V. PROPOSED CONTROL MEASURE

A. BASIS AND SUMMARY OF PROPOSED REQUIREMENTS

Health and Safety Code Section 39665, paragraph (c), states that a control measure adopted by the ARB for a toxic air contaminant without a threshold exposure, like Cr(VI), must "reduce emissions to the lowest level achievable through application of best available control technology." However, the same section of the Code allows the ARB to adopt lesser regulation of Cr(VI) emissions as sufficient to "prevent an endangerment of public health" or more stringent regulation as necessary for such protection.

The staff's proposed control measure for chrome plating emissions is included as Appendix V.

1. Hard Plating and Anodizing

As discussed earlier, one potential control requirement for hard platers and anodizers is 95 percent control and the equivalent alternative of 0.15 mg/amp-hour. The proposed control measure imposes this as a minimum for all shops. This requirement should be satisfiable at virtually all shops with well designed and operated equipment of the kind routinely used in the industry.

If only this requirement were applied to all hard plating/anodizing shops, emissions of Cr(VI) would decrease 80 percent in California. However, the remaining risks and cancer incidence would be considerable. Table V-1 shows the risks and cancer incidence around the shops with the highest and 10^{th} highest estimated emissions before control if these shops controlled emissions by 95 percent (of the average uncontrolled emission rate). The table shows maximum risks of 1,400 and 3,200 per million and theoretical cases of cancer of 32 and 72 per shop (all at the high end of the range in the risk factor). The statewide cancer incidence due to hard plating and anodizing shops if they all controlled by 95 percent would be up to 590 cases in 70 years.

Table V-1

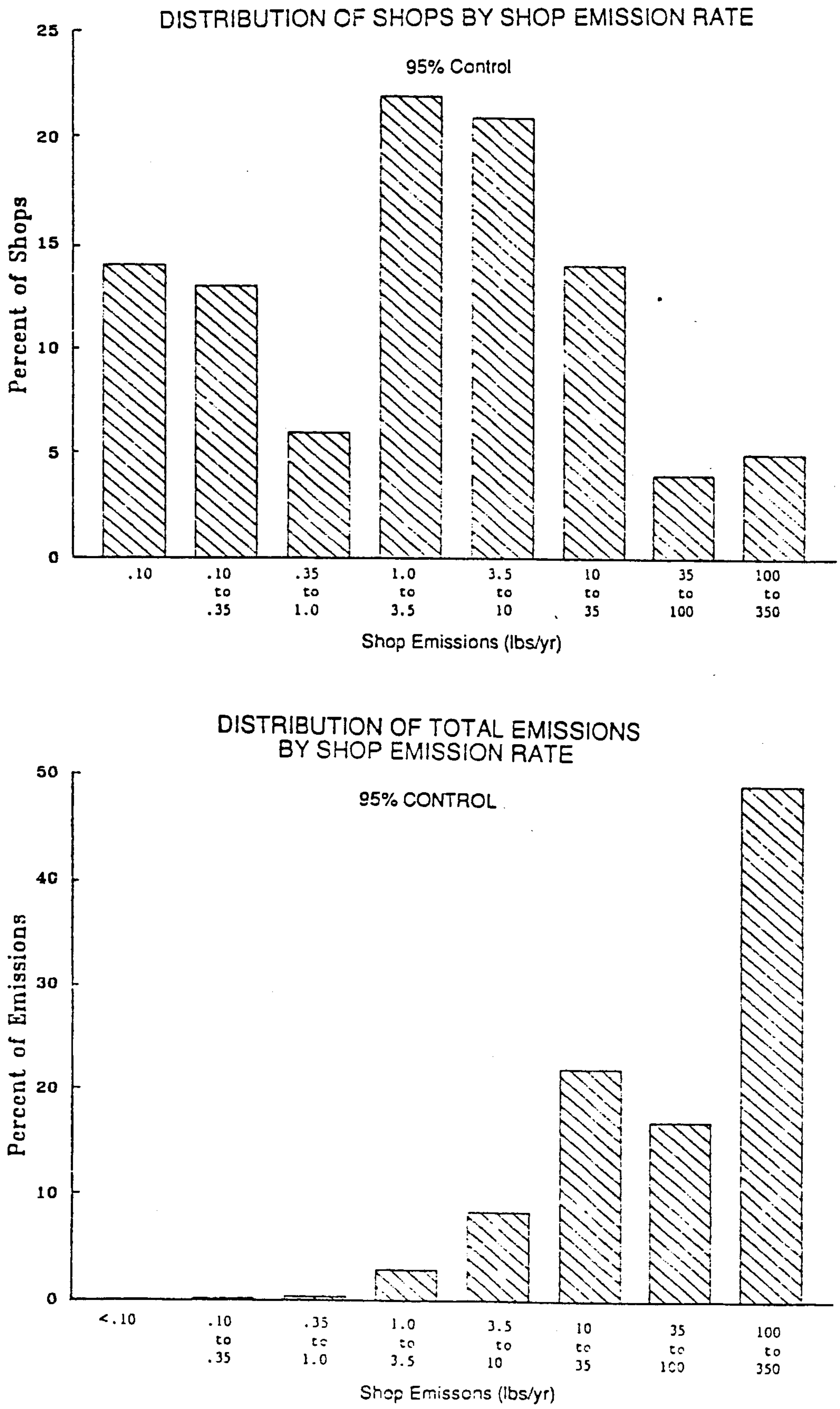
Hypothetical Risks and Cancer Incidence Near Large Hard Plating Shops at 95 Percent Control[a]

	Max. risk, per million[a]	Cases of cancer[a]
Largest Shop	260 to 3,200	6 to 72
Tenth Largest shop	120 to 1,400	2.6 to 32

a - in 70 years

The staff believes that these statistics would require a greater degree of control. Therefore we propose that the control measure allow emissions of Cr(VI) from an entire plating shop to exceed two pounds per year only if 99 percent control -- nearly the greatest demonstrated -- has been achieved. Two pounds a year would be the approximate median emission rate among all shops if they all satisfied the 95 percent/0.15 mg/amp-hour requirement. However, the shops that would emit less than two pounds of Cr(VI) per year (half the shops)

Figure V-1


DISTRIBUTION OF SHOPS BY SHOP EMISSION RATE
95% Control
Percent of Shops
0
5
10
15
20
25
.10
.10 to .35
.35 to 1.0
1.0 to 3.5
3.5 to 10
10 to 35
35 to 100
100 to 350
Shop Emissions (lbs/yr)
DISTRIBUTION OF TOTAL EMISSIONS BY SHOP EMISSION RATE
95% CONTROL
Percent of Emissions
0
10
20
30
40
50
<.10
.10 to .35
.35 to 1.0
1.0 to 3.5
3.5 to 10
10 to 35
35 to 100
100 to 350
Shop Emissons (lbs/yr)

would account for only two percent of total emissions. (See Figure V-1.) Because very little further reduction could be obtained by requiring more than 95 percent control at these smaller shops, the staff recommends that the 99 percent requirement be limited to the shops emitting more than two pounds per year.

The recommended alternative to 99 percent control is .03 mg of Cr(VI) per amp-hour. Like the 99 percent control, a slightly lower emission rate has been demonstrated at one source. Not all shops required to control beyond 95 percent would have to attain 99 percent. A lesser degree of control would suffice to bring some shops below two pounds per year.

Technology innovative in the plating industry might be needed to satisfy the 99 percent/.03 mg requirement in some cases. This could include venturi scrubbers and wet ESPs or, as seems likely on the basis of cost, the large de-misters used at sulfuric acid plants. However, 99 percent control has been demonstrated at a plating tank with a low-energy scrubber, as has .03 mg/amp-hour. Therefore, the staff believes that with attention to optimal design and operation, the typical large plating shop could achieve the 99 percent/.03 mg requirement with carefully designed and operated versions of the technology currently familiar to the industry. However, the difficulty and cost of this could be greater than for 95 percent control, and the assurance that all affected shops could comply would be less.

Table V-3 shows the maximum risk and the cancer incidence that would remain if the shops emitting over two pounds of Cr(VI) per year controlled by 99 percent or to 0.03 mg/amp-hour. The highest risk near the largest shop would be up to 640 per million and the total cancer incidence would be 12 to 140. Since residual maximum risk in Table V-3 is large, we believe that further reductions in emissions should be required for the largest sources. This would mean levels of emission reductions that have not been demonstrated at chrome plating tanks. Compliance would require the application of innovative technology. Candidates would be wet ESP's and sulfuric acid plant de-misters. However, for a super-99 percent requirement, neither assurance of success nor precise estimates of costs can be made.

Table V-3

Risks and Cancer Incidence Near Hard Plating/
Anodizing Shops if Large[a] Shops Controlled by 99%

	Maximum Risk, per 10^6	Cases of Cancer
Largest shop	53 to 640[b]	1.2 to 14
All shops	--	12 to 140

a emitting over two pounds/year
b low risk factor to high risk factor

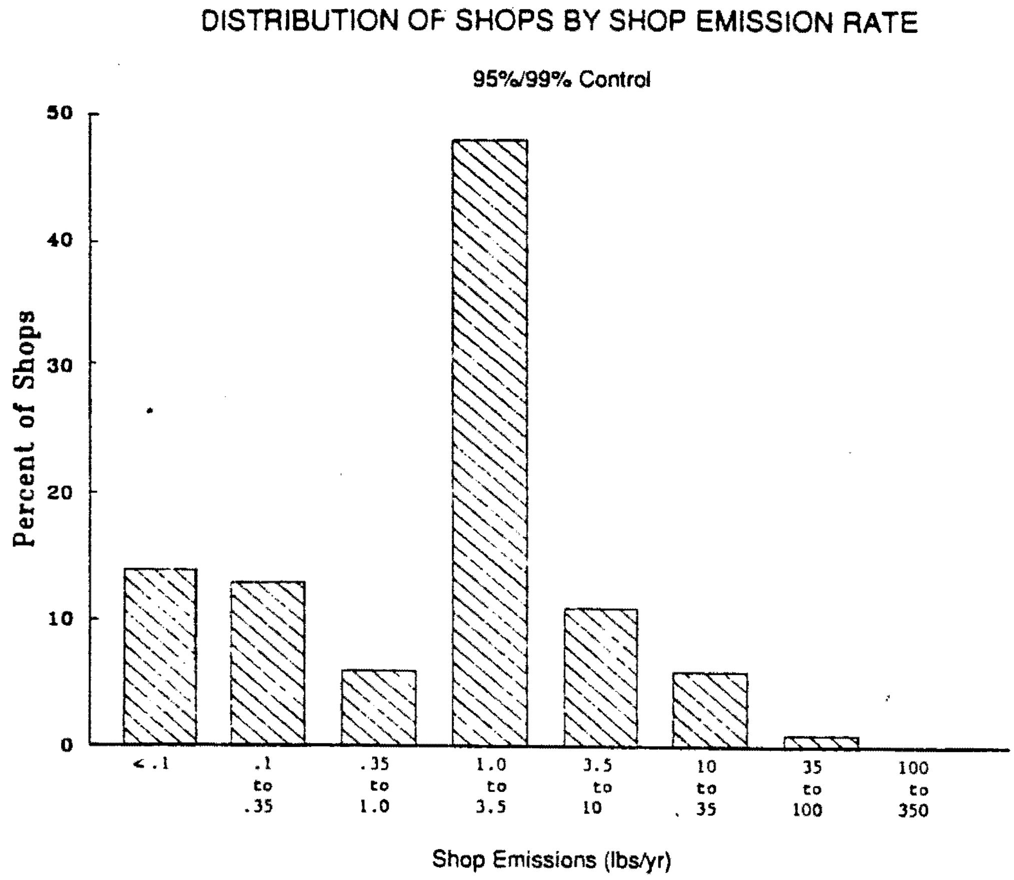
The staff recommends 99.8 percent control and the .006 mg/amp-hour alternative for this third and most stringent level of control. This value is the highest control efficiency reported for the two candidate control technologies. Given the sensitivity of the ARB source test method, to require higher control efficiency would be pointless; too little Cr(VI) would be available for sampling to reliably demonstrate compliance with the requirement. Also, greater control by the identified potential control technologies has not been demonstrated.

Not all shops required to control by more than 99 percent would have to attain 99.8 percent. A lesser degree of control would suffice to bring some shops below 10 pounds per year.

Because of the uncertainty that a shop could achieve 99.8 percent control or .006 mg/amp-hour, we recommend that the number of shops affected be few. Figure V-2 shows that the shops emitting over ten pounds per year (while satisfying 99 percent control or .03 mg/amp-hour) comprise seven percent of all shops but would contribute half of all cancer incidence under the 95 percent /99 percent dual control requirement discussed so far. Therefore, the 99.8 percent/.006 mg requirement could reasonably be applied to the shops emitting over ten pounds of Cr(VI) per year. The effect would be to induce about 11 large shops to reduce emission to the ten pounds per year level either by finding adequate control technology or curtailing operation. At ten pounds per year, the maximum risk near a shop would be 15 to 180 per million. Lowering the cut-off for 99 percent control to a value less than ten pounds would have little effect on the maximum risk.

Table V-4 summarizes the proposed requirements and Table V-5 shows how adding levels of stringency to the control measure would reduce the risk and cancer incidence.

Figure V-2


DISTRIBUTION OF SHOPS BY SHOP EMISSION RATE
95%/99% Control
Percent of Shops
50
40
30
20
10
0
<.1
.1 to .35
.35 to 1.0
1.0 to 3.5
3.5 to 10
10 to 35
35 to 100
100 to 350
Shop Emissions (lbs/yr)

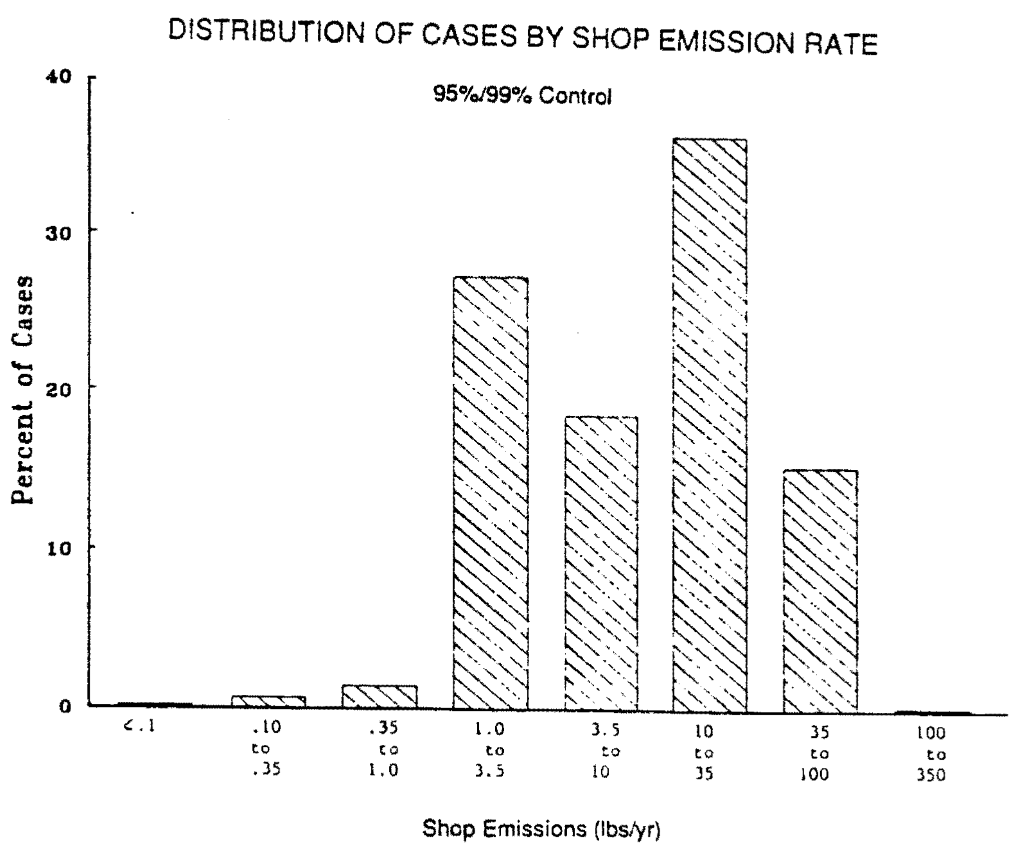

DISTRIBUTION OF CASES BY SHOP EMISSION RATE
95%/99% Control
Percent of Cases
40
30
20
10
0
<.1
.10 to .35
.35 to 1.0
1.0 to 3.5
3.5 to 10
10 to 35
35 to 100
100 to 350
Shop Emissions (lbs/yr)

Table V-4

Requirements of Proposed Control Measure for Hard Platers

Annual controlled emissions from shop	Alternative limits (all tanks)		
	mg Cr./amp-hour		% control
less than 2 lbs.	0.15	or	95
greater than 2 lbs. but less than 10 lbs.	0.03	or	99
greater than 10 lbs.	0.006	or	99.8

Table V-5

Incremental Benefits of Adding Levels of Stringency to Control Requirements at Hard/Anodizing Shops

	Range of Required Control			
	(Current)	95%[a]	95% to 99%	95 to 99.8%[b]
Maximum risk	1,000-13,000[c]	210-2,600	43-520	8.6-100
Total cases[e]	220-2,700	40-480	10-120	7.7-94

a at all shops
b control measure
c low risk factor - high risk factor
e dec., hard, and anodizing

2. Decorative Platers

The proposed control measure would require all decorative plating tanks to reduce emissions of Cr(VI) by at least 95 percent either by use of an anti-mist additive or control equipment.

3. Other Provisions

The measure would prohibit the operation of a plating tank for hard chrome plating and anodizing unless the tank has an emission collection system.

The measure would also require all hard platers and chromic acid anodizers to record the amp-hour usage by the tanks and to provide that information to the district air pollution control officer (APCO) within six months after district adoption of regulations enacting the measure and upon request thereafter. Some of the hard platers and anodizers are small businesses, and thus this measure would impose a report requirement on small businesses. Staff believes that small businesses should not be exempt from this initial report requirement because the APCO will need the information from all of the businesses, regardless of size, in order to insure prompt and complete implementation of the control measure. Under the measure, the APCO will decide whether or not later reports are needed. Staff will recommend that the board make a finding that it is necessary for the health, safety, and welfare of the people of the state that the regulation requiring the report apply to small businesses.

Other parts of the measure define key words and phrases, and provide a compliance schedule.

B. REDUCTION OF RISK AND CANCER INCIDENCE

Table V-6 shows the reductions in risk and cancer burden around the largest hard plating shop in the state and the cumulative reduction of cancer burden in each populous air basin. Under the proposed control measure, the maximum individual risk would decrease from 13,000 to 100 per million, and the statewide 70-year cancer burden would be reduced from 2,700 to 94 cases (all statistics at the high end of the range of risk).

For decorative platers, the requirement to always use an anti-mist additive would reduce emissions by 81 pounds per year and cancer cases by 1.5 to 19 in 70 years at shops not now using these controls.

Table V-6

Reductions in Risk and Cancer Cases
Provided by Proposed Control Measure

	Cases of Cancer[a]		Max. Risk[a], per million	
	reduction	residual	reduction	residual
Most emissive shop	24-290[b]	.19-2.4	1,000-13,000[b]	8.6-100
Air Basin				
Bay Area	19-230	.7-8		
Sacramento	18-220	.6-8		
San Diego	23-290	.8-10		
San Joaquin	2-26	.1-1		
So. Cent. Coast	0-0.5	0-0.1		
South Coast	160-1,900	6-70		
Total[c]	220-2,600	7.7-94		

a over 70 years
b low risk factor-high risk factor
c columns do not add because of rounding

VI. COSTS OF PROPOSED CONTROL MEASURE

A. COSTS TO PLATERS

1. Hard Plating and Anodizing

The staff has estimated a cost for each hard/anodizing shop for which we know the total surface area of the plating tanks. Surface area is the primary variable determining the necessary capacity of the control device. We have assumed 250 cubic feet per minute (capacity) per square foot of tank.

We assume that shops require to achieve 95 percent control would install a mesh pad de-mister (although not all such shops will actually need to install a complete new device.) We have used an installed cost of $14,000 for a 10,000 CFM de-mister, varying by the 0.7 power with size. For 95 to 99 percent control, we assume the installation of a packed bed scrubber (with de-mister) at an installed cost of $35,000 for a 10,000 CFM device. For control better than 99 percent, we assume the installation of a sulfuric-acid-plant-type high-efficiency de-mister at an installed cost of $140,000 for 10,000 CFM. Details on the derivation of the capital costs and of associated operating costs are given in Appendix II.

The annualized costs of capital and operation are based on an annual, after-tax net cash flow analysis discounted at six percent per year for 10 years. Depreciation was calculated over 10 years by the double-declining balance method. The total income tax rate was 43.6 percent. These costs represent "revenue requirements" -- the increased revenue that the plater would need to offset his increased expenses and to pay income taxes on his increased revenue.

Table VI-1 shows the resulting costs for the median (by tank area) shop in each of the three control categories. The median capital costs, including source test costs and permits, range from $17,500 to $480,000. The median annual revenue requirements range from $4,500 to $150,000 per year.

Table VI-1

Example Costs of Compliance
(median values)

	Control Requirement		
	95%[a]	95 to 99%[b]	99%[c]
Capital cost (initial investment)	$17,500	$61,000	$480,000
Operation & maintenance (annual)	$ 2,400	$11,000	$ 94,000
Annualized cost (revenue required)	$ 4,500	$18,000	$150,000

a de-mister
b packed bed scrubber
c high-efficiency de-mister

The costs in Table VI-1 over-estimate the costs that some platers would experience because some already comply with the proposed control measure, and some may only have to upgrade existing scrubbers or de-misters. On the other hand, some platers might incur higher costs if they have to install water treatment facilities for chromium-laden waste water from new scrubbers.

However, our data indicate that this expense would not be common. Several platers already operating complying scrubbers are able to recycle all the scrubber overflow into the chroming tanks. Some hard platers already have water treatment facilities on-site. Some hard platers will install only demisters, which produce little wastewater. Thus, we do not expect incresed wastewater management to be a generally significant problem caused by the proposed control measure.

2. Decorative Plating

Data from an EPA[26] contractor indicate that the approximate cost of using an anti-mist additive (foam or surfactant) is $.002 per cubic foot of tank content per hour. We applied this value to parameters for all plating shops that do not now use anti-mist additives. The resulting annual costs per shop range from $25 to $2,200. Permits would cost the equivalent of about $370 per shop (based on information in Section E of this chapter). The total cost to all decorative platers would be about $27,000 per year.

B. COST-EFFECTIVENESS

1. Hand Plating/Anodizing

Table VI-2 shows the statewide reduction in the cases of cancer near sources regulated at each of the three levels. It also shows the total annualized control costs for each category. Thus, the estimated cost-effectiveness of the proposed measure for hard plating emissions is $410,000 to $5,000,000 (depending on risk factor) per case avoided among the shops required to meet 95 percent control. The value among the shops emitting at least two but fewer than ten pounds per year (up to 99 percent control) is $120,000 to $1,500,000 per case avoided. The cost for the shops emitting ten or more pounds per year (figured at four times scrubber costs) would be $80,000 to $970,000 per case avoided. However, costs for this group, cannot be estimated precisely. Overall, the cost- effectiveness is $100,000 to $1,300,000 per case. To the degree that platers are able to use existing de-misters and scrubbers, these costs are biased high.

Table VI-2
Cost-Effectiveness of Proposed Control Measure

Control Requirement	Reduction in Cases (70 yrs.)	Total Annual Cost (10^6 \$)	Cost per Case Avoided (10^6 \$)
Hard Plating/Anodizing			
95%	5.5-67	.39	.41 to 5.0
95 to 99%	97-1,200	2.06	.12 to 1.5
>99%	110-1,400	1.54	.080 to .97
Overall	210-2,600[b]	4.0[a]	.11 to 1.3
Decorative Plating			
Mist suppressant	1.6-19	.027	.10 to 1.2

a assumes zero cost for shops now using anti-mist foam; $0.2 million additional cost to install scrubbers at such shops

b does not equal column sum because of rounding

The distribution of costs per case is shown by Figure VI-1. Among the shops for which we can estimate costs per case, the median value is $195,000 (or $2,400,000 at the low risk factor). The figure shows one percent of shops with values 650 or more times this median. These shops do very little plating and contribute only 0.0002 percent of current total emissions. Since the shops are service shops in large facilities, rather than profit-making job shops, they might cease chrome plating instead of installing controls. In that case, the remaining shops would all have costs per case less than $44 million.

2. Decorative Plating

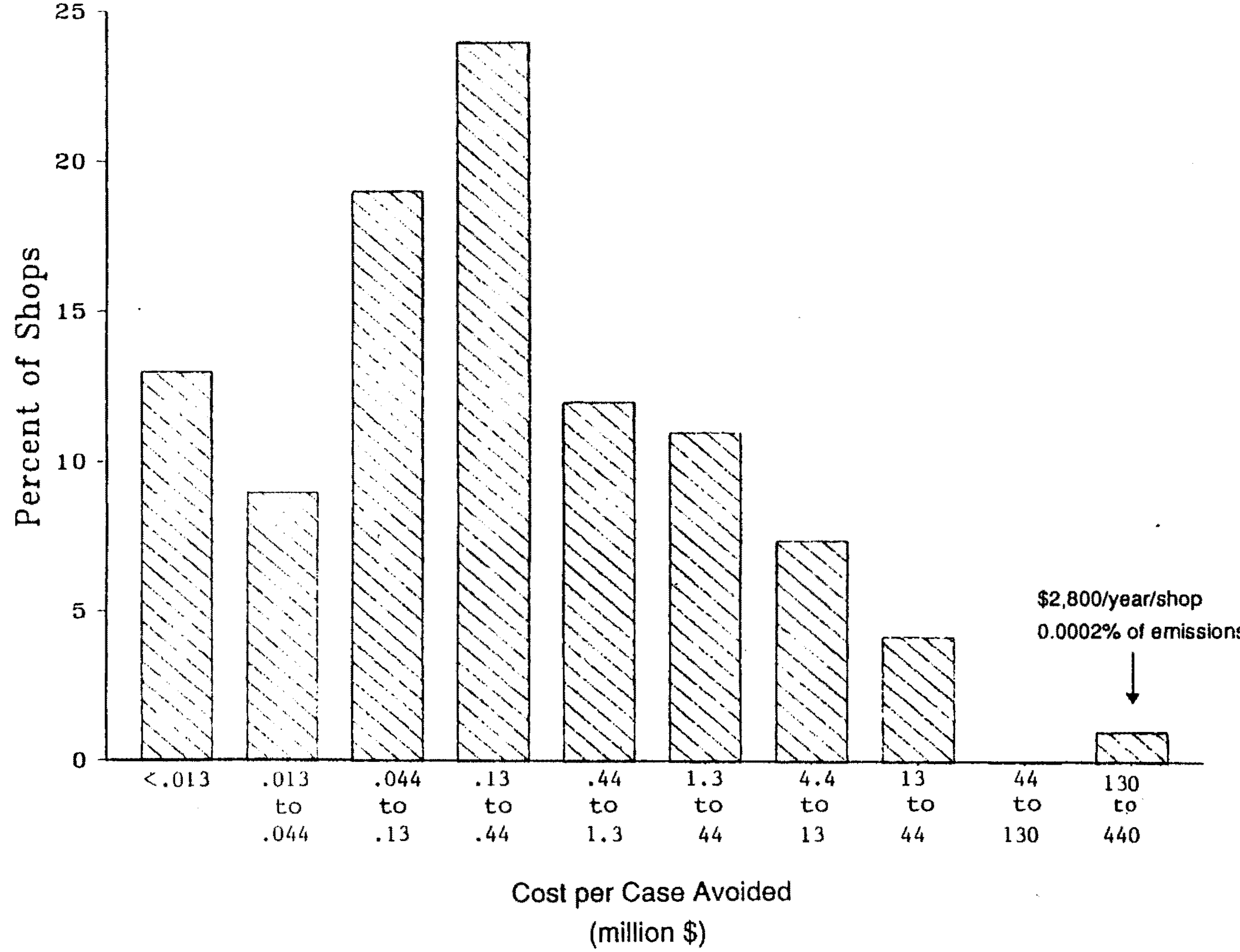
The median value of cost per case in the staff's calculations is $480,000 to $5,800,000, somewhat higher than for hard plating. However, the average value is about the same at $100,000 to $1,200,000 per case. At the high risk level, the cost per case ranges among shops from $26,000 to $39 million, which is within the range depicted in Figure VI-1 for hard plating.

C. EFFECT ON PRICES

The costs per shop in Table VI-1 are revenue requirements, the increased annual revenue that the shops would need to completely mitigate all increasd costs (including income tax effects) of compliance. It would be of interest to translate these requirements into increased price per item plated. The statistics would vary greatly according to the thickness of plating, the number of items plated, their size, and the size of the tanks (affecting the size of control equipment). Also, since many shops plate a wide variety of items, costs per item would be meaningless. However, the cost per square foot

Figure VI-1

DISTRIBUTION OF HARD/ANODIZING SHOPS BY COST-EFFECTIVENESS



plated is a meaningful number because shops often charge on a a square-foot basis.

For hard plating, the staff has considered two shops, among those with available data, having the lowest and near the highest ratios of tank area to annual plated area. These examples tend to correspond to the lowest and highest revenue requirements per square foot plated. Table VI-4 displays area ratio, the number square feet plated in 1986, and the cost per square foot at the two example shops. Although not necessarily representing the total range of costs among all platers, the costs in Table VI-4 are minor relative to the typical plater's charge of $200 per square foot.

Table VI-4

Example Costs per Square Foot Plated

Throughput ratio[a]	Items plated	Area plated per year (ft^2)	Cost per fr^2
lowest - .00033	photo engravings	54,000	$.14
high - .07	aircraft parts	600	$12

a tank/area plated per year

D. EFFECT ON SMALL BUSINESSES

The staff's conclusion from the available data is that the typical small plating firm would be financially able to comply with the control measure. However, this conclusion does not necessarily apply to all firms, nor does it project to the future. Some companies may be in financial trouble now and any additional cost may be difficult to absorb. A detailed analysis is in Appendix VIII.

Staff stratified the small businesses into small, medium, and large firms based on the amount of the firms' sales. The analysis of their financial data indicates that small and large firms could generate the profits needed to finance the annualized cost of the regulation. However, the analysis showed that a typical medium firm may not generate enough profits to finance the regulation.

An analysis of leverage (ratio of debt to worth) of all the firms for which we have data indicates that these firms are not highly leveraged. Our conclusion is that the average increase in debt would not be significant and most likely would not severely affect the firm's abilty to qualify for new loans.

Any adverse economic effect of the proposed regulation on small businesses could not be reduced further by relaxing the requirements because almost all of the plating shops are small business. To the degree that the shops who would fall into the lowest control category (i.e., who do the least plating) tend to be the smallest shops, the control measure does provide lower requirements for the smallest businesses. Since the risks associated with this lowest control category remain significant, further relaxation of requirements would not be appropriate.

E. COST TO AIR POLLUTION CONTROL DISTRICTS

Most air pollution control districts require sources currently operated without permits to obtain permits before installing emission control devices. Thus, the proposed control measure may increase the number of permit applications received by an air pollution control district. State law allows districts to impose fees to recover the costs of its permit program. Therefore the districts have a mechanism to mitigate any new costs for permitting due to the proposed control measure. Examples of the fee schedule already used by districts are in Appendix III. The fees charged by the SCAQMD are included in the plater's costs in Section VI A.

Determining compliance with the control measure may require periodic source tests. State law allows districts to recover test costs from the sources. Enforcement would also involve inspections of the plating shop for compliance with permit conditions and the collection of data on current and time of operation. For districts with small staffs, these inspections might require a noticeable increased demand on resources. The effect would depend on the frequency and depth of inspections customary to each district and on the number of platers.

The staff has estimated the initial and periodic costs of handling permits. Currently, only the South Coast Air Quality Management District (SCAQMD) issues permits for chrome platers and anodizers. SCAQMD's experience was used to estimate the time necessary for the urban districts to perform this task. Yolo-Solano Air Pollution Control District provided an estimate of a rural district's staff time necessary for implementation of the control measure. Based on the information provided by these two districts, estimates of staff time needed for permit processing are as follows:

Initial Issue:	Urban district - 30 person-hours
	Rural district - 45 person-hours
Annual Renewal:	Urban district - 4 person-hours
	Rural district - 6 person-hours

For both the initial issue and annual renewal, rural districts were assumed to need approximately 50 percent more time. This is in part due to the assumption that smaller districts do not have full-time permitting engineers and that the time spent becoming familiar with plating operations would be averaged over fewer shops. The initial issue involves granting authority-to-construct, reviewing and auditting source tests, reviewing permit applications, and other tasks. Typically, a renewal would require a staff person to review the facility files at the district offices, arrange for a site visit, visit the site and check records, inspect equipment, and write a brief inspection report.

Table VI-5 shows the hourly costs estimated by various districts for their permit work.

Table VI-5

Cost of Staff Time for Permit Work

Air Basin	\$/hour[a]	Cost per Shop initial[b]	annual[c]
No. Central Coast*	\$37.00	\$1,700	\$220
North Coast*	\$37.00	\$1,700	\$220
San Diego	\$45.50	\$1,400	\$180
SF Bay Area	\$40.00	\$1,200	\$160
Sacramento Valley	\$45.00d	\$1,400	\$180
San Joaquin Valley*			
Tulare	\$37.00	\$1,700	\$220
other	\$26.00[e]	\$1,200	\$160
So. Central Coast*	\$60.50[f]	\$2.700	\$360
South Coast	\$50.00	\$1,500	\$200

a applies to initial and annual costs
b figured at 30 hours of staff time in urban basins, 45 hours in rural basins
c figured at 4 or 6 hours of staff time per year in urban or rural basins
d supplied by Sacramento County APCD
e supplied by Fresno County APCD
f supplied by Ventura County APCD
* rural air basins

Table VI-6 shows the total costs by air basin. These costs have already been included in the estimates of costs to platers because the districts are empowered to recover permit costs from sources. The values of person-years may indicate a need in some districts to hire more staff. This may be true for small districts that may require more time per permit than is true in the SCAQMD. Small districts may lack experience with plating operations and may not enjoy the economies seen by large districts with staff working exclusively with permit applications.

Table VI-6
Costs to Districts for Permit Handling

Air Basin	No. Shops	Staff Time[a] initial	Staff Time[a] annual	Cost initial	Cost annual
No. Cen. Coast	1	.023	.003	$1,700	$220
North Coast	1	.023	.003	$1,700	$220
San Diego	38	.57	.076	$52,000	$6,900
Sacramento	19	.29	.038	$26,000	$3,400
S.F. Bay Area	45	.68	.090	$54,000	$7,200
San Joaquin Valley	27	.61	.081	$39,000	$5,200
So Central Coast	12	.27	.036	$32,000	$4,400
South Coast	273	4.1	.55	$410,000	$54,600
Total	416	6.6	.88	$620,000	$82,000

a person years

F. ENVIRONMENTAL EFFECTS

Implementation of the proposed ATCM would result in a significant improvement to the environment by reducing annual emissions of hexavalent chromium to the atmosphere by 11,700 pounds. This is a 97 percent reduction from existing emissions for the source category of platers and chromic acid anodizers.

Staff has analyzed the measure for possible significant adverse environmental impacts and has determined that none would result from implementation of the measure. Staff has identified two minor adverse environmental impacts which might result from implementation of the measure: (1) An increase in chromium laden wastewater; (2) As a result of the increased wastewater treatments, increase in the solid sludge and in the concentration of chromium in the solid sludge. However, for the reasons set forth below, staff believes that these possible adverse environmental effects are not significant.

As a preliminary matter, it should be noted that the possible increases in wastewater and sludge are described as total chromium, rather than specifically hexavlaent chromium. The reason for this is that when hexavalent chromium is mixed with organic material in sludge and when it is subject to some types of water treatment, the hexavalent chroumium converts to trivalent chromium. Hexavalent chromium is an identified carcinogen, while trivalent chromium is not. Staff can not measure the extent to which the hexavalent chromium removed from the air through the use of control equipment would remain in the hexavalent form. However, since it is known that some conversion to trivalent chromium occurs, implementation of the control measure would result in an unquantifiable reduction of hexavlant chromium in the environment.

The amount of the increase of total chromium in wastewater and solid sludge can not be estimated because it depends in large part on the manner in which those subject to the measure choose to comply with the measure's requirements. The staff has determined that available control equipment can be designed to permit the recycling of the collected chromium to the plating bath. The cost of purchasing, installing and using this equipment was included in staff's cost estimates for the measure and in the cost-effectiveness analysis for the measure. However, the rule does not require the installation of this equipment. Some platers may choose to use existing or new equipment which does not permit complete recycling of the collected chromium. It is expected that these platers would have an increase in chromium-laden wastewater as a result of the measure. Staff expects that the cost of treating this increased wastewater and the cost of replacing the chromium lost to the wastewater will encourage platers to install control equipment which will permit the recycling of the wastewater to the plating tanks.

Even though the measure may result in an increase in the chromium-laden wastewater, this will not result in a significant adverse environmental effect because the platers must comply with applicable federal and state wastewater discharge standards. The platers will have to treat the wastewater to the extent necessary to meet their individual waste discharge standards. The standards vary depending on the type of receiving waters, the type of discharge and on whether it is a new or existing facility. As each facility obtains the necessary permits to comply with the measure, the environmental effects from the operation of that equipment at the particular facility will be analyzed by the appropriate agency.

The second possible adverse environmental effect relates to an increase in the sludge and in the concentration of chromium in the sludge as a result of increased wastewater treatment. Sludge from wastewater treatment at chrome plating operations must be disposed of in a Class I landfill. In 1986 metal platers disposed of several thousand tons of sludge. If in complying with the measure none of the platers installed a system which would permit recycling of the wastewater to the tanks, the maximum annual increase in sludge is estimated at 20 tons and the maximum annual increase in the concentration of chromium in sludge is estimated at 6 tons. Staff does not believe that this small increase in sludge and in the concentration of chromium in the sludge constitutes a significant adverse environmental impact.

VII. ALTERNATIVES TO CONTROL MEASURE

The staff has considered the following alternatives to the proposed control measure. We believe that no alternative would be (1) more effective than the control measure in carrying out the purpose for which the control measure is proposed and (2) less burdensome to the regulated persons.

A. DECORATIVE PLATING

The control measure would require decorative platers to control emissions by 95 percent. The control would be by any method for which that capability had been demonstrated.

Alternative 1: Require decorative platers to use scrubbers or other "add-on" control devices.

This approach might unnecessarily limit a plater's ability to achieve high control or favorable cost-effectiveness. Also, the effectiveness of scrubbers on uncontrolled decorative plating emissions has not been demonstrated.

Alternative 2: Require decorative platers to use anti-mist additives.

We expect them to comply by this means, but there is no reason to preclude other potentially acceptable (or superior) means of control.

Alternative 3: Require the use of trivalent chromium for plating.

A plater may use trivalent chromium to comply with the rule. However, we have not required trvialent chromium because it does not always give an acceptable finish.

Alternative 4: Do not require controls.

We conclude that present emissions from decorative plating present a substantial risk to public health, that control methods are available to reduce this risk, and that these methods are cost-effective. Therefore, the proposed rule is be a reasonable measure to protect public health.

Alternative 5: Prohibit the use of hexavalent chromium for decorative plating.

(See response to alternative 3.)

Alternative 6: Make less stringent requirements for decorative platers that are small businesses.

Most decorative platers are small businesses. In light of that fact, we have proposed a requirement that is based on currently common operating practice (use of anti-mist additives) rather than requiring new control technology and that does not involve expensive source testing for each shop. Because of the potency of hexavalent chromium emitted from these shops, lesser requirements should not be made.

B. HARD PLATING AND CHROMIC ACID ANODIZING

The control measure would require a specified degree of control or an emission rate less than a specified rate. The applicable control or rate would depend on the amount emitted by the shop. The most stringent requirements would apply to the most emissive shops.

Alternative 1: Require the use of trivalent compounds for these operations.

No trivalent chromium compounds have been found that can be used for these operations.

Alternative 2: Require the use of anti-mist additives.

Because anti-mist additives may cause pitting of the plated surface, they generally are not used in hard plating operations and therefore are not required. However, if a hard plating operation is able to use a anti-mist additive to meet the amp-hour limitation, the proposed rule would allow its use to meet the requirements.

Alternative 3: Require that new sources meet more stringent emission limitations. As an example, the rule could require each new source to limit the maximum excess cancer risk due to its emissions to less than ten in a million and the excess cancer cases to fewer than one.

This would be a technology-forcing rule and could result in the development of techniques or equipment which could be used by the whole industry, further reducing risk. Because it would be required only of new sources, there would be no financial hardship for existing businesses. This kind of proposal is being considered by the SCAQMD as a requirement for new sources of toxic air contaminants. Its adoption statewide would prevent the relocation of sources from the South Coast. However, the evaluation of new sources should be handled case by case by each air pollution control district to permit the districts to take into account source specific considerations.

Alternative 4: Require no additional controls.

The risk to public health from plating emissions is high, and control technology is available to reduce the risk; therefore, controls should be required.

Alternative 5: Require the use of specific control devices or methods.

This approach would reduce the costs of implementing the measure because compliance testing could be eliminated. However, such an approach would discourage the development of controls which might achieve higher control efficiencies or better cost-effectiveness than those of the devices that have been demonstrated today. Also, a control measure which dictated the specific control hardware to be used would not allow a plating shop operator to develop the most effective and economical approach to control that shop's emissions. For instance, an operator could not comply with such a regulation by improving the performance of emission control equipment already in place.

Alternative 6: Lower the requirements for or provide an exemption from the requirements for hard plating and chromic acid anodizing operations which are small businesses.

A small business in the manufacturing sector is defined as one which has under 250 employees. It appears that most hard plating and anodizing shops are small businesses. The staff rejected keying the level of control to the size of the business or providing an exemption for the smallest shops and instead chose to recommend levels of stringency based on the level of emissions at a facility. Staff believes that this is the best control measure design because it focuses on the risk posed by the business rather than other factors such as number of employees or business profitability. To the extent that small businesses might have lower emissions, they are subject to lower emission reduction requirements.

VIII. COMMENTS ON DRAFT PROPOSAL: RESPONSES

During and after the consultation meetings that were held to discuss draft versions of the ATCM for chrome plating operations, representatives of various industries commented on the draft ATCM. Some of these comments were incorporated as revisions to the ATCM. A summary of the major issues raised by the comments is provided below.

Comment 1: Available tests do not show that 99 percent is achievable. Test results from a facility in the SCAQMD which used the type of equipment that ARB staff suggests will give the 99 percent control showed only 50 percent control. The highest efficiency cited from all tests is 99.4 percent and only occurs where the inlet concentration is high.

Response 1: At any given plating shop, either low emissions or a high control efficiency can be reached. Test results have shown a wet scrubber operating at 99.4 percent efficiency at one operation and an emission rate of less than 0.03 mg/amp-hour at another. At three facilities, wet scrubbers or demisters achieved 98 percent efficiency. Those values were achieved without regulatory pressure and with only conventional control devices.

Little attention has been paid to controlling emissions from plating. In the staff's experience, regulatory pressure produces great improvements in control technology. In this case, significant improvements may occur in the design and operation of plating tanks to prevent emissions and in the "tailoring" of wet scrubbers to plating emissions. Futhermore, devices more effective than scrubbers can be applied to plating tanks.

The test results which showed a wet scrubber operating at only about half of predicted efficiency prompted the inclusion of the mass emission (mg/amp-hr) alternatives to the efficiency requirements in the rule. That shop used a physical barrier (floating plastic beads) on the bath surface to prevent emissions. As a result, the acid mist entering the scrubber was at a very low concentration and probably depleted of the large droplets that a scrubber can remove. The low control across the scrubber was not surprising. However, the shop in question would satisfy the requirement on mass emissions (mg) per amp-hour and thus satisfy the control measure.

The ARB staff believes that 99 percent control or 0.03 mg/amp-hour can be obtained, although heretofore unpracticed effort such as optimization of scrubber design and operation or process changes to minimize emission rate, may be required. The high risks from plating emissions warrant such efforts.

Comment 2: The cost of control for small businesses is not affordable. At least one commenter stated that the proposed ATCM would force the company out of business.

Response 2: The annual cost per cancer prevented is low, but we recognize the cost of compliance may be a burden on some small businesses. Although the annual cost is low, some companies may have difficulty affording this measure. Limited information on the financial standing of small plating companies shows that they generally would be able to finance compliance efforts, but some have not been profitable in the recent past.

Comment 3: The requirement for 95 percent control efficiency for decorative plating will require source testing at every facility, at high expense.

Response 3: The requirement does not mandate direct testing at every facility. If a mist suppressant is used to achieve compliance, the requirement allows, subject to district APCO's approval, that the additive be maintained in a manner that has been demonstrated to be 95 percent effective in reducing hexavalent chromium emissions. We expect that the demonstration of effectiveness will be done by either the suppliers of additives or control devices, or by pooling industry resources through trade associations. There is a 6-month compliance period for this activity. For mist suppressants, there are very simple and inexpensive methods that are used now to monitor bath additive concentration; the plater could measure foam coverage of the tank surface area or the measurement of surface tension of the plating bath. When a correlation between parameters such as these and emission reductions has been established through source testing for a typical operation, periodic measurment of the operating parameter will suffice to demonstrate compliance with the requirement. The specific recommendations for operating parameter(s) to be measured, the frequency of measurement, and target ranges to demonstrate compliance depend upon the specific operating conditions of the plating bath and formulation of the additives. A similar approach could be taken for those decorative platers that choose to use new control hardware to achieve compliance with the 95 percent requirement. Therefore, these details are not incorporated into the ATCM.

Comment 4: Emission reductions made by changing the plating process or tank design should be counted towards meeting the control efficiency requirements.

Response 4: Staff's proposal allows compliance with the rule by meeting one of two alternatives; a facility can meet the efficiency requirement or it can meet the mg/amp-hr requirement. The mg/amp-hr alternative was specifically added to allow facilities to modify their process or use mist suppressants to reduce emissions.

Staff believes that reductions in emissions from process changes should not be credited in calculating control efficiency for the following reasons: 1) the efficiency requirements were based on an evaluation of reductions achieved on uncontrolled emissions by add-on control equipment. Therefore, compliance should be based only on the performance of the add-on control equipment. This would ensure that control equipment is achieving the degree of control of which it is capable; and 2) the baseline (pre-control) emission rate may have to be determined a year or more in advance of the final compliance test if the pre-control process would be modified. This would increase the chance for extraneous factors to affect the apparent results. Also, if the baseline emission rate should be questioned at a later time, it might not be possible to re-measure it.

Comment 5: Can control equipment be certified to meet the necessary efficiency requirements so source testing will not be necessary.

Response 5: Staff believes that for some equipment, an engineering evaluation of equipment based on previous tests would be sufficient to determine whether it will achieve 95 percent efficiency. To determine the compliance category for all shops and to demonstrate compliance at shops which have to meet efficiencies greater than 95%, source testing will probably be required. However, district permit engineers will need to make this determination case-by-case.

Comment 6: The number of small platers is larger than that listed in the report.

Response 6: Staff has made every reasonable effort possible to identify all chrome plating facilities. Staff has consulted the industry association, local districts, and telephone directories to identify affected platers. All platers identified were either sent survey forms or contacted by phone. The staff knows of no additional method to identify affected platers.

Comment 7: Waste water treatment may be necessary because it may not be possible to recycle the scrubber solution to the plating tank. Commentors cited a case where fibers from a fiberglass exhaust duct precludes recycling the scrubber water to the plating tank.

Response 7: Cost estimates from the proposed control measure include costs for new control equipment. A well designed new system should not require water treatment. However, the use of old equipment may make water treatment necessary. Foreign objects like fiberglass could be simply filtered. Fiberglass as duct material is not usual and is not necessary.

Comment 8: Do not include the 99.8 percent control efficiency requirement in the proposed control measure until a demonstration project can be carried out. The demonstration project would be designed to evaluate how successfully the technology needed to achieve that level of control can be applied to control plating emissions.

Response 8: After a review of the available data, staff are convinced that there is a high potential for successful transfer of control technology from the sulfuric acid industry to chrome plating. The proposed control measure includes a later compliance date (48 months from date of an apcd's adoption) for this requirement than for the others. It is provided in recognition of the possible difficulties in applying the technology to the plating industry.

Retaining the proposed 99.8 percent requirement on a 48-month schedule will provide for timely reductions in emissions and risk from the largest emitters and will provide an incentive to achieve a high level of control. Delaying implementation of the 99.8 percent requirement to allow for a demonstration of technology transfer would result in higher emissions during the study period but would provide a greater assurance that the most stringent requirement (be it 99.8 percent or something else) could be met. If the Board elects to allow a demonstration project, an interim requirement of 99 percent control could be set for the largest shops to minimize the increase in emissions and risk which would occur relative to the current proposal.

Staff recommends that the proposed measure be left unchanged in this regard on the basis of the weight of evidence for the feasibility of technology transfer and on the time allowed in the proposed measure to accomplish it.

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