educational institutions that teach vehicle painting
- Businesses that paint/repaint their own vehicles as part of a larger business activity
- Businesses whose primary business is vehicle painting/repainting
- Customers that need/want a vehicle painted/repainted

According to discussions with jobbers, coating manufacturers charge higher prices for water-based coatings. ERG therefore assumed no impacts from Rule 459 amendments to the manufacturing sector because additional costs are passed through to the jobbers. In support of this project, ERG spoke with eight jobbers. Every jobber that we contacted stated that they passed the higher costs to the autobody shops. ERG therefore assumed no impacts from Rule 459 amendments to jobbers.

3.2 Permitted Autobody Shops

SMAQMD refines and updates its list of permitted facilities on an ongoing basis. As of June 2011, 63 facilities were identified as converted to water-based coatings and 72 as unconverted facilities. One facility (Porter Sprague) appears on both the converted and unconverted list because it performs both water-based and solvent-based coatings. For the purpose of the economic analysis, this facility is considered converted. Thus the total number of SMAQMD permitted facilities is 134.

One government facility has all the equipment and training necessary for water-based operations but has not switched to using water-based color coatings. For the economic analysis, this facility incurs incremental coating costs, but no equipment or training costs. For the purpose of the economic analysis, there are 63 converted facilities and 71 unconverted facilities. The unconverted facilities are likely to incur costs under Rule 459 amendments.

Six noncommercial facilities hold permits (see Table 3); four are government institutions and two are educational institutions. The four government institutions (two for Regional Transit, one for the City of Sacramento Public Works, and one for the State of California Department of Transportation (Caltrans)) have a total of six spray booths. Of these, three booths have converted to water-based coatings, one booth has partially converted, and two have not converted. The two educational institutions (Los Rios District College and Universal Technical Institute) have a combined total of 11 spray booths—all of which have been converted to water-based coatings. Thus, of the six noncommercial facilities, three are likely to incur costs under Rule 459 amendments.

Table 3. Noncommercial Permitted Facilities

Category	Data Source	Number of Facilities	Number of Spray Booths	Converted	Partially Converted	Not Converted
Government	SMAQMD	4	6	3	1	2
Educational	SMAQMD	2	11	11	0	0

3.3 Dun & Bradstreet List of Auto Repair/Painting Facilities

Under District Rule 459, General Permit Requirements, facilities that use less than 1 gallon per day of coating/solvent are exempt from permits. Thus, there are additional facilities that do not appear on the SMAQMD list but might incur costs under the amendments to Rule 459. The unpermitted facilities are likely to be small businesses. In order to better characterize this segment, ERG extracted all locations with primary or secondary NAICS code 811121 (Automotive Body, Paint, and Interior Repair and Maintenance) from the Dun & Bradstreet (D&B) Million Dollar Database¹. Given the time lag for reporting data and its incorporation in commercial databases, financial date extracted in early 2011, as was done for this report, reflects

¹ Which, despite its name, tracks businesses with annual revenues as low as \$50,000 although coverage might not be as complete as for businesses with larger annual revenues.

2009 data. After removing facilities that only did interior work, (i.e., upholstery), and an industry organization (California Autobody Association), ERG's final list included 280 locations that potentially could be affected by the rule.

3.4 Merged and Updated Lists

ERG, with input from SMAQMD, merged the permitted facilities and D&B lists. This involved tracking name changes, entities that held permits under one name but "did business as" under a second name, distinguishing mailing and location addresses, etc. After matching facilities to the D&B list extracted under the NAICS code 811121, ERG searched the D&B database for the names of unmatched businesses. These generally do auto painting as a small part of a larger business. In all, 112 matches were made between the two sets of commercial facilities. The resultant profile includes 6 noncommercial permitted facilities, 128 commercial permitted facilities, and 168 commercial unpermitted facilities for a total of 302 facilities.

3.5 Final Industry Profile

Table 4 describes the overall industry profile. The first set of rows shows the 134 permitted facilities (i.e., 6 noncommercial and 128 commercial). There are an additional 168 commercial facilities that are not permitted. The second set of rows shows the counts of converted facilities. While 63 of 134 permitted facilities have already converted to water-based coatings, ERG assumes that none of the unpermitted facilities have done so.

The third set of rows identifies the counts of unconverted facilities likely to be affected by Rule 459 amendments. Three noncommercial permitted facilities, 68 commercial permitted facilities, and 168 commercial unpermitted facilities are in the cost analysis for a total of 239 facilities. ERG could not identify revenues for 10 commercial permitted facilities; these are listed under the column labeled "Unknown."

Unpermitted facilities are smaller operations (i.e., none fall into the revenue categories greater than \$750,000 per year). Of the 41 facilities with annual revenues greater than \$1,000,000 (2009 data), 27 have already converted. As a result, all but 14 of the 239 commercial facilities considered to incur costs under Rule 459 amendments have less than \$1,000,000 in annual revenues.

Table 4. Autobody Industry Profile

Category	Revenue Category					Total	
	Source	Unknown	<\$250,000	\$250,000 - \$500,000	\$500,000 - \$750,000		\$750,000 - \$1,000,000
ALL							
Non-Commercial	SMAQMD	6					6
Commercial	SMAQMD	23	32	9	13	10	41
Commercial	D&B	0	139	25	4	0	168
Total							302
CONVERTED							
Non-Commercial	SMAQMD	3					3
Commercial	SMAQMD	13	10	2	5	3	27
Commercial	D&B	0	0	0	0	0	0
Total							63
INCURRING COSTS							
Non-Commercial	SMAQMD	3					3
Commercial	SMAQMD	10	22	7	8	7	14
Commercial	D&B	0	139	25	4	0	168
Total							239

4.0 ESTIMATED COST OF AMENDMENTS TO RULE 459

ERG used SMAQMD permit, inventory, and inspection data on the number of spray booths and annual coating usage to conduct a facility-specific cost analysis for each permitted facility. Unpermitted facilities were assumed to have a single spray booth, train one person in the use of water-borne coatings, and use 18.4 gallons of coatings per year. Equipment, training, and incremental coating costs are incurred in the first year while only incremental coating costs are incurred in subsequent years. The initial costs were annualized over a 10-year period with a 7 percent discount rate.

Table 5 summarizes the results of the Low Cost and High Cost scenarios. Costs are aggregated by revenue category. For both scenarios, the one-time costs of equipment and training total \$240,210. The scenarios differ according to the incremental cost incurred every year for using waterborne coatings (i.e., the Low Cost scenario assumes zero incremental coating costs on a coverage basis). For the Low Cost Scenario, the total annual cost is \$0 and the total annualized cost is \$34,161. Average annualized costs per facility range from \$127 to \$166 depending on the revenue category with an overall average of \$143 per facility.

Under the High Cost scenario, the results are \$509,919 in annual costs, and \$579,877 in annualized costs. This High Cost scenario is conservative because the improved coverage of water based coatings has not been taken into account. Improved coverage will likely result in a decrease in coating usage.

5.0 POTENTIAL IMPACTS

5.1 Suppliers

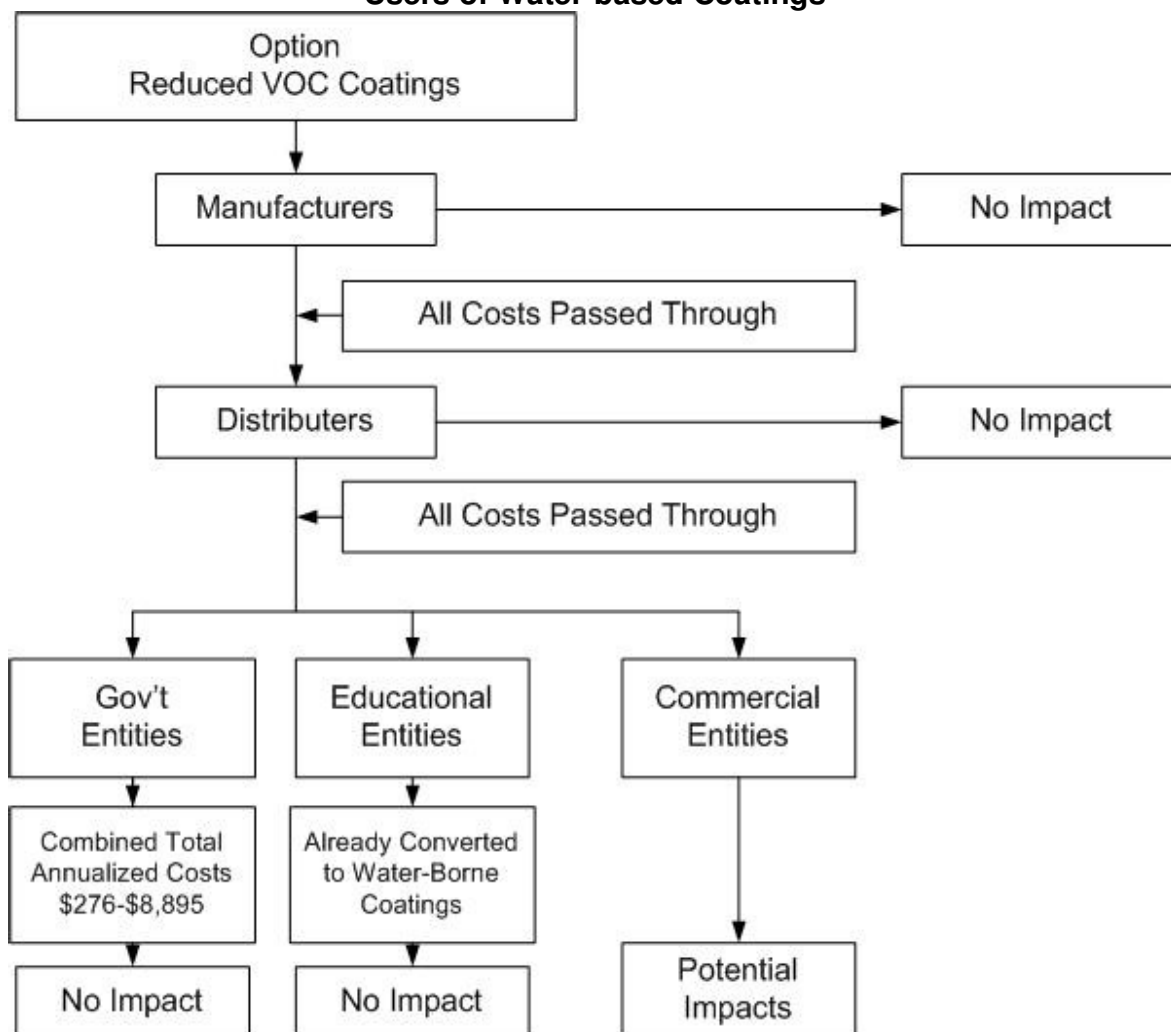
5.1.1 Who Might Bear Costs?

Figure 1 is a logic diagram of how different groups might be affected by Rule 459 amendments. Beginning at the top of the figure, the coatings manufacturers incur the cost of adding a new product line (water-based coatings). These requirements have already been in place in different areas of California. Based on conversations with the distributors, the manufacturers pass all increased costs for water-based coatings to the distributors. Thus, ERG estimates that there will be no impacts on the manufacturers. The same conversations consistently indicated

Table 5. Cost Analysis

Category	Variable	Total	Revenue Category						
			Unknown	<\$250,000	\$250,000 - \$500,000	\$500,000 - \$750,000	\$750,000 - \$1,000,000	>\$1,000,000	
SMAQMD Non-Commercial	Counts	3	3						
	One-time	\$1,940	\$1,940						
	Annual	\$8,054	\$8,054						
	Annualized	\$8,895	\$276-\$8,895						
SMAQMD Commercial	Counts	68	10	22	7	8	7	14	
	One-time	\$75,310	\$9,700	\$24,640	\$7,890	\$9,410	\$7,340	\$16,330	
	Annual	\$424,060	\$24,163	\$63,327	\$59,703	51,590	42,990	\$181,927	
	Annualized	\$464,470	\$1,380-\$27,238	\$3,498-\$71,271	\$1,120-\$65,004	\$1,336-\$56,926	\$1,043-\$47,044	\$2,324-\$196,987	
D&B Commercial	Counts	168	0	139	25	4	0	0	
	One-time	\$162,960	\$0	\$134,830	\$24,250	\$3,880	\$0	\$0	
	Annual	\$77,805	\$0	\$64,374	\$11,578	\$1,852	\$0	\$0	
	Annualized	\$106,512	\$0	\$88,126	\$15,850	\$2,536	\$0	\$0	
Totals	Counts	239	13	161	32	12	7	14	
	One-time	\$240,210	\$11,640	\$159,470	\$32,140	\$13,290	\$7,340	\$16,330	
	Annual	\$509,919	\$32,217	\$127,701	\$71,281	\$53,803	\$42,990	\$181,927	
	Annualized	\$579,877	\$36,133	\$159,397	\$80,854	\$59,462	\$47,044	\$196,987	
	Average Annualized Cost per Facility	\$143-\$2,426	\$127-\$2,779	\$141-\$990	\$143-\$2,527	\$157-\$4,995	\$149-\$6,721	\$166-\$14,071	

Figure 1. Logic Diagram of Potential Impacts on Manufacturers, Distributors, and Users of Water-based Coatings



that distributors pass through all increased costs to their customers. Thus, ERG estimates there will be no impacts on the distributors.

Government and educational entities conduct repainting operations to maintain their fleet of vehicles or to teach automobile painting and several of them appear in SMAQMD’s list of permitted facilities. Under the Low Cost scenario, the **combined** annualized cost incurred for the three noncommercial facilities is \$276. This minimal cost is likely to have no adverse impact on government facilities. Under the High Cost scenario, the combined annualized cost is \$8,895. This cost is small compared to the operating budget and can be mitigated by training in proper

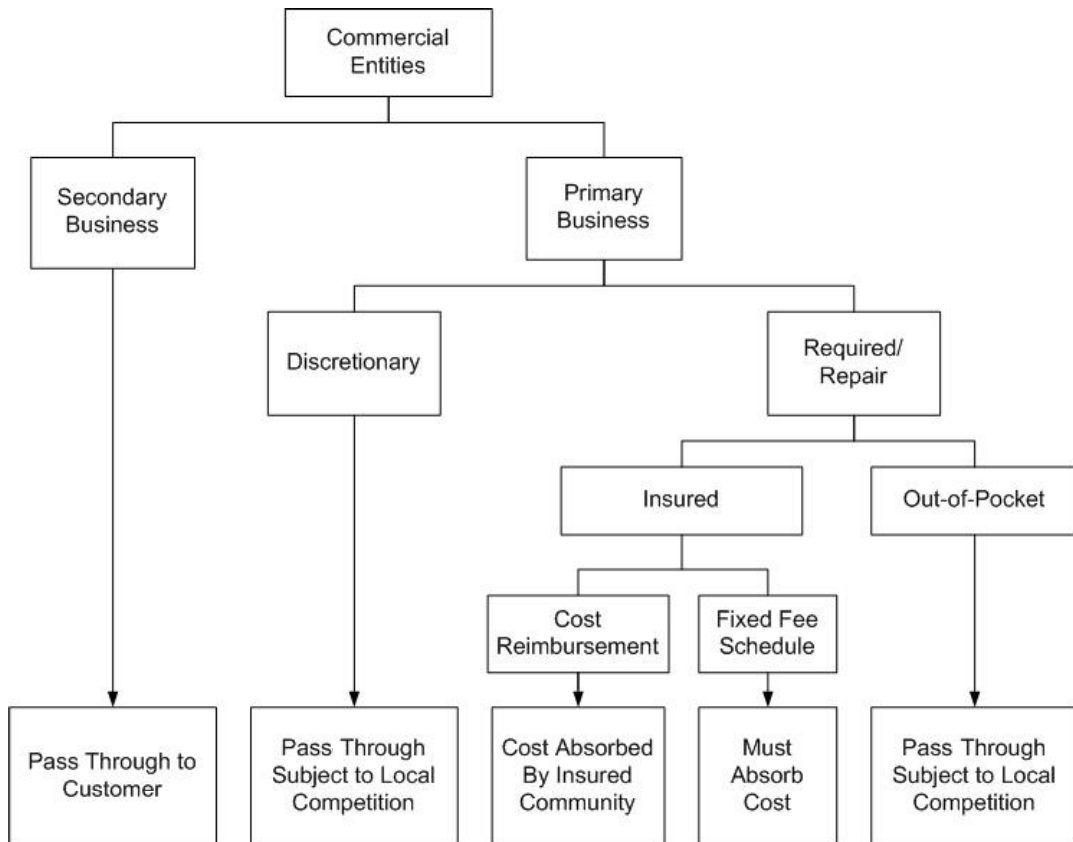
and efficient application of water-based coatings. Both educational entities in the analysis have already converted to water-based coatings with no discernable impact.

However, there might be impacts on commercial entities and these are described in more detail in Figure 2. Rule 459 amendments might affect businesses where vehicle painting/painting is part of a larger business (see box labeled “Secondary Business”). For example, MCM Construction in Sacramento is on the list of permitted facilities where vehicle repainting appears to be part of the maintenance program for its own equipment (MCM, 2011). The Rule 459 amendment costs would be very small compared to the overall operations of such businesses and ERG believes that it is highly likely that all costs could and would be passed on to the consumer. However, we analyzed secondary businesses as if they could not pass costs through to the consumers of their primary business’s products and services.

The right side of Figure 2 shows some of the possible situations for entities whose primary (if not sole) business is vehicle painting/repainting. If the repainting job is discretionary (e.g., the customer doesn’t like the color any more, etc.), the business might be able to pass through some of the additional costs subject to the pressure on prices from the local competition.

The next branch in the logic diagram concerns repainting that is necessary, perhaps part of a vehicle repair. If the driver is insured and the insurance company uses a cost-reimbursement approach, then the autobody shop is able to pass through the additional costs. The insurance company, in turn, distributes the cost among its policy holders. Given the relative magnitude of the costs associated with accident repairs and the marginal cost increase for water-based coatings, ERG considers it likely that the insured community would see miniscule, if noticeable, increases in policy costs.

Figure 2. Logic Diagram of Potential Impacts on Commercial Entities



5.1.2 Potential Impacts

Costs as Percent of Revenues and Net Income. ERG examined IRS data for the automotive repair and maintenance industry for tax year 2007 (the most recent year available) (IRS, 2011). These data represent more than 110,000 returns nationwide. For this industry, a substantial proportion of businesses (44 percent) do **not** have net income (i.e., the business showed a loss for the year). For the 56 percent of businesses reporting net income, the profit margin was 6.2 percent. However, in keeping with the High Cost analysis approach, ERG calculated the profit margin for all returns, profitable and not profitable. The profit margin used in the calculations is 4.3 percent.

Table 6 shows the annualized compliance costs compared to revenues and net income by revenue category and by total industry. Both converted and unconverted facilities were included

when calculating the category average for a total of 273 facilities.² Table 6 compares the category average revenues (per facility) with the average annualized cost per facility. Annualized costs from 0.0 percent to 0.9 percent of revenues for all size categories under both scenarios. Annualized costs range from 0.0 percent to 3.0% of net income under the Low Cost scenario and from 3.1 percent to 21.0 percent under the High Cost scenario. On an industry basis, under the High Cost scenario, the annualized costs are 3.1 percent of net income; the impacts reflect the substantial proportion of the industry that has already converted to water-based coatings (63 of 302 facilities or 21 percent of the population). These results are not inconsistent with other analyses; BAAQMD 2008 found the cost/net income ratio was 19.5 percent for their smallest category. Even under High Cost assumptions (no costs passed through to the customer and highest incremental cost for water-based coatings) did the annualized costs exceed net income.

Table 6. Compliance Costs to Revenue and Net Income by Size Category

Category	No. Incurring Costs	Average Revenues	Average Net Income	Annualized Cost	Annualized Cost to	
					Revenues	Net Income
Unknown	13	— ^a	— ^a	\$127-\$2,779	— ^a	— ^a
<\$250,000	161	\$109,194	\$4,717	\$141-\$990	0.1%-0.9%	3.0%-21.0%
\$250,000 - \$500,000	32	\$346,629	\$14,973	\$143-\$2,527	0.0%-0.7%	1.0%-16.9%
\$500,000 - \$750,000	12	\$614,249	\$26,534	\$157-\$4,955	0.0%-0.8%	0.6%-18.7%
\$750,000 - \$1,000,000	7	\$884,500	\$38,207	\$149-\$6,721	0.0%-0.8%	0.4%-17.6%
>\$1,000,000	14	\$10,658,408	\$460,408	\$166-\$14,071	0.0%-0.1%	0.0%-3.1%
Industry Average	239	\$1,782,928	\$77,017	\$143-\$2,426	0.0%-0.1%	0.2%-3.1%

^a Unable to calculate average revenues or net income due to lack of data.

Return on Equity. The average net worth and net income can be calculated from the IRS data. The ratio of these values is the return on equity. Under the Low Cost scenario, the return on equity declines by 0.3 percent. Under the High Cost Scenario, the return on equity declines by 5.7 percent.³

Output, Earnings, and Employment. ERG used the Regional Input-Output Modeling System (RIMS II) developed by the U.S. Commerce Department, Bureau of Economic Analysis

² ERG could not locate revenue information for 23 commercial permitted facilities, see Table 4. Adding these and the six noncommercial facilities results in a total count of 302 facilities in the analysis.

(BEA) for detailed industry 8111A0 (automotive repair and maintenance, except car washes) to estimate the loss in output, earnings, and employment (BEA, 2011a). RIMS multipliers are done on the basis of 2007 dollars. For output and earnings, the multipliers are from dollars to dollars. Hence, no adjustment needs to be made for a change in time. The multiplier for employment, however, is in terms of jobs per \$1 million (2007 dollars). ERG used the change in Consumer Price Index (CPI-U) (BLS, 2011a) to deflate the annualized regulatory cost to 2007 dollars before applying the multiplier.

ERG used BEA estimates of Gross Domestic Product (GDP) by Metropolitan Area for the Sacramento-Arden-Arcade-Roseville, CA (Metropolitan Statistical Area or MSA) (BEA, 2011b). The estimated 2009 GDP for the NAICS Sector 81 “other services except government” is \$2.47 billion. The sector includes other services, such as computer and office equipment repair and maintenance and personal and laundry services. As a result, the relative impacts on output might be underestimated, but no further detail was available from BEA.

ERG used annual payroll data for NAICS 81112 from the 2008 County Business Patterns for Sacramento County to estimate earnings (Census, 2011a).⁴ This is about \$59.2 million.

Estimating the number of jobs associated with the industry is complicated by the large proportion of single-person facilities. If these are sole proprietorships and the proprietor does not pay himself or herself a set wage, they would not appear in County Business Pattern data as a “paid employee.” Thus, ERG used both County Business Pattern data and data from the Census’ Non-employer statistics (Census, 2011b) to estimate the number of jobs associated with the industry. For Sacramento County, in 2008, this is about 1,605 jobs.

Table 7 presents the data and calculations for estimating impacts on output, earnings, and employment. The added costs for the Low Cost scenario might lead to the loss of \$44,905 in output, \$43,518 in earnings, and 0 jobs. For perspective, this is 0.07 percent of the earnings in this industry in Sacramento County, and no discernable impact on output or employment. The added costs for the High Cost scenario might lead to the loss of \$762,248 in output, \$738,705 in

³ These findings are more favorable than those in CARB (2005) which found a 15% change in the ROE and said “If the automotive refinishing facilities absorbed all costs, they would be adversely impacted by the proposed SCM” (p. VII-9).

⁴ The most recent year for which data are available.

earnings, and 6 jobs. For perspective, this is 0.03 percent of the output, 1.25 percent of the earnings, and 0.37 percent of the employment in this industry in Sacramento County.

Sacramento County Unemployment Rate. The preliminary estimate of the December 2010 unemployment rate for Sacramento County is 12.61 percent (BLS, 2011b). Neither the Low Cost or High Cost scenario has an effect on the unemployment rate.

Table 7. Potential Impacts from Low Cost Scenario

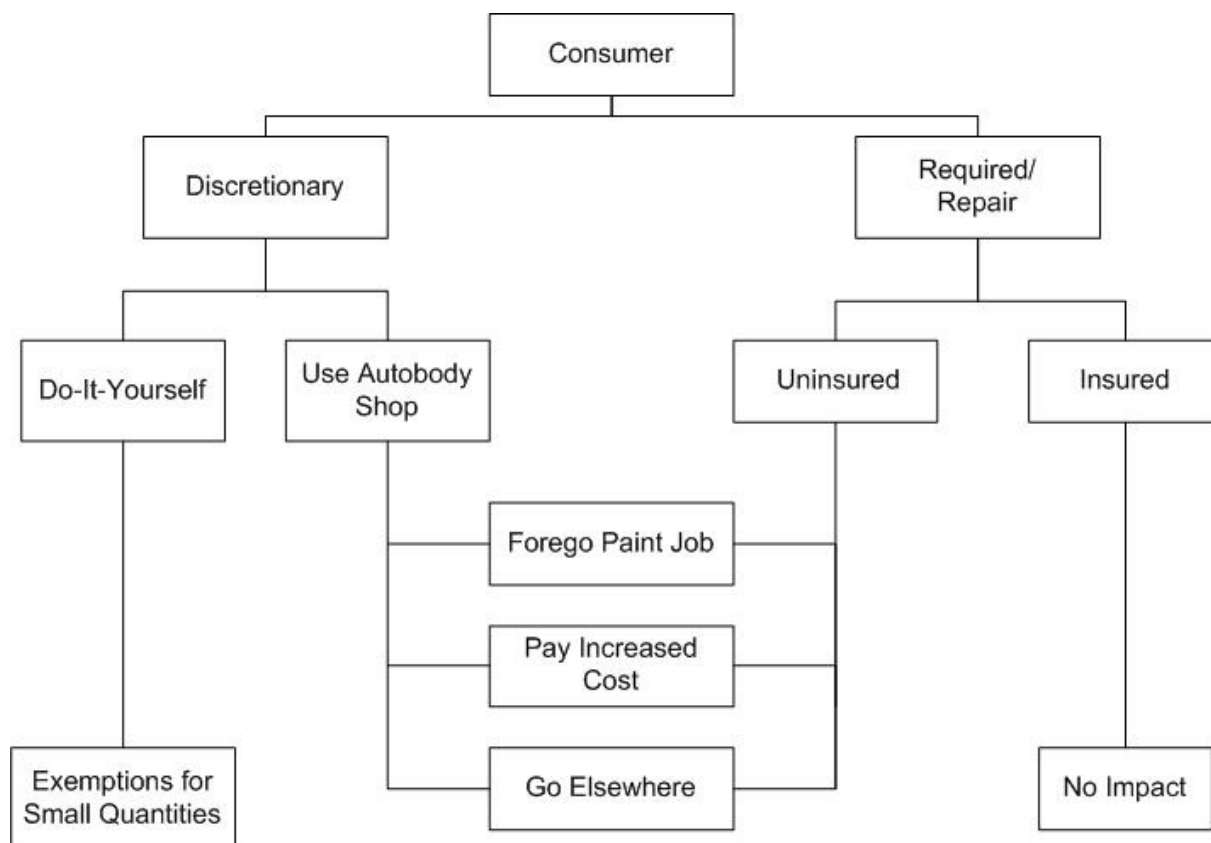
Parameter	Data
Annualized Cost of the Rule (2010\$)	\$34,161-\$579,887
Annualized Cost of the Rule (2007\$)	\$32,483-\$551,385
RIMS II Multipliers For Automotive Repair and Maintenance	
Output (\$/\$)	1.3145
Earnings (\$/\$)	1.2739
Employment (Jobs per \$1 million, 2007\$)	11.6816
Potential Impacts	
Output	\$44,905-\$762,248
Earnings	\$43,518-\$738,705
Employment	0.00-6.00
Sacramento County Data	
Output (2009)--all other services except government (\$)	\$2,470,000,000
Earnings (2008)--NAICS 81112	\$59,236,000
Paid employees in NAICS 811121 (2008)	1,156
Nonemployer firms in NAICS 81112	449
Total Jobs	1,605
Relative Impacts	
Output	0.00%-0.03%
Earnings	0.07%-1.25%
Jobs	0.00%-0.37%

5.2 Consumers

5.2.1 Who Might Bear Costs?

Figure 3 is the logic diagram for evaluating the potential impacts on consumers. In these analyses, the suppliers are assumed to pass through **all** increased costs to the consumer. That is, there are no impacts on the suppliers. A consumer might wish to touch up paint flaws that accumulate through routine use. If the consumer decides to do it herself/himself, the amendments to Rule 459 contain exemptions for aerosol coating products (Section 459.111) and containers with no more than 1 fluid ounce of product (Section 459.112).

Figure 3. Logic Diagram of Potential Impacts on Consumers



If, in his or her discretion, a consumer decides to use an autobody shop to repaint all or parts of a vehicle to match its original color or the change the vehicle’s color, there are three possible reactions to any cost increases for the use of water-borne coatings. The consumer can forego or delay the paint job, pay the increased cost, or go outside the SMAQMD region to a business that is not required to use water-based coatings.

For this analysis, if the paint job is associated with a repair, the paint job is considered necessary. If the customer is insured, he or she would see no impact from Rule 459 amendments. If the customer is not insured—and, during 2002-2004, about 15 percent of the motorists in

Sacramento County were not insured⁵—then the consumer faces the same three decisions as he or she would for discretionary painting (California, 2011).

For this analysis, ERG assumes that accidents are equally likely to occur to insured and uninsured motorists. Thus a consumer might be exposed to higher prices for water-based coatings in the 15 percent of the cases where an uninsured motorist pays out-of-pocket for accident repairs plus some unknown percentage of discretionary paint jobs.

5.2.2 Potential Cost Increase to Consumers

ERG found several references that refer to the amount of coatings needed to coat an entire vehicle (AutocolorLibrary.com, 2011; Lutz, 2010; and Wise, 2011). These range from three to four quarts for a mid-sized car to seven to eight quarts for a truck or large vehicle. Most of the time, customers are not looking to recoat an entire car. The vehicle is painted as part of a repair, which might be a quarter to half the vehicle. Under the High Cost scenario, the estimated cost differential for water-borne coatings is \$25.17 per gallon.⁶ Thus, the price increase for a mid-sized car might range from \$4.72 (three quarts for car, one-quarter painted) to \$12.58 (4 quarts per car, half painted) for a mid-sized car. For a large vehicle, the estimated price increase ranges from \$11.01 to \$25.17. Given that the average ticket price for a repair is \$2,295 (Autobody Shop Business, 2010), the price increase to the customer would range from 0.21 percent to 1.1 percent of the repair price.

The 2008 median household income for Sacramento County is \$56,882 (Census, 2011c). Thus, the incremental cost of using water-based coatings to repaint an entire vehicle is less than 0.1 percent of median household income.

5.2.3 Potential Demand Shifting to Non-Sacramento County Shops

ERG does not anticipate any discernable loss in business to surrounding areas for two reasons. First, the neighboring counties of San Joaquin, Placer, Yolo, and Solano have already enacted requirements comparable to the Rule 459 amendments. That these areas converted to water-based coatings with minimal, if any, impacts supports Sacramento's use of the Low Cost scenario as the primary findings for the socioeconomic analysis. Even if there were a price

⁵ The most recent years for which data appear to be available

⁶ Under the Low Cost scenario, there is zero incremental coating cost so there are no impacts to the consumer.

differential for water-borne coatings, these regions would have already incorporated them in the prices offered to customers. Second, the High Cost estimate for painting half a large vehicle is \$25.17 or 1.1 percent of the overall repair cost. Any incentive to take the job outside of Sacramento is likely to be negated by the additional travel time, travel expenses, and annoyance factors involved.

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