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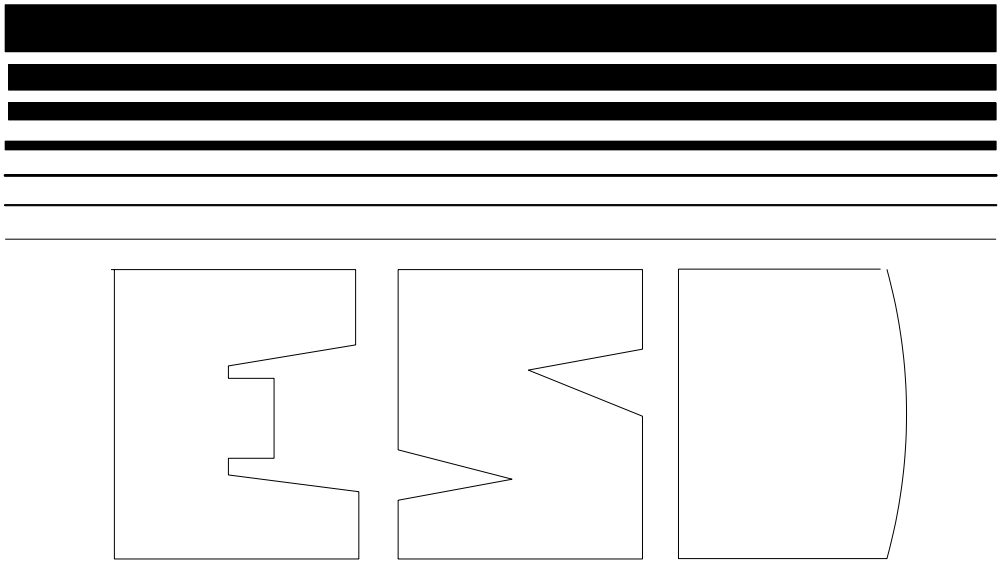
Response to Comments On Section 183(e) Study And Report to Congress



RESPONSE TO COMMENTS ON SECTION 183(e) STUDY AND REPORT TO CONGRESS

Emission Standards Division

U.S. Environmental Protection Agency
Office of Air and Radiation
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

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ACRONYM LIST

Act	Clean Air Act
BAC	best available control
CARB	California Air Resources Board
CASAC	Clean Air Scientific Advisory Committee of the Science Advisory Board
CCP	Composite Correction Plan
CSMA	Chemical Specialities Manufacturers Association
CTG	Control Technique Guidelines
EIA	Economic Impacts Analysis
EO	executive order
EPA	Environmental Protection Agency
HAP	Hazardous Air Pollutant
IR	Incremental Reactivity
MIR	Maximum Incremental Reactivity
MOIR	Maximum Ozone Incremental Reactivity
NAAQS	National Ambient Air Quality Standards
NAPCTAC	National Air Pollution Control Techniques Advisory Committee
NARSTO	North American Research Strategy for Tropospheric Ozone
NEPA	National Environmental Policy Act of 1969
NO	nitric oxide
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
OAQPS	Office of Air Quality Planning and Standards
OH	hydroxyl radicals
O_2	oxygen
O_3	ozone
ORD	Office of Research and Development
OTA	Office to Technology Assessment
OTAG	Ozone Transport Assessment Group
PAMS	photochemical assessment monitoring stations
ppbv	parts per billion, by volume
ppmC	parts per million as Carbon
$ppm^{-1}min^{-1}$	per part per million per minute
RACT	reasonably available control technology
Reg-Neg	Architectural Coatings Regulatory Negotiations (1992 to 1994)
Report	Section 183(e) report to Congress
RFA	Regulatory Flexibility Act
RIR	relative incremental reactivity
ROMNET	Regional Ozone Modeling for Northeast Transport
RVOC	Reportable VOC
SCAQMD	South Coast Air Quality Management District
SIP	State Implementation Plan
tpy	tons per year
TSCA	Toxic Substances Control Act
UAM	Urban Airshed Model
UMRA	Unfunded Mandates Reform Act
VOC	volatile organic compounds

1.0 LIST OF COMMENTERS

A list of the commenters, their affiliations, and EPA docket number assigned to their correspondence is given in table 1-1. Comments on the section 183(e) report to Congress (Report) and the list and schedule of consumer product categories to be regulated were received in four different dockets: (1) the consumer and commercial product Report docket (A-94-65); (2) the architectural coatings rulemaking docket (A-92-18); (3) the consumer products rulemaking docket (A-95-40); and (4) the automobile refinish coatings rulemaking docket (A-95-18). Each docket number listed in the table and referenced in this document is preceded by a two or three letter code indicating the docket in which the item may be found: AIM signifies the architectural coatings docket, CCP signifies the docket for the consumer and commercial product Report, CP signifies the consumer products docket, and AR signifies the automobile refinish coatings docket. Some letters were submitted to more than one docket or were submitted multiple times to the same docket. Any duplicated letter is listed once with alternate docket numbers listed in parentheses underneath. Attachments are indented and designated by a lower case letter following the docket number. When more than 26 documents were attached, the additional documents are designated by duplicate lower case letters following the docket number i.e., aa, bb, etc. Some attachments included their own attachments, which are numbered following the letter.

Table 1-2 lists an additional 17 docket items containing comments on the Report that were received in the architectural coatings docket before publication of the proposed architectural

coatings rule. These items were reviewed but were not summarized in this document because they contained no issues that were not raised in subsequent letters listed in table 1-1.

TABLE 1-1. LIST OF COMMENTERS ON THE SECTION 183(e) REPORT TO CONGRESS AND LIST AND SCHEDULE OF CONSUMER PRODUCT CATEGORIES TO BE REGULATED

Docket number[a] Attachments	Commenter and affiliation
AIM-IV-D-02	N.B. Kisner President Triangle Coatings, Inc. San Leandro, California
AIM-IV-D-05	W.A. Rostine President Cast-O-Magic Springfield, Missouri
AIM-IV-D-08	Richard Hardy President XIM Products, Incorporated Westlake, Ohio
AIM-IV-D-16	James S. Jennison President Jennison Industries Burlington, Iowa
AIM-IV-D-26	Alaistair MacDonald Chief Executive Officer Specialty Coatings & Chemicals, Inc. North Hollywood, California
AIM-IV-D-28	K.R. Schultz Environmental Consultant DuPont Automotive Products Wilmington, Delaware
AIM-IV-D-30	James G. Stilling Vice-President and General Manager W.R. Meadows, Incorporated Elgin, Illinois
AIM-IV-D-32	G.A. Green Administrator Air Quality Division Oregon Department of Environmental Quality Portland, Oregon
AIM-IV-D-33	B.A. Kwetz Director Division of Air Quality Control Commonwealth of Massachusetts Executive Office of Environmental Affairs Department of Environmental Protection Boston, Massachusetts

TABLE 1-1. LIST OF COMMENTERS ON THE SECTION 183(e) REPORT TO CONGRESS AND LIST AND SCHEDULE OF CONSUMER PRODUCT CATEGORIES TO BE REGULATED (CONTINUED)

Docket number[a] Attachments	Commenter and affiliation
AIM-IV-D-49	E.D. Edwards Owner Dunn-Edwards Corporation Los Angeles, California
AIM-IV-D-49b	Howard Berman, Esq. Director of Regulatory Affairs Representing the Dunn-Edwards Corporation Los Angeles, California
AIM-IV-D-50	R.E. Mitchell Chairman of the Board Dunn-Edwards Corporation Los Angeles, California
AIM-IV-D-55	R.E. Mitchell Chairman of the Board Dunn-Edwards Corporation Los Angeles, California
AIM-IV-D-82	L.A. Spurlock, Ph.D, CAE Chemical Manufacturers Association Arlington, Virginia
AIM-IV-D-93	David Altena President Repcolite Paints, Inc. Holland, Michigan
AIM-IV-D-96	Arthur J. Fossa, P.E. Director Division of Air Resources New York State Department of Environmental Conservation Albany, New York
AIM-IV-D-115	L.R. Rogers Director Regulatory Compliance Anchor Paint Manufacturing Company Tulsa, Oklahoma
AIM-IV-D-117	Susan S.G. Wierman Executive Director Mid-Atlantic Regional Air Management Association Baltimore, Maryland
AIM-IV-D-155	R.E. Mitchell Chairman of the Board Dunn-Edwards Corporation Los Angeles, California

TABLE 1-1. LIST OF COMMENTERS ON THE SECTION 183(e) REPORT TO CONGRESS AND LIST AND SCHEDULE OF CONSUMER PRODUCT CATEGORIES TO BE REGULATED (CONTINUED)

Docket number[a] Attachments	Commenter and affiliation
AIM-IV-D-161	Madelyn K. Harding Administrator, Product Compliance & Registrations Sherwin-Williams Company Cleveland, Ohio
AIM-IV-D-162	B.R. Appleman Executive Director M.J. Masciale President Steel Structures Painting Council (SSPC) Pittsburgh, Pennsylvania
AIM-IV-D-165	R. Hardy President XIM Products, Incorporated Westlake, Ohio
AIM-IV-D-166	J.J. Jennison President Jennison Industries Burlington, Iowa
AIM-IV-D-170	M.P. Stock Vice President TK Products Minnetonka, Minnesota
AIM-IV-D-175	M. Uglem Executive Vice President Hirchfields Paint Manufacturing, Incorporated Minneapolis, Minnesota
AIM-IV-D-177	E.D. Edwards Futurist Greenwood, Minnesota
AIM-IV-D-177a	Attached document entitled “Cause of Ozone and Peak Ozone Exceedance”
AIM-IV-D-178	N.B. Kisner President Triangle Coatings, Incorporated San Leandro, California
AIM-IV-D-185	N.S. Bryson Crowell & Moring, LLP for the Thompson-Minwax Company Washington, District of Columbia

TABLE 1-1. LIST OF COMMENTERS ON THE SECTION 183(e) REPORT TO CONGRESS AND LIST AND SCHEDULE OF CONSUMER PRODUCT CATEGORIES TO BE REGULATED (CONTINUED)

Docket number[a] Attachments	Commenter and affiliation
AIM-IV-D-189	R.J. Nelson Director Environmental Affairs J. Sell Senior Counsel National Paint and Coatings Association Washington, District of Columbia
AIM-IV-D-212	Dunn-Edwards Corp. Los Angeles, California
AIM-IV-D-212d	Attached article from Environmental Week entitled "Ozone Control Strategies Flawed, Says EPA Scientist"
AIM-IV-D-212k (AIM-IV-D-212p6h) (AIM-IV-D-212mm) (CCP-IV-D-06) (CP-IV-D-35h) (CP-IV-D-35k3)	R.E. Mitchell Chairman of the Board Dunn-Edwards Corporation Los Angeles, California
AIM-IV-D-212p (CCP-IV-D-04) (CP-IV-D-35n)	R.E. Mitchell Chairman of the Board Dunn-Edwards Corporation Los Angeles, California
AIM-IV-D-212p2 (CCP-I-D-13) (CP IV-D-35e)	R.E. Mitchell Chairman of the Board Dunn-Edwards Corporation Los Angeles, California
AIM-IV-D-212p3 (CCP-I-D-14) (CP-IV-D-35f)	R.E. Mitchell Chairman of the Board Dunn-Edwards Corporation Los Angeles, California
AIM-IV-D-212p4 (CCP-I-D-18) (CP-IV-D-35g)	R.E. Mitchell Chairman of the Board Dunn-Edwards Corporation Los Angeles, California
AIM-IV-D-212p5 (CCP-IV-D-05) (CP-IV-D-35v)	R.E. Mitchell Chairman of the Board Dunn-Edwards Corporation Los Angeles, California
AIM-IV-D-212p6 (CCP-I-D-18) (CCP-IV-D-02) (CP-IV-D-35t)	R.E. Mitchell Chairman of the Board Dunn-Edwards Corporation Los Angeles, California

TABLE 1-1. LIST OF COMMENTERS ON THE SECTION 183(e) REPORT TO CONGRESS AND LIST AND SCHEDULE OF CONSUMER PRODUCT CATEGORIES TO BE REGULATED (CONTINUED)

Docket number[a] Attachments	Commenter and affiliation
AIM-IV-D-212p6i (CP-IV-D-35j)	R.E. Mitchell Chairman of the Board Dunn-Edwards Corporation Los Angeles, California
AIM-IV-D-212p6q (CP-IV-D-35s4)	Attached letter from C.C. Cowan Director The National Values Center, Incorporated Denton, Texas
AIM-IV-D-212p6r (CP-IV-D-35s5)	Attached document entitled, "Stepping Stones" - a section of the Values Center, Inc.
AIM-IV-D-214	Smiland and Khachigian Los Angeles, California
AIM-IV-D-214b (CP-IV-D-07b)	W.M. Smiland Smiland and Khachigian Los Angeles, California
AIM-IV-D-214c	C.G. Foster Smiland and Khachigian Los Angeles, California
AIM-IV-F-1c	R.E. Mitchell Chairman of the Board Dunn-Edwards Corporation Los Angeles, California
AIM-IV-F-1d	H. Berman Wellborn Paints
AIM-IV-F-1k	D. Collier Courtauld Coatings
AIM-IV-F-1l	R. Wendoll for Ned Kisner Triangle Coatings
AIM-IV-F-1o	J. Sell National Paint and Coatings Association
CCP-I-D-17 (CCP-IV-D-03)	S.J.H. Manekshaw Director Environmental, Safety and Health Affairs Pennzoil Company Houston, Texas

TABLE 1-1. LIST OF COMMENTERS ON THE SECTION 183(e) REPORT TO CONGRESS AND LIST AND SCHEDULE OF CONSUMER PRODUCT CATEGORIES TO BE REGULATED (CONTINUED)

Docket number[a] Attachments	Commenter and affiliation
CCP-IV-D-01 (CP-IV-D-35k)	R.E. Mitchell Chairman of the Board Dunn-Edwards Corporation Los Angeles, California
CP-IV-D-01	J. Janeczek Jr., P.E. Capital Cities/ABC, Inc. New York, New York
CP-IV-D-02	R.D. Elliott Executive Director Southwest Air Pollution Control Authority Vancouver, Washington
CP-IV-D-04	G.F. Tappan Section Chief Regulatory Affairs Block Drug Company, Inc. Jersey City, New Jersey
CP-IV-D-06	A.W. Effinger, Esq. General Counsel American Pet Products Manufacturers Association, Inc. Greenwich, Connecticut
CP-IV-D-07	W.M. Smiland Smiland and Khachigian Los Angeles, California
CP-IV-D-07a	W.M. Smiland Smiland and Khachigian Los Angeles, California
CP-IV-D-10	W.K. Lim President Aerosol Services Company, Inc. City of Industry, California
CP-IV-D-11	B. Mathur Chief Bureau of Air State of Illinois Environmental Protection Agency Springfield, Illinois

TABLE 1-1. LIST OF COMMENTERS ON THE SECTION 183(e) REPORT TO CONGRESS AND LIST AND SCHEDULE OF CONSUMER PRODUCT CATEGORIES TO BE REGULATED (CONTINUED)

Docket number[a] Attachments	Commenter and affiliation
CP-IV-D-13	B.A. Kwetz Director Division of Air Quality Control Commonwealth of Massachusetts Department of Environmental Protection Boston, Massachusetts
CP-IV-D-33	R. Engel, President Chemical Specialties Manufacturers Association Washington, DC
CP-IV-D-34	L.A. Spurlock, Ph.D, CAE Chemical Manufacturers Association Arlington, Virginia
CP-IV-D-35	Dunn-Edwards Corporation Los Angeles, California
CP-IV-D-35k (CCP-IV-D-01)	R.E. Mitchell Chairman of the Board Dunn-Edwards Corporation Los Angeles, California
CP-IV-D-35m	Attached document entitled, “Economic Analysis” by Dunn-Edwards Corp.
CP-IV-D-40	F.N. Romano Chairman of the Board Chief Executive Officer Key West Fragrance & Cosmetic Factory, Inc. Key West, Florida
CP-IV-D-42	I.S. Combe Chairman Combe Incorporated White Plains, New York
CP-IV-D-44	M.A. Dirzis Director Government Affairs Avon Products, Inc. New York, New York
CP-IV-D-45	E.O. Sullivan State of Maine Department of Environmental Protection Augusta, Maine

TABLE 1-1. LIST OF COMMENTERS ON THE SECTION 183(e) REPORT TO CONGRESS AND LIST AND SCHEDULE OF CONSUMER PRODUCT CATEGORIES TO BE REGULATED (CONTINUED)

Docket number[a] Attachments	Commenter and affiliation
CP-IV-D-46	T.J. Donegan, Jr. Vice President-Legal and General Counsel The Cosmetic, Toiletry, and Fragrance Association Washington, DC
CP-IV-D-48	R.N. Hiatt Chairman Maybelline, Inc. Memphis, Tennessee
CP-IV-D-49	G.T. Blair Haarmann & Reimer Corporation Springfield, New Jersey
CP-IV-D-50	S.I. Sadove President Clairol Stamford, Connecticut
CP-IV-D-51	E. Zeffren, Ph.D. President Helene Curtis, Inc. Chicago, Illinois
CP-IV-D-52	D.L. Stein Senior Specialist 3M Corporate Product Responsibility St. Paul, Minnesota
CP-IV-D-53	R.N. Sturm Director Professional & Regulatory Services The Procter & Gamble Company Cincinnati, Ohio
CP-IV-D-54	J.B. Hallagan Law Offices Daniel R. Thompson, P.C. Washington, DC
CP-IV-D-56	S.P. Risotto Director of Regulatory Affairs Halogenated Solvents Industry Alliance, Inc. Washington, DC
CP-IV-F-1a	R.E. Mitchell Chairman of the Board Dunn-Edwards Corporation Los Angeles, California

TABLE 1-1. LIST OF COMMENTERS ON THE SECTION 183(e) REPORT TO CONGRESS AND LIST AND SCHEDULE OF CONSUMER PRODUCT CATEGORIES TO BE REGULATED (CONTINUED)

Docket number[a] Attachments	Commenter and affiliation
CP-IV-F-1b	M. Thompson Chemical Specialties Manufacturers Association
CP-IV-F-1d	T. Wernick Gillette
CP-IV-F-1g	B. Mercer Prestone
CP-IV-F-1j	B. Sabo Apollo Industries
CP-IV-F-1k	G. Brown National Aerosol Association
AR-IV-F-1	H. Berman Vice President Jefferson Environment, Health, and Safety Group Denver, Colorado

[a] AIM = Docket A-92-18
CCP = Docket A-94-65
CP = Docket A-95-40
AR = Docket A-95-18

TABLE 1-2. LIST OF UNSUMMARIZED ITEMS RECEIVED BEFORE PUBLICATION OF THE PROPOSED ARCHITECTURAL COATINGS RULE[a]

Docket number[b]	Commenter and affiliation
AIM-II-D-146	R.E. Mitchell Chairman of the Board Dunn-Edwards Corporation Los Angeles, California
AIM-II-D-149	R.E. Mitchell Chairman of the Board Dunn-Edwards Corporation Los Angeles, California
AIM-II-D-152	R.E. Mitchell Chairman of the Board Dunn-Edwards Corporation Los Angeles, California
AIM-II-D-155	R.E. Mitchell Chairman of the Board Dunn-Edwards Corporation Los Angeles, California
AIM-II-D-160 and AIM-II-D-169	R.E. Mitchell Chairman of the Board Dunn-Edwards Corporation Los Angeles, California
AIM-II-D-161	E.D. Edwards Owner Dunn-Edwards Corporation Los Angeles, California
AIM-II-D-169 and AIM-II-D-160	R.E. Mitchell Chairman of the Board Dunn-Edwards Corporation Los Angeles, California
AIM-II-D-177	R.E. Mitchell Chairman of the Board Dunn-Edwards Corporation Los Angeles, California
AIM-II-D-184	R.E. Mitchell Chairman of the Board Dunn-Edwards Corporation Los Angeles, California
AIM-II-D-186 and AIM-II-D-203	Dunn-Edwards Corporation Los Angeles, California

TABLE 1-2. LIST OF UNSUMMARIZED ITEMS RECEIVED BEFORE PUBLICATION OF THE PROPOSED ARCHITECTURAL COATINGS RULE[a](CONTINUED)

Docket number[b]	Commenter and affiliation
AIM-II-D-231	R.E. Mitchell Chairman of the Board Dunn-Edwards Corporation Los Angeles, California
AIM-II-D-235	R.E. Mitchell Chairman of the Board Dunn-Edwards Corporation Los Angeles, California
AIM-II-D-255	R.E. Mitchell Chairman of the Board Dunn-Edwards Corporation Los Angeles, California
AIM-II-D-256	R.E. Mitchell Chairman of the Board Dunn-Edwards Corporation Los Angeles, California
AIM-II-D-258	R.E. Mitchell Chairman of the Board Dunn-Edwards Corporation Los Angeles, California
AIM-II-D-291	R.E. Mitchell Chairman of the Board Dunn-Edwards Corporation Los Angeles, California
AIM-II-D-20	W.M. Smiland Smiland Paint Company
AIM-II-D-203 and AIM-II-D-186	W.M. Smiland Smiland and Khachigian Los Angeles, California
AIM-II-D-332	C.G. Foster Smiland and Khachigian Los Angeles, California

[a]These items were reviewed for section 183(e) issues. These letters contained no new issues so they were not summarized and will not be referenced in the comment response document.

[b]AIM = Docket A-92-18

2.0 SUMMARY OF PUBLIC COMMENTS

A total of 85 letters and 12 public hearing comments were received on the section 183(e) study and report to Congress.

For purpose of orderly presentation, the comments have been categorized under the following topics:

- Consumer and Commercial Products Study
- Reactivity
- EPA's Regulatory Strategy
- Legal Issues

2.1 CONSUMER AND COMMERCIAL PRODUCTS STUDY

Section 183(e) of the Act mandates a new regulatory program for controlling VOC emissions. Through this provision, Congress required EPA to conduct a study of emissions of VOC into the ambient air from consumer and commercial products and to list for regulation, based on the study, certain categories of products that have the potential to contribute to ozone nonattainment.

The term “consumer and commercial products” is defined in section 183(e) of the Act to mean:

> ...any substance, product (including paints, coatings, and solvents), or article (including any containers or packaging) held by any person, the use, consumption, storage, disposal, destruction, or decomposition of which may result in the release of volatile organic compounds.

The statutory definition of consumer and commercial products thus includes a much broader array of products than those usually considered to be consumer products (e.g., personal care products, household cleaning products, or household pesticides) because it encompasses all VOC-emitting products used in the home, by businesses, by institutions, and in a wide range of industrial manufacturing operations.

The stated objectives of the consumer and commercial products study mandated in section 183(e) of the Act were: (1) to determine the potential of VOC emissions from consumer and commercial products to contribute to ozone levels which violate the ozone NAAQS; and (2) to establish criteria for regulating consumer and commercial products. In establishing criteria for regulating products, the Administrator was directed to consider the following five factors: (1) the uses, benefits, and commercial demand of products; (2) the health or safety functions served by such products; (3) whether products emit highly reactive VOC into the ambient air; (4) the relative cost-effectiveness of controls for products; and (5) the availability of alternative products which are of comparable costs, considering health, safety, and environmental impacts.

Upon completion of the study, section 183(e) required EPA to submit a report to Congress documenting the results of the study. The statutory provision further required EPA to list those categories of products that it determined, based on the study, account for at least 80 percent of the total VOC emissions, on a reactivity-adjusted basis, from consumer and commercial products in areas that violate the ozone NAAQS. In addition, section 183(e) required EPA to divide the list of products into four groups establishing priority for regulation. Every 2 years following publication of the list, EPA is required to regulate one group of categories until all four groups are regulated.

Regulatory criteria and ranking of product categories.

As directed in section 183(e)(2)(B) of the Act, EPA developed the following eight criteria for use in establishing the list of consumer and commercial product categories to be regulated:

(1) Utility,
(2) commercial demand,
(3) health and safety functions,
(4) emissions of highly reactive VOC,
(5) availability of alternatives,

(6) cost-effectiveness of controls,

(7) magnitude of annual VOC emissions, and

(8) regulatory efficiency and program considerations.

The first factor stipulated by section 183(e) is reflected in two criteria developed by EPA. Criterion 1 (utility) considers uses and benefits and Criterion 2 addresses commercial demand. The remaining four factors stipulated in section 183(e) are addressed individually by Criteria 3 through 6.

Criteria 7 and 8 (magnitude of emissions and regulatory efficiency) reflect additional considerations not specifically prescribed in the Act. The EPA has exercised its discretion to include these criteria, because EPA concluded that they are important in prioritizing product categories for regulation in a manner that best effectuates Congress's intent under Section 183(e). The EPA's interpretation of each of the five factors and the rationale and intent of each of the eight criteria are discussed in detail in the Report.

The EPA developed Criteria 1 through 7 to allow each product category to be ranked numerically. The numerical ranking process involved objective and subjective considerations. Criteria 2, 4, 6, and 7 are objective in nature and could be scored quantitatively based on annual sales, VOC emissions, and cost of control. Application of Criteria 1, 3, and 5 included some subjective considerations. Scoring of these criteria could be affected by the scorer's background, knowledge of the category, or other considerations. In order to ensure consistency and fairness, EPA convened the National Air Pollution Control Techniques Advisory Committee (NAPCTAC) to assist the Agency in application of these criteria. Because of the balance afforded by the diversity of the NAPCTAC membership, EPA concluded that it was an appropriate and convenient choice for the panel. The panel met in July 1994 in Durham, North Carolina, to assign preliminary scores for Criteria 1 through 7 to each of the product categories. Results of the preliminary scoring exercise are available in the docket (A-94-65; item I-B-2). The EPA used

NAPCTAC to provide expert advice on the question of product ranking, but excercised its own independent judgment to assign the final ranking of products for regulation.

Once the initial ranking of products based on exercise of Criteria 1 through 7 was completed, EPA applied Criterion 8, regulatory efficiency and program considerations, to prioritize the products in the schedule for regulation, and thereby identify which product categories comprised at least 80 percent of VOC emissions in nonattainment areas. As required by section 183(e) of the Act, EPA grouped the listed categories of consumer and commercial products into four groups for regulation in 2-year intervals. Although the statute does not require that the 80 percent be divided into four equal groups, EPA placed product categories into the four groups as equally as possible with the goal of achieving VOC emission reductions as early as possible, given available EPA resources. Thus, nearly two-thirds of the cumulative emissions from consumer and commercial products result from products in the first two groups of categories.

The EPA submitted the Report, including the required criteria for regulation, on March 23, 1995. A summary of the 6-volume report (EPA-453/R-94-066-a through f) was published at 60 FR 15264. In the same notice, the list of products and the schedule for regulation was published. The Act requires that the Group I rules be promulgated within 2 years of the publication date of the Report.

Regulations under section 183(e) of the Act. Regulations under section 183(e) of the Act must reflect EPA's consideration of best available controls (BAC) for the category of product. As defined in section 183(e)(1) of the Act, BAC is

> ...the degree of emission reduction that the Administrator determines, on the basis of technological and economic feasibility, health, environmental, and energy impacts, is achievable through the application of the most effective equipment, measures, processes, methods, systems, or techniques, including chemical reformulation, product or feedstock substitution, repackaging, and directions for use, consumption, storage, or disposal.

For any regulations under section 183(e) of the Act, the regulated entities are defined as follows:

> (i) manufacturers, processors, wholesale distributors, or importers of consumer or commercial products for sale or distribution in interstate commerce in the United States; or
>
> (ii) manufacturers, processors, wholesale distributors, or importers that supply the entities listed under clause (i)with such products for sale or distribution in interstate commerce in the United States.

Section 183(e) grants the Agency discretion to issue control technique guidelines (CTGs) in lieu of regulations if the Agency determines that a CTG will be substantially as effective as a regulation in reducing emissions of VOC in ozone nonattainment areas. A CTG is a guidance document issued by the EPA. Whenever a CTG is published, section 182(b)(2) of the Act requires that States adopt (as part of their State implementation plans) reasonably available control technology (RACT) rules for stationary sources of VOC that are covered by a CTG. A CTG includes a presumptive norm for RACT that EPA believes satisfies the definition of RACT. By submitting a RACT rule that is consistent with a CTG, a State does not need to provide additional support to demonstrate that the rule meets the Act's RACT requirement.

Since publication of the list and schedule for regulation, the EPA has proposed regulations for three product categories pursuant to section 183(e): architectural coatings (61 FR 32729), automobile refinish coatings (61 FR 19005), and consumer products (61 FR 4531). In addition, EPA has proposed determinations that CTGs are substantially as effective as regulations for three product categories: wood furniture manufacturing coatings, aerospace coatings, and shipbuilding and ship repair coatings (62 FR 44672).

2.1.1 Ranking Process

2.1.1.1 Adequacy of the Section 183(e) Study and Report to Congress.

Comment: Six commenters in nine documents (AIM-IV-D-212, CP-IV-D-07a, CP-IV-D-35, CP-IV-F-1a, AIM-IV-D-214b/CP-IV-D-07b, AIM-IV-D-178, AIM-IV-F-1[l], AIM-IV-D-170, AIM-IV-F-1d) claimed that EPA failed to perform the study necessary to establish criteria for regulating categories of consumer and commercial products as mandated by section 183(e)(2)(A)(ii) of the Act. One commenter (CP-IV-F-1a) claimed that instead of developing the in-depth study requested by Congress, EPA conducted an inventory of mass emissions from particular products. The commenter contended that a "study" involves investigation, analysis, and comparison, whereas an inventory involves counting and identifying items.

One of the commenters (CP-IV-D-07a) stated that a complying study is an essential precondition to preparing the Consumer and Commercial Products list and schedule. Two commenters (CP-IV-D-07a, CP-IV-D-35) concluded that until EPA completes the required study, EPA is without authority to propose any regulations under section 183(e) of the Act.

One commenter (AIM-IV-D-214b/CP-IV-D-07b) contended that, under section 304, a district court could enter a mandatory injunction ordering EPA to perform its study and listing duties, and also a prohibitory injunction ordering EPA not to propose any rule until it performed those duties. The commenter cited various court decisions regarding the performance of mandatory and nondiscretionary duties in various contexts. The commenter also listed remedies available under section 304 of the Act for failure to perform a mandatory duty. In addition, the commenter cited decisions in which courts prohibited actions until the mandatory duties were performed.

One commenter in two letters (AIM-IV-D-212, AIM-IV-D-212p4/CP-IV-D-35g) contended that EPA failed to implement the clear mandate of section 183(e) of the Act. The commenter examined various parts of the business, the science,

and the psychology that affected human health and contended that the Report had not analyzed the health effects of regulation. The commenter insisted that EPA adopt a broader sense of the "health...function served by such...products" to include an understanding that certain regulations would result in the loss of jobs and that poverty, hunger, and stress would occur.

The commenter cited the articles "Risky Business" (Marshall [AIM-IV-D-212p4b/CPIV-D-35g4]), "Effects of Diminished Economic Opportunities on Social Stress: Heart Attacks, Strokes and Crime" (Merva and Fowles [AIM-IV-D-212p4a/CP-IV-D-35g3]), and "Human Mortality, Air Pollution and Unemployment in Southern California" (Haring and Vatarues [AIM-IV-D-212p4c]). The commenter used these articles to argue that unnecessary regulations create costs to business, thereby creating unemployment which has adverse health effects. The commenter also noted that one study also showed a strong correlation between adverse health effects and unemployment and also showed a strong correlation between adverse health effects and ozone concentrations. In addition to these articles, the commenter also attached other documents which they claimed support their contention that the Report ignores the effects of VOC regulations on the sociological/psychological health of the general population (loss of jobs due to VOC regulations). The commenter recommended that section 4.3.1 of the Report include a definition of "health" that considered both the physical and mental well-being of a person. According to the commenter, section 4.3.2 of the Report focuses on regulation, not health or safety analyses. The commenter requested that the Report be redone.

One commenter (AIM-IV-D-214c) maintained that EPA's failure to list statutory priorities for regulation based on the criteria established under sections 183(e)(2)(A)(ii) and (B) of the Act had stark consequences for disfavored industries or industry segments, such as the one to which local and regional manufacturers belong, which have been targeted for immediate regulation. The commenter contended that Congress intended that

EPA would list certain categories for regulation in “the most effective, least disruptive way.”

One commenter (CCP-IV-D-03) supported EPA’s findings stated in the Report which promote several options for reducing VOC emissions from consumer and commercial products. The commenter asserted that allowing flexibility in the methods used to reduce emissions will promote technological innovation and minimize control and implementation costs. The commenter agreed that emission reductions must be balanced with product efficacy, consumer acceptance, and economic impacts, and that reducing emissions from different categories of products may require different regulatory strategies. The commenter also urged EPA to consider safety and health effects issues when formulating regulations for consumer and commercial products. The commenter supported limiting the use of certain substitutes in products sold to the general public because of their toxicity and encouraged EPA to consider the toxicological data in determining safe substitutes in consumer and commercial products.

Three additional commenters (CP-IV-D-46, CP-IV-F-1b, CP-IV-F-1d) stated that EPA had fulfilled all necessary requirements of section 183(e) of the Act. One commenter (CP-IV-D-46) stated that based on the record established by EPA in the preamble to the consumer products rule and the extensive survey of consumer products in the Report, EPA acted entirely in accordance with the requirements of section 183(e) of the Act and within its authority as delegated by Congress through the 1990 Amendments to the Act. The commenter stated that EPA met the requirements to perform a study and write a report of the emissions of volatile organic compounds into the ambient air from consumer and commercial products. This report was to determine the potential of VOC emitted from consumer and commercial products to contribute to ozone levels which violate the ozone NAAQS and establish criteria for regulation under section 183(e)(2)(A) of the Act. The commenter asserted that EPA did this by undertaking the largest survey at the time of all

consumer product manufacturers that sell products in the United States, compiling the data, and reporting the results in the Report submitted in March 1995. The commenter stated that EPA met the requirement under section 183(e)(2)(ii) of the Act to establish criteria for regulating consumer and commercial products based on factors outlined in section 183(e)(2)(B) of the Act by convening the NAPCTAC to apply the suggested criteria for regulation. The commenter argued that 24 products chosen for inclusion in the proposed consumer products regulation are supported by the results of the NAPCTAC evaluation. The commenter stated that EPA's Report was good because it included: (1) a detailed section on why reactivity can be a relevant consideration (2) how products were scored for reactivity and (3) the NAPCTAC ranking sheets for each personal care product which included a reactivity ranking as required under the statute.

Response: The EPA believes that it has satisfied the requirements of section 183(e) of the Act as they relate to the Consumer and Commercial Products Study, the report to Congress, and the listing of consumer and commercial products for regulation. Therefore, EPA has authority to propose and promulgate regulations under section 183(e) of the Act.

Contrary to the commenters' assertions, EPA conducted a comprehensive 4-year study of consumer and commercial products. The study involved identification of all consumer and commercial products; development of VOC emission inventory; consideration of photochemical reactivity of these VOC emissions; study of the fate of products in wastewater and landfills; analysis of systems of regulation; development of criteria for ranking products for regulation; and listing of product categories responsible for 80% of the VOC emissions and development of schedule for regulation. The objectives of the study were to: (1) determine the potential of emissions from consumer and commercial products to contribute to the ozone nonattainment problem; and (2) establish criteria for regulating consumer and commercial products as stipulated by

the statute. One of the things EPA considered is that consumer and commercial products account for 28 percent of the anthropogenic VOC emissions and these emissions are largely uncontrolled nationwide. In light of this, EPA examined in the study the potential for emissions from these products to contribute to ozone nonattainment.

A major element of the study was a comprehensive accounting of VOC emissions from the full range of consumer and commercial products subject to section 183(e) of the Act. To develop this comprehensive emissions inventory, EPA used information from existing regulatory efforts, conducted literature searches to obtain emission information for certain products and conducted a survey of consumer product manufacturers. The survey of consumer product manufacturers obtained information on the total VOC content (and the individual VOC ingredients) of products.

Another key element of the study was an analysis of photochemical reactivity as it relates to VOC emissions from consumer and commercial products. This effort investigated the validity, uncertainties, and overall utility of available reactivity data and evaluated methodologies by which relative reactivity could be employed in implementation of section 183(e) of the Act.

In another part of the study, EPA investigated the fate of consumer and commercial product-related VOC in wastewater and in landfills. The purpose of this effort was to determine whether adjustments to VOC inventory data should be made to account for the portion of the VOC content of consumer products that enter landfills or wastewater and, due to physical or chemical mechanisms, do not enter the ambient air.

Also as part of the comprehensive study, EPA analyzed various systems of regulation, including product registration and labeling, self-monitoring and reporting, prohibitions, limitations, and economic incentives, that could be used to achieve reductions in VOC emissions and resultant ozone formation. Various measures such as reformulation, product

substitution, repackaging, and consumer education were investigated as possible methods of achieving VOC reductions. In addition, the study included an in-depth analysis of aerosol products and packaging systems.

One of the major objectives of the study was to establish criteria for regulating consumer and commercial products under section 183(e) of the Act. Pursuant to the statute, EPA developed eight criteria based closely upon five factors that Congress instructed EPA to take into consideration in section 183(e)(2)(B) of the Act. These criteria and the process of applying them are discussed in more detail in section 2.1.1.6. The five statutory factors for consideration by EPA in establishing criteria are:

1. Uses, benefits, and commercial demand;
2. health and safety functions;
3. products which emit highly reactive VOC;
4. cost-effectiveness of control; and
5. availability of alternatives.

Utilizing the discretion allocated to the Agency in section 183(e) of the Act, EPA established eight criteria based upon its consideration of the statutory factors:

1. Product utility;
2. commercial demand;
3. health and safety functions;
4. emissions of highly reactive VOC;
5. availability of alternatives;
6. cost-effectiveness of controls;
7. magnitude of annual VOC emissions; and
8. regulatory efficiency and program considerations.

In March 1995, following completion of the 4-year comprehensive study, EPA published and submitted to Congress a report entitled “Study of Volatile Organic Compound Emissions from Consumer and Commercial Products - Report to Congress” (EPA-453/R-94-066-A) and published five supporting documents as follows:

1. “Comprehensive Emissions Inventory” (EPA-453/R-94-066-B);
2. “Fate of Consumer Product VOC in Landfills” (EPA-453/R-94-066-C);

3. "Fate of Consumer Product VOC in Wastewater" (EPA-453/R-94-066-D);
4. "Economic Incentives to Reduce VOC Emissions from Consumer and Commercial Products" (EPA-453/R-94-066-E); and
5. "Aerosol Products and Packaging Systems" (EPA-453/R-94-066-F).

On March 23, 1995, EPA published a notice in the Federal Register [60 FR 15264] entitled "Consumer and Commercial Products: Schedule for Regulation." This notice contained a list of consumer and commercial products identified for possible regulation and a schedule for promulgation of such regulations. In accordance with section 183(e)(3)(A) of the Act, EPA listed those categories of consumer and commercial products, based on the study, which account for at least 80 percent of the VOC emissions, on a reactivity-adjusted basis, from consumer and commercial products in ozone nonattainment areas. The EPA divided the list into four groups, by priority, based on application of the eight criteria established in the study. In accordance with the statute, EPA scheduled a group to be regulated every 2 years beginning in March 1997.

Having conducted the comprehensive 4-year study, established criteria for regulating products, submitted the required report to Congress, and published the consumer and commercial product category list and schedule for regulation, EPA believes it has satisfied the preconditions to regulation under section 183(e) of the Act. With regard to the commenter's claims that EPA has failed to complete the study and listing, EPA notes that a U.S. District Court has recently rejected the commenter's claim that the Agency failed to comply with a mandatory duty for lack of jurisdiction under section 304 of the Act and the U.S. Court of Appeals for the Ninth Circuit has recently upheld that decision. See Dunn-Edwards v. EPA, 1997 U.S. App.LEXIS 22891 (8/5/97). In addition, EPA notes that a number of courts have held that the contents of reports to Congress, and the adequacy of those contents, are not subject to judicial review. See, e.g., NRDC v. Hodel, 865 F.2d288 (D.C. Cir. 1988).

Concerning the allegation that EPA failed to analyze the health effects of regulations as required by section 183(e), EPA believes that the commenter misconstrued the section 183(e)(2)(B)(ii) directive to consider health and safety functions. The EPA considers the reference to health and safety function in section 183 (e)(2)(B)(ii) to provide direction to the Agency to take into consideration the health benefits of products, such as asthmatic inhalers, when listing consumer and commercial products for regulation. This provision does not instruct the EPA to look at secondary health effects such as those suggested by the commenter. Nevertheless, EPA does in fact take into account factors such as economic impacts and potential for closures and unemployment in consideration of the economic impact associated with a rulemaking.

In establishing the ranking criteria, EPA did consider the health and safety function in the application of Criterion 3. Criterion 3 was designed to lower the priority for regulation of products that contribute to the protection of health or safety. A product with no health or safety function was assigned a maximum score, under this criterion (higher priority for regulation). A product marketed primarily for its health or safety functions received a minimum score (lower priority for regulation). A product whose health or safety functions are secondary was assigned a mid-range score. By this process, EPA recognized the health and safety benefits derived from the use of consumer and commercial products and sought to ensure that these benefits were not unduly or unnecessarily compromised.

With respect to the articles and other documents submitted by the commenter, EPA disagrees that these items raise issues for consideration at the time of the Study. The EPA examines the economic impacts of regulations at the time of rulemaking because it is only at that point that it is possible to evaluate such impacts. In this case, the commenter presupposed that there are significant adverse employment impacts of any rule and indicated that there are secondary impacts associated with unemployment

that are not accounted for by EPA's analysis. The EPA does not agree that it is possible to anticipate the economic impacts and benefits of any rules issued under section 183 (e) of the Act in advance of development of the rules. The EPA has considered the economic impact of the proposed standards for the automobile refinish coatings rule, the consumer products rule, and the architectural coatings rule in the rulemakings on these standards rather than in the study.

Finally, EPA agrees that allowing flexibility in the methods used to reduce emissions will promote technological innovation and minimize control and implementation costs. The EPA also agrees that its approach balances emission reductions with product efficacy, consumer acceptance, and economic impacts and recognizes that reducing emissions from different categories of products may require different regulatory strategies. The EPA also agrees that health and safety effects should be considered when issuing regulations for consumer and commercial products. In consideration of substitutes for products, EPA would of course consider whether or not the reformulated product presented other concerns, such as emissions of hazardous air pollutants (HAPs) or other health hazards. The EPA's consideration of health effects would be in the decision on whether or not there are acceptable substitutes.

Comment: One commenter claimed that EPA did not conduct the proper required peer review of the section 183(e) study and the report to Congress because the Agency wrongly concluded that peer review was unnecessary.

Response: The EPA believes that the degree of peer review conducted for the section 183(e) study and report to Congress was within the discretion of EPA. The EPA's January 1993 Peer Review Policy states that: "(A)gency managers within Headquarters, Regions, laboratories and field components determine and are accountable for the decision whether to employ peer review in particular instances and, if so, its character, scope, and timing. These decisions are made in conformance with program

goals and priorities, resource constraints, and statutory or court-ordered deadlines."

Although EPA conducted no formal peer review process for the report to Congress, there was extensive peer involvement at various stages of the section 183(e) study. For example, the basis for chapter 3, Photochemical Reactivity, was a scientific paper entitled, "Scientific Basis of the VOC Reactivity Issues Raised by Section 183(e) of The Clean Air Act Amendments of 1990."[1] (A-94-65, item IV-J-8) This paper was reviewed by members of the National Academy of Sciences prior to publication of the report to Congress. In addition, in October of 1996, this approach was published as a technical paper in the Journal of Air and Waste Management Association. As a published paper, it was subjected to the same peer review policy as all other papers submitted to this journal. The fact that, after meeting the peer review requirements of the journal, it was published without changes confirms its technical merit. In addition, in September 1992 as part of the architectural coatings regulatory negotiation process, EPA convened a meeting of photochemical reactivity and modeling experts to obtain their input on the state of the science of reactivity and the suitability of reactivity to regulatory programs.

Other elements of the study and Report were developed with a high degree of peer involvement by representatives of various sectors of the consumer and commercial products industry. Elements of the study that involved input from industry or were reviewed by industry prior to publication of the report to Congress included: draft and revised documents entitled, "Criteria for Regulation of Consumer and Commercial Products under Section 183(e) of the Clean Air Act"; the consumer products survey questionnaire and results; and the report on aerosol products and packaging systems (A-94-65, item I-A-6).[2,3] Industry groups and regulatory agencies who provided input on various topics included the Chemical Specialties Manufacturers Association; the Cosmetic, Toiletry, and Fragrance Association;

the Soap and Detergent Association; the National Paint and Coatings Association; the Automotive Chemical Manufacturers Council; the Adhesive and Sealant Council; California Air Resources Board; New Jersey Department of Environmental Protection; New York Department of Environmental Conservation; and Wisconsin Department of Natural Resources.

With regard to the listing and scheduling of categories for regulation, NAPCTAC, as well as members of the public, were consulted and were provided an opportunity to participate in the criteria ranking process in an open public meeting.

The EPA believes that peer involvement in the most controversial and technical element of the study (reactivity), the high degree of industry and State regulatory agency involvement, and participation of the public and the NAPCTAC in the ranking process all work together to satisfy the goal of involving experts in the field, obtaining input from outside of the Agency and ensuring policy decisions rest on sound, credible science and data.

2.1.1.2 Addition of Two Criteria (Emission Magnitude, and Regulatory Efficiency and Program Considerations).

Comment: Two commenters in seven documents (AIM-IV-D-55, AIM-IV-D-214b/CP-IV-D-07b, AIM-IV-D-214c, CP-IV-D-35, CP-IV-F-1a, AIM-IV-D-212p6/CP-IV-D-35t, AR-IV-F-1) stated that the U.S. Environmental Protection Agency (EPA or Agency) did not have the authority to add the "emission magnitude" and the "regulatory efficiency and program considerations" criteria to the five factors listed in section 183(e)(2)(B) of the Clean Air Act (Act). The commenters claim that any Agency action relying on these factors is illegal and invalid.

One commenter in two letters (AIM-IV-D-214c, AIM-IV-D-214b/CP-IV-D-07b) cited the following three court cases to support its position: (1) Motor Vehicle Manufacturers Assn. v. State Farm Mutual, 463 U.S. 29, 43 (1983); (2) Hazardous Waste Treatment Council v. U.S.E.P.A., 861 F.2d 270, 274-277 (D.C. Cir. 1988); and (3) Leatherman v. Tarrant County Narcotics

Unit, 113 S. Ct. 1160, 1163 (1993). The commenter stated that these cases demonstrate that: (1) Agency action was invalid where the Agency relied on factors which Congress did not intend it to consider; (2) decisions based on a criterion not authorized by the Act are not in accordance with law; and (3) where Congress enumerates specific factors for consideration, it is beyond an agency's authorized discretion to consider additional factors not specifically enumerated.

Another commenter in two letters (AIM-IV-D-212, CP-IV-D-35) supported this position by stating that the Act's use of the term "shall" meant that EPA had no discretion to alter, ignore, or add to these factors.

According to one commenter (AIM-IV-D-212, AIM-IV-D-212p6/CP-IV-D-35t), EPA unfairly altered the ranking process by using the magnitude of volatile organic compound (VOC) emissions as an additional factor. The commenter alleged that use of emissions magnitude effectively substituted a volume factor for the relative reactivity determination of each VOC as required by Congress.

One commenter (AIM-IV-D-214c) stated that the regulatory efficiency and program considerations criterion severely prejudices the ranking process against those products that have current State and/or Federal regulations, such as architectural coatings.

One of the commenters (CP-IV-F-1a) asserted that the efficiency factor was subjective and could be abused by EPA because there is no standard definition of "efficiency."

Response: The EPA agrees that the Act requires EPA to establish criteria for regulating consumer and commercial products, taking into consideration certain listed factors. The statute does not require, however, that EPA establish criteria that precisely mirror the factors listed in section 183(e)(2)(B) of the Act, nor does it require that EPA consider the list of factors to be exclusive. Section 183(e)(2)(B) of the Act only requires that the criteria reflect consideration of the listed

factors. Accordingly, the statute provides EPA discretion to identify the relevant and necessary criteria for regulation. The EPA fulfilled its duty to establish criteria and to consider each of the five listed factors in developing its criteria. The statutory factors and the criteria established by EPA are discussed in more detail in sections 2.1.1.1 and 2.1.1.6.

The EPA exercised its discretion by establishing two criteria that did not specifically mirror the five listed factors, but which EPA believed were important for the purposes of establishing priorities for regulation, as instructed by Congress, and in keeping with the objectives reflected by Congress in the factors listed for EPA consideration in devising criteria. Because Congress gave EPA discretion to devise appropriate criteria, taking into consideration certain factors enumerated in section 183(e)(2)(B) of the Act, EPA believes that the commenter's reference to the decisions in Motor Vehicle Manufacturers Assn., Hazardous Waste Treatment Council, and Leatherman are inapposite. Those decisions are distinguishable because the courts addressed instances in which entities relied on factors not permitted by the applicable statutes. In this instance, EPA's establishment of criteria was explicitly directed by statute and the scope of EPA's authority to do so was not limited to the factors or in other ways analogous to the cases cited by the commenter.

Criterion 7, Magnitude of Annual VOC Emissions, provided for ranking of products based on their annual mass emissions of VOC expressed in tons. As required by section 183(e) of the Act, these mass emission estimates were adjusted on the basis of relative reactivity. The procedure for this adjustment is explained in detail in chapter 3 of the report to Congress. Following the adjustment for relative reactivity, products with higher annual reactivity-adjusted emissions received higher scores, indicating a higher priority for regulation. The criteria and scoring process are discussed in detail in section 2.1.1.6 of this document and in chapter 4 of the report

to Congress. Thus, EPA considered both volume and reactivity; it did not substitute a volume basis for reactivity adjustment. The EPA believes that it is preferable to regulate products taking into consideration how much VOC they emit relative to other products. The Agency's position of focusing on larger emission sources is reasonable because the larger sources generally provide a greater opportunity for emission reductions.

Criterion 8, Regulatory Efficiency and Program Considerations, was established solely to assure that EPA continues to use resources in the most effective manner to meet the mandate of section 183(e) of the Act. It is reasonable for EPA to consider whether a given consumer and commercial product category has already been the subject of State or Federal regulatory programs. Such categories typically would have been fairly well-characterized, alternatives of control would have been explored, and cost and economic impacts of regulation would have been investigated. The EPA believes it is also reasonable to consider the existence of this information in prioritizing product categories for regulation because EPA must regulate the first group of products in a relatively short period of time (i.e., 2 years after the listing of products for regulation). Giving these well-characterized categories higher priority allows EPA more time to evaluate potential rules for categories that may be less well understood at this time.

The architectural coatings industry was not adversely affected by EPA's application of Criterion 8, Regulatory Efficiency and Program Considerations. Comparison of the tabular results of the product category ranking exercise (before application of Criterion 8) and the resulting March 1995 schedule for regulations (following application of Criterion 8) shows that in only two cases were categories listed for regulation that fell outside the categories accounting for at least 80 percent of the emissions based on numerical score alone. These categories were: (1) shipbuilding and repair coatings; and (2) a collection of 24 household consumer products which were currently regulated by

California and several other States. Therefore, contrary to the commenter's suggestion, the ranking of architectural coatings in the top 80 percent was not a result of EPA's use of Criterion 8.

The EPA intends to exercise discretion in adjusting the product category rankings, as necessary, to achieve an effective and practical regulatory program. As a result, EPA may amend the list and schedule for regulations as regulatory development proceeds or as new information becomes available. For example, while developing regulations for aerosol spray paints (listed for regulation in 1997), EPA added acetone to the list of compounds considered negligibly reactive and exempt from EPA's definition of VOC. Acetone is a solvent used in the formulation of many aerosol paint products. Consequently, EPA's analysis of best available controls (BAC) conducted during the regulatory development process for aerosol spray paints was no longer accurate, and would have to be revisited. The EPA has determined that additional time is required to consider the aerosol spray paint category, and intends to exercise its discretion to amend the schedule for regulations to move aerosol spray paints from Group 1.

With regard to the commenter's assertion that Criterion 8 is subjective and that there is no standard definition of "efficiency," EPA believes that the existence of data, rules, and studies on consumer and commercial products was a valid basis for evaluating Criterion 8 and listing categories for regulation. As explained in section 2.1.1.6, most of the criteria have elements of subjectivity, and EPA believes this criterion is no less valid than the other criteria. Therefore, EPA believes there is no need for a definition for "efficiency."

Comment: Two commenters (AIM-IV-D-214c, AIM-IV-D-212p6/CP-IV-D-35t) referred to EPA's acknowledgment in the Report that products used in larger quantities may be given "undue emphasis" to support the commenters' contention that EPA's allegedly wrongful consideration of emission magnitude grossly skewed subsequent regulatory decisions.

Response: The phrase "undue emphasis" is not used with regard to emissions magnitude. It is used at the top of page 4-4 of the Report in the discussion of Criterion 2 - Commercial Demand. In explaining why total volume or weight sold was not selected as an indicator of commercial demand, the Report states: "Other indicators of commercial demand that were considered include the total volume or weight sold, the number of units sold, and price per unit. A measure of total volume or weight sold may indicate the relative importance of the product to consumers, as does the total annual sales. However, products that are used in larger quantities may be given undue emphasis." The phrase "undue emphasis" in this case refers to the fact that although evaluating commercial demand based solely on total volume or weight sold may have been used to indicate the relative importance of the product to consumers, that approach could also have biased the ranking toward products that take up large volumes or are very heavy. For example, commercial demand for underarm deodorant and hair spray may be equal but because underarm deodorant has a different density than hair spray, using the total volume or weight sold may not provide an equivalent indication of commercial demand.

This issue of biasing the ranking toward products that take up large volumes or are very heavy was discussed at the July 1994 National Air Pollution Control Techniques Advisory Committee (NAPCTAC) meeting (see section 2.1.1.6). Based on input from members of the public and the Committee, EPA revised Criterion 2 to mitigate any bias this might have introduced. Criterion 2 was redefined to be annual dollar sales divided by tons VOC emitted. This approach tends to minimize any bias for or against high sales volume products such as coatings. The EPA believes that this modification in response to the NAPCTAC committee comments addressed the commenter’s concerns.

2.1.1.3 Subgroups Addressed by the Study and Ranking Process.

Comment: One commenter in two letters (AIM-IV-D-212, CP-IV-D-35) contended that EPA misinterpreted the regulatory approach of section 183(e)by regulating on an industry-by-industry basis rather than on a product-by-product basis. The commenter stated that section 183(e) of the Act clearly made reference to regulation of products rather than of industries and asserted that EPA was trying to rewrite the law. Two commenters (AIM-IV-D-212, AIM-IV-D-214b/CP-IV-D-07b) stated that EPA improperly listed all categories of architectural coatings in the first phase of regulations in Group I as though they were one omnibus category. The commenters argued that EPA should have listed products on a category-by-category basis and that the list should have separated out each type of architectural coating for separate listing.

The commenters cited EPA's section 183(e) study and report to Congress which identified 46 categories of architectural coatings and asserted that the Report failed to provide any information about the VOC emissions from any one of the 46 architectural coating categories identified in the report to Congress.

Response: In studying and listing product categories, EPA selected categories based upon reasonable distinctions. Architectural coatings have been defined by States and EPA regulators as coatings applied to stationary structures in the “field.” Since architectural coatings are used for similar purposes, i.e., to coat stationary substrates outside of a manufacturing or shop application, EPA placed them in one group for purposes of determining regulatory priority. The EPA recognizes there is a continuum of possibilities for grouping architectural coating products into product categories. However, creation of architectural coating categories is intertwined with the specifics of the regulatory option chosen. For example, one approach pursued by EPA during regulatory development would have

eliminated the need for category distinctions since the requirements would have focused on a company average VOC content for all “field applied” coatings manufactured by each company. Conversely, more categories may be created as lower VOC content levels are contemplated for a given category. During regulatory development, decisions to subdivide a given category into more specific subcategories is often a direct consequence of the VOC content levels under consideration. Separating out a specific “niche” product from a broader classification creates more opportunities for emission reductions and avoids application of emission limits that could not be achieved or would create an unreasonable cost impact on the niche market. For example, in the process of developing the proposed architectural coating rule, EPA established over 50 categories with varying VOC content requirements. This is significantly more categories than have appeared in previous State rules affecting architectural coatings and could not have been predicted prior to completion of EPA’s regulatory development efforts. Therefore, performance requirements and other specific characteristics of individual coating categories were taken into account during regulatory development, even though EPA chose to consider all of these types of products together for purposes of listing and prioritizing the products for regulation.

The EPA disagrees with the commenter’s differentiation between “product” and “industry” with regard to listing consumer and commercial products for regulation. When a product (or product category) is regulated under section 183(e) of the Act, the regulated entity is the manufacturer, importer, processor, or wholesale distributor of the product. Consequently, the listing of a product or product category for regulation ultimately affects the industry associated with that product or product category.

With regard to the commenter’s assertion that EPA improperly listed all categories of architectural coatings in Group I as one "omnibus" category, EPA was within the discretion accorded to it

by section 183(e)(3)(A) of the Act to list for regulation "those categories of consumer or commercial products that the Administrator determines, based on the study, account for at least 80 percent of the VOC emissions" in areas that violate the ozone national ambient air quality standards (NAAQS). The EPA believes that section 183(e) explicitly accords the Agency broad discretion to determine the best form of controls to achieve the necessary VOC reductions and that it is reasonable to regulate all similar products together as a single category of product for purposes of regulation.

The commenter remarked that EPA presented 46 categories of architectural products in the report to Congress, but failed to present emission estimates for each of the 46 categories. Section 5.4 of the Report contains brief descriptions of each category of products in order to help the reader understand the range of VOC-emitting products used in the various categories. Accordingly, there is a one-page description of architectural coatings presented on page 5-31 of the Report, that includes a list of 46 types of architectural coatings. The page on architectural coatings was merely descriptive, and was not meant to imply that each product should be inventoried and ranked separately.

For household consumer products, EPA selected 61 relatively broad categories to include in the listing and prioritization exercise. Similar to the architectural coatings rule, further refinement of these categories was also possible, but EPA grouped household consumer product categories according to similar uses. For example, EPA grouped all general purpose cleaners in one category and all hair sprays in another.

Since EPA imposed consistent considerations in selecting the category of products as well as categories of household consumer products for listing and ranking purposes, no bias against particular architectural coating products was introduced into the process that would have caused specific architectural coating products to be regulated without cause.

Comment: One commenter (AIM-IV-D-212) stated that California considered architectural and industrial maintenance coatings separately from consumer and commercial products. The commenter pointed out that California published its data and table of product categories approximately 4 months before EPA completed its Report in March of 1995. Based on this and other information, the commenter concluded that the report is based substantially on biased and predetermined conclusions on the part of EPA.

Response: The Act's definition of consumer and commercial products is much broader than California's definition. Section 183(e)(1)(B) of the Act specifically defines a "consumer or commercial product" as "any substance, product (including paints, coatings, and solvents), or article (including any container or packaging) held by any person, the use, consumption, storage, disposal, destruction, or decomposition of which may result in the release of volatile organic compounds." Since the statutory definition of consumer and commercial products specifically includes paints and coatings, EPA considers architectural and industrial maintenance coatings to be within the scope of authority of section 183(e) of the Act.

2.1.1.4 Consideration of the Impacts of Regulatory Alternatives

Comment: Two commenters in three documents (AIM-IV-D-214b/CP-IV-D-07b, CP-IV-F-1a, CP-IV-D-07) asserted that an analysis of the economic and environmental effects of each alternative method of regulation (exemption, substitution, etc.) for each category was needed in order to rank and list categories for regulation.

One of the commenters (CP-IV-D-07) asserted that the decision to regulate a category should include consideration of any environmental impacts associated with exempting categories as well as the economic costs of regulating the category with different methods and regulating the category in each of the four possible phases for regulation.

One commenter (AIM-IV-D-214c) claimed that EPA's study of VOC from consumer and commercial products did not identify the availability of alternatives to such products which were of "comparable costs" as required by section 183(e)(2)(B)(v) of the Act. The commenter referred to EPA's statements in the Report that it did not have information on the cost of alternative products and promised that it would do so in developing regulations. The commenter stated that if EPA had considered economic costs in developing regulatory criteria, as mandated, it would have been in a position to decide which forms of regulation were appropriate, how much time to give manufacturers to meet any reformulation limits, and whether substitution limits were warranted at all. The commenter referred to less stringent measures authorized by Congress such as: labeling regulations containing directions for use or other disclosures; economic incentives, such as marketable permits; and control technique guidelines for State regulation in nonattainment areas.

One commenter (AIM-IV-D-55) stated that establishment of the four-part list of categories for regulation must be based on a comparative analysis of both the environmental and economic impacts of each VOC. The commenter asserted that EPA could not regulate any category until it completed this comparative analysis and determined the merits of other possible regulatory options.

Response: Factors relating to economic and environmental impacts are included under section 183(e)(2)(B) of the Act for the establishment of criteria to be used in prioritizing categories of consumer and commercial products for regulation. Here, EPA is required to consider two factors: (1) those consumer and commercial products which are subject to the most cost-effective controls (section 183(e)(2)(B)(iv)); and (2) the availability of alternatives (if any) to such consumer and commercial products which are of comparable costs, considering health, safety, and environmental impacts (section 183(e)(2)(B)(v)).

The EPA disagrees with the commenters' interpretation that this language mandates an in-depth analysis of impacts of all regulatory alternatives for every product category at the time of listing. The section 183(e) list and schedule for regulations is a prioritization exercise to be completed upon submission of the Report. It would have been impossible for EPA to conduct the in-depth analysis suggested by the commenters for every category of consumer and commercial products in the 3 years Congress provided for the study in addition to completing the other studies and determinations necessary to complete the Report (see section 2.1.1.1 for a more detailed discussion of the study). The EPA therefore believes that Congress could not have intended the Agency to perform the actions advocated by the commenters prior to the listing and scheduling of products for regulation.

To fulfill the requirements of section 183(e)(2)(B) of the Act, EPA developed a practical approach based on using available information. The EPA established Criterion 5, Availability of Alternatives and Criterion 6, Cost-Effectiveness of Controls, to provide consideration of these two factors. Criterion 5 provides a higher score, meaning a higher priority for regulation, to product categories for which alternatives were available at a comparable cost, with acceptance by consumers (as indicated by market share), and with comparable efficacy, health effects, and environmental impacts. Criterion 5 provided a lower score, meaning a lower priority for regulation, to product categories for which no alternatives were available, or for which alternatives were available but not at a comparable cost. Criterion 6 is discussed in section 2.1.1.5. The EPA believes this was a reasonable approach for purposes of scoring the categories for regulatory priority.

As mentioned above, the EPA believes that a more comprehensive analysis of alternatives and impacts is more consistent with and appropriate for data collection and analysis for the BAC determination required at the time of regulation development, not at the time of listing. For the BAC

determination, EPA would prefer to use the most current information possible, rather than relying on information developed at the time of the study. The EPA does not believe it is reasonable to do such a resource-intensive analysis twice (i.e., for listing and for regulation), especially in light of the fact, as discussed below, that the list and schedule are not final rulemaking actions. Accordingly, EPA has and will continue to evaluate the effects of alternative methods of regulation when each category is regulated. In addition, it should be noted that EPA will also consider "economic feasibility" and "environmental impacts" at the time of regulation as required under section 183(e)(1)(A) of the Act.

Furthermore, in the Federal Register notice of the schedule for regulation [60 FR 15264, March 23, 1995], EPA noted that the list and schedule may be amended if further information becomes available [60 FR 15264, 15265, 15268]. Thus, as individual products and categories are further assessed and if relevant information becomes available, EPA will consider changing the prioritization for regulation under section 183(e) of the Act or even removing a category from the listing if appropriate. For example, as explained in section 2.1.1.1, EPA initially listed aerosol spray paint in the first group for regulation. Following an initial regulatory assessment, EPA intends to move the aerosol spray paints category from Group I.

Comment: One commenter (AIM-IV-D-212) asserted that EPA failed to demonstrate economic and technological feasibility of BAC for each of the consumer and commercial product categories. As a result, the commenter concluded that it was difficult to compare the technological feasibility among consumer and commercial products.

Response: As mentioned previously, the consumer and commercial product list and schedule required by section 183(e)(3)(A) of the Act is a prioritization exercise, not an analysis of the technology that should be selected as the basis for the standards themselves. Determination of BAC is not

required at the time of listing. The only reference to BAC in section 183(e) of the Act relates exclusively to the regulations established under the section. Section 183(e)(3)(A) of the Act states: "The regulations shall require best available controls as defined in this section." Therefore, EPA concludes that a BAC analysis is not required at the time of listing categories for regulation. The EPA has and will continue to determine BAC when each category is regulated.

2.1.1.5 Consideration of Cost-Effectiveness

Comment: One commenter in two letters (AIM-IV-D-214b/CP-IV-D-07b, CP-IV-D-07a) stated that EPA's consideration of cost-effectiveness was inadequate for establishing regulatory priorities. The commenter (AIM-IV-D-214b/CP-IV-D-07b) asserted that EPA failed to perform the clear non-discretionary duty to list categories based upon cost-effectiveness.

The commenter (AIM-IV-D-214c) claimed that EPA failed to consider those products which were subject to the most cost-effective controls in establishing criteria for regulating consumer and commercial products as mandated under section 183(e)(2)(B)(iv) of the Act. The commenter considered this factor particularly crucial as a preparatory step to subsequent rulemaking under section 183(e)(1)(A) and (3)(A) of the Act. The commenter referred to a previous court ruling in Corrosion Proof Fittings v. EPA, 947 F.2d 1201 (5th Cir. 1991), for the proposition that EPA is required by statute to regulate to the extent necessary to protect the public using the least burdensome measures. The commenter also referred to the National Environmental Policy Act (NEPA) which the commenter contends requires EPA to study, develop, and describe appropriate alternatives to recommended courses of action in any proposal to the fullest extent possible. Moreover, the commenter questioned EPA's statement in the Report that it would evaluate information on cost-effectiveness in developing specific regulations because

"cost-effectiveness data are unavailable" for certain categories at the time of listing.

Two commenters (AIM-IV-D-55, AIM-IV-D-214c) questioned EPA's assertion that "insufficient data exists" to conduct a comparative study of the costs and cost-effectiveness of regulating products under section 183(e) of the Act. One commenter (AIM-IV-D-55) stated that cost-effectiveness data were available for architectural coatings based on a formal study done in Southern California by an economic consultant who found and disclosed the economic impacts of VOC regulation for architectural coatings.

Response: In-depth discussion of the consideration of the impacts of regulatory alternatives is presented in section 2.1.1.4. In establishing the criteria to prioritize consumer and commercial products for regulation, section 183(e)(B)(iv) of the Act requires EPA to consider "[t]hose consumer and commercial products which are subject to the most cost-effective controls." The EPA established Criterion 6, Cost-Effectiveness of Controls, to implement consideration of this factor. For this criterion, EPA used two methods to evaluate cost-effectiveness of control measures which varied depending on the availability of cost-effectiveness data. First, for products with a known cost-effectiveness value, EPA assigned a higher relative priority for regulation to products for which controls are very cost-effective. Second, for products for which cost-effectiveness data were unavailable, EPA developed a matrix based on scores determined by application of Criterion 5, Availability of Alternatives, and Criterion 7, Magnitude of Annual VOC Emissions, in order to evaluate cost-effectiveness. The highest score, which corresponded to the highest priority for regulation, was assigned to a product with high emissions and for which reformulation was available at a comparable cost to the current formulation. The lowest score, which corresponded to the lowest priority for regulation, was assigned to a product with low emissions and for which no

alternative was available at any cost. This matrix is presented and discussed more fully in section 4.6 of the Report. For architectural coatings the cost-effectiveness estimate of $260 per ton of VOC emissions reduction developed for the architectural coatings rule was used to apply Criterion 6 to architectural coatings. The EPA believes that it has considered cost effectiveness as contemplated by section 183(e) of the Act. As stated by the commenter, some study of the cost-effectiveness of VOC regulation for architectural coatings has been done in California. However, some of the data is not applicable for extrapolation to a national level because of the assumptions used in generating the data. Some of the proposed and promulgated VOC content limits in California are significantly lower than limits considered by EPA. These lower limits have significantly greater costs and impacts than any limits considered by EPA. Thus, EPA does not believe this data is applicable.

The March 23, 1995, notice did not represent a final agency action on the listing determination. The notice announced that the EPA would take comment on the listing in connection with its rulemakings on emission standards for the categories on the initial list, and that final agency action on the listing for each product category would occur upon publication of a final regulation for that category. At the time of each rulemaking, EPA will conduct an in-depth analysis of costs and emissions reduction. Contrary to the commenter's assertion, EPA did conduct an economic impacts analysis (EIA) to determine the cost effectiveness of the controls required by the proposed architectural coatings rule. The proposed architectural coating VOC rule has an estimated cost of $260 per ton of VOC emissions reduction. Based on information contained in the associated EIAs, the proposed automobile refinish VOC rule has an estimated cost of $136 per ton of VOC emissions reduction, and the proposed consumer products VOC rule has an estimated cost of $289 per ton of VOC emissions reduction. These EIAs were placed in the dockets for the respective proposed rules, and the

cost-effectiveness of each proposed rule is discussed in the rule's preamble which was published in the Federal Register. See the dockets for the architectural coatings rule, the automobile refinish rule, and the consumer products rule (A-92-18, A-95-18, and A-95-40, respectively).

The EPA believes that the commenters are mistaken as to several legal conclusions they seek to assert. First, EPA disagrees that the report to Congress required separate cost effectiveness analyses under section 183(e), section 309 of the Act, and Executive Order (EO) 12866. As discussed more fully in section 2.3.2.7 of this document, EPA need only comply with the language of section 183(e) of the Act at the time of the report to Congress, and the Agency believes that it has performed an appropriate analysis under this section.

Second, the commenters cite Corrosion Proof Fittings v. EPA, 947 F.2d 1201 (5th Cir. 1991), for the proposition that the Agency may only regulate to the extent necessary and using the least burdensome means. The Agency notes that the case in question dealt not with the Clean Air Act, but with the Toxic Substances Control Act (TSCA), and that the case turned upon an express statutory provision of TSCA that does not appear in the Clean Air Act. See ID., 947 F.2d at 1215. Reference to this precedent is thus inappropriate. Section 183(e) of the Act explicitly requires EPA to issue regulations based upon "best available controls" as that term is defined in the statute. The definition of best available controls empowers EPA to exercise discretion to determine what method and degree of emission control is appropriate, without reference either explicit or implicit to choosing the means that is "least burdensome." In fact, EPA believes that it has properly considered and mitigated the burdens imposed by the regulations, but disagrees with the commenters' allegation that it must choose the alternative that a commenter considers least burdensome.

Third, the Agency notes that, contrary to the assertion of some of the commenters, NEPA does not apply to regulatory actions of EPA under the Act. See 15 U.S.C. section 793(c)(1).

2.1.1.6. Category Scoring Process and Public Meeting

Comment: One commenter (AIM-IV-D-212) asserted that the NAPCTAC meeting and its findings were groundless and without merit and could not be the foundation for EPA's VOC study for the following reasons: (1) EPA had no authority to add the two factors to the ranking process; (2) the two additional factors were not fair and equitable towards the paint and coatings industry; (3) NAPCTAC had no expertise to assist EPA in the ranking, as shown by EPA's own treatment of the group; and (4) EPA acted in a biased fashion because it ignored reactivity.

One commenter (AIM-IV-D-212p6/CP-IV-D-35t) claimed that at a public hearing before the NAPCTAC on July 18-19, 1994, one EPA official responded to charges that EPA failed to consider reactivity as required by section 183(e) of the Act, by claiming that there was no appropriate scientific reactivity basis upon which to determine reactivity at the present time. The commenter stated that the EPA official did not intend to conduct reactivity tests on solvent-borne products because he summarily concluded that they were all reactive, and that highly reactive VOC constituted a substantial portion of VOC contained in paint products. The commenter stated further that in contrast to the EPA official’s statements, solvent-borne VOC are less reactive than waterborne VOC, and on this basis, the EPA official prejudged the issue without providing due scientific deference and supporting analysis.

Response: The EPA's response to the comment concerning the addition of two factors not listed in the Act is presented in section 2.1.1.2. The EPA’s response to the comment concerning how addition of the two factors affected the paint and coatings industry is presented in section 2.1.1.7. The EPA’s response to the comments concerning reactivity is presented in section 2.2.1.

Contrary to the commenter's assertion, EPA believes that NAPCTAC had sufficient expertise to assist in the ranking, and that the findings of the committee were valid and had merit. The committee, as a standing advisory group, provides independent views based upon the specialized knowledge and skills of its members. The Committee advises the Director, Office of Air Quality Planning and Standards (OAQPS), on the latest available technology and economic feasibility of alternative methods to prevent and control air contamination to be published in air quality control techniques guideline documents. It also advises on air pollution control techniques and testing and monitoring methodology for categories of sources subject to the provisions of sections 111, 112, and 183 of the Act. In addition, the Committee, through a subcommittee, periodically reviews Air Quality Planning and Standards program accomplishment plans and the associated contracts and grants awarded to carry out these plans.

The committee consists of the Director of OAQPS, or his designee, as Chairperson and 11 members appointed by the EPA Deputy Administrator. Members serve overlapping terms of from 1 to 4 years. Members are selected from the chemical, engineering, biomedical, and socioeconomic disciplines resident in universities, State and local governments, research institutions, and industry. Members are also selected for their technical expertise and/or interest in the development of air pollution control techniques. Because these members are experienced environmental professionals, EPA believes NAPCTAC had sufficient expertise to assist in ranking the categories of consumer and commercial products.

To obtain balanced and unbiased input in the evaluation of some relatively subjective criteria, EPA determined that an independent panel should be involved in the ranking process. The EPA considered NAPCTAC a logical choice for an independent and technically qualified panel because of the balance afforded by the diversity and expertise of such a group. Accordingly, the

Committee was convened on July 18-19, 1994, in Durham, North Carolina, for the purpose of assigning scores for Criteria 1 through 7 to each of the consumer and commercial product categories. The scoring process was conducted in an open public forum. A discussion of the criteria is presented later in this section.

Finally, EPA notes that nothing in section 183(e) of the Act obligated EPA to utilize NAPCTAC or any other group to assist the Agency in its application of the criteria in the listing process. The EPA instituted this procedure to insure a fuller evaluation of the criteria by qualified experts aided by public input in the ranking procedure. The EPA utilized this procedure in accordance with the discretion granted to the Agency in ranking the products for regulation and used the conclusions of NAPCTAC only as a guideline for the ultimate decision to rank products in a particular fashion.

Comment: One commenter (AIM-IV-D-212) asserted that a conflict of interest existed because the same EPA official who chaired the architectural coatings regulatory negotiation process also chaired the July 1994 NAPCTAC meeting. The commenter (AIM-IV-D-212p6/CP-IV-D-35t) demanded that the rankings be reviewed, and that hearings be conducted by a non-biased official so that additional public input could be used to develop more accurate and complete information pertaining to regulated products.

Response: As discussed above, the NAPCTAC charter establishes that the Director of OAQPS, or his designee, serves as Chairperson of the Committee. It is, therefore, always the case that the Chairperson of the Committee is responsible for the regulations discussed at each NAPCTAC meeting. In addition, Mr. Bruce Jordan, the NAPCTAC Chairperson at the July 1994 hearing, served solely as a facilitator for the meeting and did not participate in the scoring of any product category, including architectural and industrial maintenance coatings. For this

reason, EPA believes that Mr. Jordan's chairing of the meeting did not constitute a conflict of interest.

Comment: A commenter (AIM-IV-D-212) asserted that members of the architectural coatings industry were not properly notified of EPA's regulatory intent, and were not provided with an opportunity to participate in the July 1994 public NAPCTAC meeting.

Response: The EPA disagrees that members of the industry had inadequate notice of the NAPCTAC meeting, or an inadequate opportunity to submit information to NAPCTAC. As explained above, EPA convened NAPCTAC for the purpose of having an independent panel assign scores to Criteria 1 through 7 for each consumer and commercial product category. The meeting provided the public, including industry representatives, an opportunity to make statements regarding the products being scored and to provide clarifying information to the panel. The EPA published an announcement of the NAPCTAC meeting in the Federal Register on July 5, 1994 [59 FR 34436] (docket A-94-65, item IV-F-2). In addition to the time and place for the meeting, the notice included a summary of the purpose of the meeting, a tentative agenda, a statement that the meeting would be open to the public, an explanation of the purpose and composition of the Committee, and how members of the public could arrange to make presentations at the meeting.

Throughout the meeting, and before scoring of each category by the panel, the audience, including members of the architectural coatings industry, was given an opportunity to ask questions of EPA and the NAPCTAC panel and to provide information on the categories being scored. Furthermore, several industry representatives, including the commenter, were on the agenda and made formal presentations. These presentations were placed in Docket A-94-65 as part of the meeting minutes (item I-B-1).

Comment: One commenter (AIM-IV-D-212) asserted that NAPCTAC was not independent because EPA prejudged the application of

certain criteria and refused to allow the panel to make changes to these scores, thereby lessening the role of the panel.

Response: As explained above, EPA convened NAPCTAC to assist EPA in assigning criteria scores to each product category because the Committee is an independent panel of environmental experts. The overall scoring process involved assigning a value from 1 to 5 for Criteria 1 through 7 for each of 105 consumer and commercial product categories. These criteria are: Criterion 1, Product Utility; Criterion 2, Commercial Demand (as indicated by annual dollar sales in 1990); Criterion 3, Health or Safety Functions; Criterion 4, Emissions of Highly-Reactive Compounds; Criterion 5, Availability of Alternatives; Criterion 6, Cost-Effectiveness of Controls; and Criterion 7, Magnitude of Annual VOC Emissions. Criterion 8, Regulatory Efficiency and Program Considerations, was applied by EPA subsequent to the NAPCTAC meeting, and is discussed further in section 2.1.1.2.

The primary objective of the NAPCTAC meeting was for the panel to assign a score to each criterion for each of the 105 product categories. Three of the seven scored criteria (Criteria 2, 4, and 7) were objective criteria that could be evaluated quantitatively, and four of the criteria were subjective criteria requiring judgement. Preliminary scores for the three objective criteria had been entered by EPA prior to the NAPCTAC meeting. The EPA conducted research to develop the quantitative information, and used that information to assign tentative scores for the three objective criteria. These tentative scores could have been revised by the NAPCTAC panelists if they so desired.

The four subjective criteria (Criteria 1, 3, 5, and 6) were scored by the NAPCTAC panel. The EPA prepared a score sheet for each category which provided information to help the panel understand the products in the category and the subjective criteria being scored. Nevertheless, EPA made no recommendations to the panel on what scores to assign to any particular category

and made no changes to the individual scores assigned by the panel.

The score sheets also displayed the scores previously entered by EPA for the objective criteria and presented the data that were the basis for the assigned scores. This provided an opportunity for the NAPCTAC panel and members of the public attending the open meeting to review and comment on the preassigned scores for Criteria 2, 4, and 7.

The scoring process was conducted as follows for each of the 105 categories of products. First, EPA presented the information entered on the score sheet to the NAPCTAC panel and to the audience. The audience was allowed time to offer comments or provide clarification. The panel was then given an opportunity to discuss the category being scored. Each NAPCTAC panelist then assigned a score for each of the four subjective criteria, and was free to make corrections to preassigned scores. The EPA collected the score sheets and averaged the panelists' scores for each criterion. A composite score was compiled for the category by adding the average scores for all seven criteria. This process was repeated for each category.

In response to this comment, EPA has again reviewed all of the original score sheets used by the panelists. There was no indication on any score sheet that EPA had ignored a recommendation from any panelist regarding scores of either objective (EPA-scored) or subjective (panel-scored) criteria. In fact, in two product categories - Other Metal Product Coatings (later referred to as “Miscellaneous Metal Products Coatings”) and Auto and Light Truck Assembly Coatings - EPA used scores that several panelists had entered in place of the preassigned scores for Criterion 4, Emissions of Highly Reactive Compounds. This demonstrates that EPA did not refuse to change the preassigned scores as the commenter asserts.

Comment: One commenter (AIM-IV-D-212) asserted that NAPCTAC was not provided with all of the information that it needed to make valid rankings.

Response: As discussed above, score sheets were prepared for each product category being scored. To the extent possible, EPA provided information on the score sheets to facilitate the committee in making informed decisions. In cases where EPA had little or no data on specific criteria, EPA relied on the expertise of the panel as well as input from members of the public attending the meeting.

Prior to the July 1994 meeting, EPA mailed NAPCTAC members packages of information containing background on section 183(e) of the Act, documents discussing the criteria, and advance copies of product category score sheets. Two teleconferences were conducted in order to brief NAPCTAC on section 183(e) of the Act and to prepare them for the July meeting. The EPA thus believes that NAPCTAC had the necessary information to perform the scoring exercise.

Comment: The commenter (AIM IV-D-212) further stated that the committee was hindered in making valid decisions because it was unclear to NAPCTAC whether the inventories excluded or included compounds not classified as “reportable VOC” (RVOC). The commenter further stated that the committee ranked the products without considering the RVOC factor because they had no knowledge that such a factor existed.

One commenter (CP-IV-D-35) stated that EPA considered volatility of VOC instead of reactivity, which was not consistent with the requirements of the Act.

Response: The EPA employed a volatility cutoff for purposes of collecting information in the consumer product survey as discussed in section 5.3 of the report to Congress. The term “RVOC” was used exclusively in the household consumer products survey. Respondents to the survey were instructed to report those VOC's which had a vapor pressure of greater than 0.1 millimeter of mercury at 20 degrees Celsius (^{O} C). This cutoff was selected because existing State consumer product regulations, as well as State surveys, employed this threshold. As a result, EPA had emissions information in two forms. For all

categories except household consumer products, the VOC emissions inventory included all VOC; the VOC inventory data for the 61 household consumer product categories included only the RVOC. The EPA agrees that no distinction was made on the score sheets provided to the panel regarding this fact. To make a more direct comparison with other categories, all VOC emissions should have been included in the household consumer product VOC inventory, not just the RVOC. This oversight, therefore, potentially affects the scores for the 61 household consumer product categories with respect to Criterion 7, Magnitude of Annual VOC Emissions.

However, EPA believes that this did not affect the outcome of the scoring exercise. After the commenter raised this issue, EPA investigated to determine whether the scores for the 61 household consumer product categories would have been significantly affected if all VOC emissions, not just RVOC, had been counted in the inventory. To do this, EPA adjusted the total VOC emission estimates to account for the missing VOC content. Although detailed information concerning the magnitude of RVOC found in consumer products as compared to total VOC content is not available, EPA believes the portion of missing VOC content to be no more than 10 percent. The EPA chose to evaluate the impact of this oversight by using the very conservative estimate that adding missing VOC back into the inventory could potentially double the magnitude of annual emissions for each of the 61 household consumer product categories scored. Based upon this analysis, EPA determined that the outcome of the ranking exercise would not have been significantly different. The result of this exercise is discussed more fully in section 2.1.2.1.

The EPA disagrees that volatility was substituted for consideration of photochemical reactivity in the ranking process. The EPA's consideration of highly reactive compounds is discussed previously in this section.

Comment: One commenter in two letters (AIM-IV-D-212, CP-IV-D-35v/AIM-IV-D-212p5) stated that the Committee did not

have adequate knowledge of the complete VOC inventory because the presence of VOC in the ambient air due to emissions from these products and thus availability for ozone formation of VOC from consumer and commercial products was not substantiated by ambient monitoring.

Response: The EPA believes that the VOC inventory information provided to the NAPCTAC panel was adequate for purposes of ranking categories for regulation. As explained in section 2.1.2, because of the difficulty in tracking the fate of individual compounds and their atmospheric transformations, and in obtaining precise measurements of trace compounds involved in ozone chemistry, EPA relies on the conservative assumption that all VOC emitted by consumer and commercial products are available in the atmosphere to react to form ozone.

Comment: Two commenters in three letters (AIM-IV-D-212p6/CP-IV-D-35t, CP-IV-D-07, CP-IV-D-35) stated that EPA exhibited prejudice in the listing of categories for regulation. One commenter (AIM-IV-D-212p6/CP-IV-D-35t) stated that the rankings set forth by EPA were inaccurate, not based on factual data, and possibly biased against certain industries and products because of preconceptions and prejudgments by EPA officials. The commenter (CP-IV-D-35) stated that a number of consumer products were given high scores and yet did not appear on EPA's list of products for regulation. The commenter cited fragrances as an example. Another commenter (CP-IV-D-07) asserted that numerous product categories with very high VOC emissions escaped listing altogether which the commenter asserted was highly prejudicial to all those categories which have been listed.

Response: The ranking to which the commenter is referring is the preliminary ranking that was based on Criterion 1 through 7 only. The scoring process and the input provided by NAPCTAC is discussed in detail earlier in this section. The result of the preliminary ranking is available in Docket A-94-65, item I-B-2.

Subsequent to the preliminary ranking by NAPCTAC, EPA applied Criterion 8, Regulatory Efficiency and Program Considerations, to identify which product categories should be listed in the schedule for regulation (see section 2.1.1.2). Application of Criterion 8 did cause some categories in the preliminary ranking to be displaced by other categories. For example, the 24 categories of household consumer products, many of which were not among the preliminary set of categories accounting for at least 80 percent of emissions in the preliminary ranking were listed as a group. As a result, personal fragrances, which was among those categories which accounted for at least 80 percent of emissions in the preliminary ranking table, were displaced in the final prioritized list. The listing of the 24 categories of consumer products in Group I is discussed in a Federal Register notice [60 FR 15264] which was published on March 23, 1995 and is also discussed in the preamble to the proposed household consumer products VOC rule [61 FR 14531] published on April 2, 1996. The EPA notes that it was within the Agency's discretion under section 183(e) of the Act to determine which products to regulate in which phase of regulations, taking into consideration the criteria developed for making such determinations.

2.1.1.7 Ranking of Architectural Coatings

Comment: One commenter in two letters (AIM-IV-D-212, AIM-IV-D-212p6/CP-IV-D-35t) stated that Mr. Bruce Jordan's demeanor, attitude, and public statements gave some members of the paint industry the impression that the industry must resign itself to be regulated. The commenter implied that EPA was determined to regulate the paint industry not on the basis of science, but on EPA's prejudgment. The commenter contended that "Administrator Jordan was in a position to adopt procedures and factors so as to ensure that the architectural coatings industry would be ranked within the first group for regulation." The commenter concluded that the findings of the section 183(e) study

were based substantially on biased and highly predetermined conclusions on the part of EPA.

The commenter (AIM-IV-D-212) asserted that EPA utilized old and unreliable information upon which to base its assumptions. The commenter noted that in July 1992 when regulatory negotiation started, the architectural coatings industry had not completed its inventory, the section 183(e) study had not been completed, a listing had not been made, and the statutory requirement of commencing regulation 2 years after submission of the report to Congress had not occurred. The commenter asserted that EPA "jumped the gun" in its haste to regulate architectural coatings based on biased assumptions from the 1989 Office of Technology Assessment (OTA) report.[4] The commenter claimed the OTA report was inaccurate, incomplete, and lacking in merit and credibility.

One commenter (AIM-IV-D-212p6/CP-IV-D-35t) asserted that the ranking of architectural coating products should not have occurred until after all objective studies were conducted. The fact that the architectural coatings regulatory negotiation proceedings began before this point was allegedly demonstrable evidence that EPA prejudged regulation of the architectural coating industry before completion of all studies.

Response: The EPA did not prejudge the architectural coatings category for regulation. The architectural coatings category received a high priority for regulation through the application of the criteria developed in accordance with section 183(e). (See section 2.1.1.6). The architectural coatings category received the highest score for Criterion 5, Availability of Alternatives; Criterion 6, Cost-Effectiveness of Controls; and Criterion 7, Magnitude of Annual VOC Emissions. The EPA did not use Criterion 8, Regulatory Efficiency and Program Considerations, to adjust the ranking of architectural coatings.

Prior to the ranking of architectural coating products, EPA had initiated the regulatory negotiation process based on the expectation that this relatively large source of VOC emissions

would likely be regulated within the first group of consumer and commercial products. This expectation was based on information on this industry derived from past EPA studies and State regulatory efforts. Even though architectural coating products were included in the first group of products to be regulated, the listing and schedule for regulation under section 183(e) of the Act are not final Agency actions. Accordingly, if during rule development, it had been determined that emission estimates were inaccurate, or that cost-effective controls were not available, or if any other new information was received which affected the ranking, EPA could alter the priority given to the product category. However, to date, EPA has had no basis for making such a finding for architectural coatings products. On the contrary, the regulatory analysis for architectural coatings has confirmed that architectural coatings are an emission source that warrants early regulation under section 183(e) of the Act.

The EPA disagrees with the commenter's claims that EPA decided to regulate architectural coatings because of preliminary reports, such as the 1989 OTA report, alluding to the possibility of establishing Control Technique Guidelines (CTG) for architectural coatings. As stated earlier, EPA anticipated that the relatively large source of VOC emissions from architectural coatings would likely be one of the regulated categories of consumer and commercial products. This expectation was reasonable not only because of the large amount of emissions, but also because the availability of alternatives based on the number of State and local rules under development or already promulgated.

Comment: Two commenters in three letters (AIM-IV-D-214b/CP-IV-D-07b, AIM-IV-D-214c, AIM-IV-D-212p6/CP-IV-D-35t) stated that considering emission magnitude and regulatory efficiency was extremely prejudicial to architectural coating manufacturers. The commenters asserted that architectural coatings did not warrant early or severe regulation under the five statutory factors. One commenter in

two letters (AIM-IV-D-212p6i/CP-IV-D-35j, AIM-IV-D-212p2/CP-IV-D-35e) stated that architectural coatings should not have been included in the first category to be regulated under section 183(e) of the Act because the amount of emissions from these products was so insignificant that they did not contribute significantly to ozone nonattainment. Another commenter (AIM-IV-D-175) stated that architectural coatings should not be regulated at all because there are much greater sources of air pollution that EPA should be regulating instead.

By contrast, two other commenters (AIM-IV-D-28, AIM-IV-D-32) asserted that architectural coatings clearly belong in the first group of consumer and commercial products for regulation under section 183(e) of the Act. One of these commenters (AIM-IV-D-32) noted that architectural coatings are the single largest area source category in the Portland, Oregon, Ozone Nonattainment Area where they are responsible for 23 percent of all "Area Source" VOC emissions and 6 percent of the total VOC generated by human activity. The other commenter (AIM-IV-D-28) stated that although the industry has historically made substantial voluntary, market-driven VOC reductions in the past, the emissions of VOC still comprise a substantial fraction of the total VOC emissions inventory. This commenter agreed with EPA's justification for placing architectural coatings in the first priority of categories for regulation.

Response: The EPA believes that some commenters' assertions that architectural coatings were treated prejudicially and that they should not have been included in the first priority of categories for regulation are unfounded. The rationale for the use of Criteria 7 and 8 is presented in section 2.1.1.2. The EPA believes that the application of the criteria indicated that architectural coatings should be listed and should be regulated in the first phase of regulations. The EPA contends that it applied the criteria in a reasonable fashion to determine the proper sequence for product regulation, and that to do so was a

proper exercise of the discretion accorded to the Agency in the statute itself.

Criterion 7, Magnitude of Annual VOC Emissions, provided for products with higher annual reactivity-adjusted emissions to receive higher scores, indicating a higher priority for regulation. The architectural coatings category received a score of 5 (the top score) based on a 1990 nonattainment area VOC emissions estimate of 315,000 tons per year (tpy), reactivity-adjusted to 398,000 tpy, which is not an insignificant amount. After receiving this and other comments, EPA re-examined the initial estimate of highly-reactive compounds emitted from architectural coatings and revised that estimate, bringing the reactivity-adjusted emission total down to approximately 323,000 tpy. However, the revised estimate still would have resulted in a score of 5 for Criterion 7. The correction of the estimate of highly reactive compounds in architectural coatings is discussed later in this section.

Of the 105 product categories ranked, 8 were assigned a score of 5 (the highest score) for Criterion 7, only 3 of which were paints and coatings - aerospace coatings, architectural coatings, and other metal product coatings (later referred to as miscellaneous metal products coatings). The remaining five categories that received the top score for Criterion 7 were hair sprays, lithographic printing, industrial cleaning solvents, cutback asphalt paving materials, and flexible package printing. There were 16 categories of paints and coatings that received a score of 4 or less. Contrary to the commenters' assertion, EPA applied the methodology to all of the coating categories in the same manner as it applied the methodology to all product categories. Thus, EPA treated the paint and coatings industry fairly with regard to Criterion 7.

Application of Criterion 8, Regulatory Efficiency and Program Considerations, was used to change the ranking of only one category of paints and coatings - shipbuilding and repair coatings. This category was brought forward to Group I (for

regulation in 1997) from a later group because control techniques guidelines for shipbuilding and repair were already under development pursuant to section 183(a) of the Act, independent of section 183(e). Criterion 8 is further discussed in section 2.1.1.2.

Comment: One commenter (AIM-IV-D-212) asserted that EPA manipulated the category rankings by double-counting reactive VOC and other VOC using the added criterion of VOC volume. The commenter asserted that EPA's interpretation of reactivity considerations was faulty and incorrectly resulted in the determination that architectural coating products emitted an extremely high volume of reactive VOC.

Response: Contrary to the assertions of the commenter, EPA's consideration of highly reactive compounds, as required in the Act, was not substituted by addition of Criterion 7, Magnitude of Annual VOC Emissions. Before scoring Criterion 7, EPA made an adjustment to the VOC emission estimates of categories which emitted highly reactive compounds. The portion of a category's VOC emissions that EPA determined consisted of highly reactive compounds was given additional weight according to the compound's relative reactivity. This methodology is explained at length in section 3.5 of the report to Congress (EPA-453/R-94-066-a).

The EPA believes the intent of Congress was to give additional regulatory emphasis to emissions of highly reactive compounds. The EPA accomplished this by including Criterion 4, Emissions of Highly Reactive Compounds, and Criterion 7, Magnitude of Annual Emissions, and by scoring Criterion 7 on a reactivity-adjusted basis as explained above. The EPA does not agree with the commenter that consideration of both magnitude of emissions and emissions of highly reactive compounds is double-counting. Instead, EPA believes that giving greater regulatory emphasis to products that emit highly-reactive compounds and to products that have a high amount of annual VOC

emissions is consistent with the intent of section 183(e) of the Act.

Comment: One commenter in three letters (AIM-IV-D-55, AIM-IV-D-212, AIM-IV-D-212p6/CP-IV-D-35t) insisted that architectural coatings should have received lower scores for: (1) uses, benefits, and commercial demand; (2) health and safety functions; (3) emissions of highly reactive VOC; (4) cost-effectiveness of controls; and (5) availability of alternatives. The commenter concluded that the ranking for architectural coatings was, therefore, inaccurate, biased, and wrong. The five factors referred to below and the eight criteria that EPA established in consideration of them are discussed in section 2.1.1.2 and in chapter 4 of the report to Congress.

Uses, benefits, and commercial demand. The commenter claimed that architectural coatings' scores for uses, benefits, and commercial demand, should be adjusted downward. The commenter stated that the score should reflect that the primary purpose of paints is to preserve and protect, and is not decorative as contended by EPA. The commenter further claimed that the annual dollar sales for architectural coatings was exaggerated by EPA.

Health and safety functions. With regard to this factor, the commenter also asserted that paints have health and safety benefits in that they preserve a clean and healthy environment in schools, hospitals, and food processing facilities, and traffic and signaling paints are used to ensure public safety. The commenter stated that the score the architectural coatings category received for this factor did not reflect the high level of health and safety functions that architectural coatings provide.

Emissions of highly reactive volatile organic compound. For this factor, the commenter stated that EPA's information regarding highly reactive VOC in paints is inaccurate. The EPA's score sheet for architectural coatings showed xylene as the only highly reactive VOC in coatings and estimated the xylene content

at 10 percent. The commenter contended that most architectural coatings do not contain xylene. The commenter presented solvent use data for 1994 and an article from "Environmental Science and Technology", both indicating a xylene content of 1 percent in architectural coatings (AIM-IV-D-212). The commenter pointed out that EPA provided no documentation to support the estimate of 10 percent xylene content.

Cost-effectiveness of controls. As to this factor, the commenter stated that EPA manipulated the ranking process by claiming that the cost of controls for the architectural coatings industry is $500 to $1,000 per ton, while the South Coast Air Quality Management District (SCAQMD) suggests the cost of controls for architectural coatings is $16,400 per ton. (A reference showing the SCAQMD control costs was attached to the comment and is filed as CP-IV-D-35t6.) The commenter argued that erroneous numbers for cost-effectiveness and emissions of highly reactive compounds skewed the ranking results to the disadvantage of the architectural coatings industry.

Availability of alternatives. The commenter insisted that architectural coatings should have received lower scores for availability of alternatives. The commenter did not explain the basis for this opinion.

Responses: Uses, benefits, and commercial demand. Factor 1 (uses, benefits, and commercial demand of the product) was accounted for by two criteria. The EPA established Criterion 1, Product Utility, to represent "uses and benefits" of the product. The EPA established Criterion 2, Commercial Demand, to reflect commercial demand expressed quantitatively as annual dollar sales divided by annual VOC emissions in tons. As explained in section 2.1.1.6, Criteria 1, 3, 5, and 6 were subjective, and therefore were scored by the panel at the NAPCTAC meeting with subsequent EPA review of the results. With this independent advice from NAPCTAC, EPA made its own separate determination that the scoring was appropriate. The panel apparently viewed architectural coatings as quite utilitarian, as the score

assigned to Criterion 1 was only 1.9 out of 5, indicating a relatively low priority for regulation with regard to uses and benefits. The EPA considered the panel's recommendation and agreed with it. Thus, EPA disagrees that paint received an adverse ranking because of any alleged prejudice by EPA that it is only "decorative."

For Criterion 2, Commercial Demand, EPA verified the annual dollar sales estimate used in the ranking exercise. On the criteria score sheet, EPA had indicated 1990 sales of architectural coatings to be $6 billion. According to EPA's reference for the figure, U.S. Department of Commerce's “Current Industrial Reports: Paints and Allied Products, 1990,” the value shipped of architectural coatings for 1990 was $5.8 billion. Although this figure had been rounded to $6 billion for use in the ranking exercise, the rounding had no effect on the score assigned for Criterion 2.

Health and safety functions. Health and safety functions of products were not only considered under Criterion 1, Utility, but were considered specifically under Criterion 3, Health or Safety Functions. Criterion 3 was designed to lower the priority for regulation of products that contribute to the protection of health or safety. A product with no health or safety function was assigned a score closer to 5 (higher priority for regulation); a product marketed primarily for its health or safety functions received a score closer to 0. The EPA noted on the score sheet for this category that "(t)raffic marking coatings have a primary safety function; others may have primary or secondary health or safety functions." The NAPCTAC panel assigned a score of 3.9 out of 5 to this subjective criterion, presumably indicating that the health or safety functions were not considered to be such a primary function of architectural coatings and that their priority for regulation should not be greatly reduced. The EPA has no basis on which to question this judgement. Thus, EPA disagrees that the ranking failed to take

into account any health and safety functions of architectural coatings.

Emissions of highly reactive volatile organic compound. A review of the data used to score Criterion 4, Emissions of Highly Reactive VOC, performed in response to this comment, showed that the tonnage of xylene emitted by architectural coating products was overestimated. That figure has been adjusted based on 1990 data published in the National Paint and Coatings Association's "1992 U.S. Paint Industry Database," and has been changed to reflect the xylene content of architectural coatings (1,000 tons), maintenance coatings (16,200 tons), and traffic marking paints (450 tons). Therefore, the nationwide 1990 total for all architectural coatings is 17,650 tons, or approximately 10,600 tons in ozone nonattainment areas. The revised figure is about one-third the original figure of 30,000 tons.

After receiving this comment, EPA reviewed the scoring for architectural coatings and discovered that the score for Criterion 4 was recorded in error as a 3. The original score sheets used at the NAPCTAC meeting reflected a score of 5, which was the score assigned to products emitting greater than 1,000 tons of highly reactive compounds. Consequently, the revised figure of 10,600 tons does not change the score of 5 that should be assigned to Criterion 4 for architectural coatings. Furthermore, the result of the mistake in recording is that the corrected composite criteria score for architectural coatings should be increased by two points, moving architectural coatings from seventh-highest to third-highest ranked product category in the preliminary ranking table.

Cost-effectiveness. The cost-effectiveness for architectural coatings at the time of ranking ($500 to $1,000 per ton) was estimated from available data, and is of the same order of magnitude as the cost-effectiveness calculated at proposal of the architectural coatings rule ($260 per ton). This calculation is documented in the EIA for the proposed architectural coatings rule, and can be found in Docket A-92-18, item II-A-5.

The SCAQMD cost-effectiveness estimate cited by the commenter ($16,400 per ton) was based on an assumption of a 75 percent VOC reduction from 1997 levels over 13 years. This reduction is well beyond the reduction contemplated by EPA for national implementation. As more and more VOC emission reduction is required, the cost is expected to become higher and higher per ton of VOC reduced. Therefore, the comparison used by the commenter is not meaningful.

Availability of alternatives. As discussed in section 2.1.1.6, Criterion 5, Availability of Alternatives, was one of the subjective criteria scored by the NAPCTAC panel at its July 1994 public meeting. Quantitative information on the availability and cost of alternative, lower-VOC products was generally unavailable for the vast array of consumer and commercial products subject to section 183(e) of the Act. Consequently, EPA utilized the expertise of the NAPCTAC panel for guidance, which assigned the score for Criterion 5 for each category. In the case of architectural coatings, EPA believes that the fact that several States had promulgated architectural coating rules and that manufacturers were currently complying with those rules may have been one valid factor justifying the panel's collectively assigning a score of 4.4 out of 5 to this criterion. In any case, EPA believes that the score was reasonable compared to other product categories.

2.1.2 Volatile Organic Compound Inventory

2.1.2.1 Reportable Volatile Organic Compound Concerns

Comment: Two commenters in four documents (AIM-IV-D-214b/CP-IV-D-07b, AIM-IV-D-212, AIM-IV-D-55, CP-IV-F-1a) contended that EPA emission estimates were overstated for architectural and industrial maintenance products in general, and for solvent-borne architectural coatings products in particular. The commenter stated that the solvent contents of many of the consumer and commercial products were based on two surveys, the architectural coatings survey and the consumer products survey. However, the commenter asserted that the two

surveys did not treat VOC content equally. The architectural coatings survey reported all VOC as defined in EPA regulations and the consumer products survey reported only a subset of VOC, termed "RVOC" which excluded certain low-volatility VOC.

One commenter (AIM-IV-D-214b/CP-IV-D-07b) asserted that the difference in reporting of VOC by the two surveys overstated the magnitude of VOC emissions attributed to architectural coatings by 20 to 25 percent relative to other consumer and commercial products. The two commenters (AIM-IV-D-214b/CP-IV-D-07b, AIM-IV-D-212, AIM-IV-D-55, CP-IV-F-1a) stated that this overstatement of VOC emissions caused EPA to put architectural coatings within the first group of products scheduled for regulation because EPA gave great weight to magnitude of annual VOC emissions in setting priorities for regulation. The commenter argued that as a result of this priority for regulation of architectural coatings, manufacturers of solvent-borne paint were at a disadvantage.

One commenter in two documents (AIM-IV-D-212, AIM-IV-D-212p6/CP-IV-D-35t) further stated that besides prejudicing the ranking process, if EPA had considered RVOC when regulating architectural coatings, the resulting regulations would be biased against solvent-borne coatings. Because waterborne coatings are composed of materials with low volatility, considering RVOC would essentially exclude waterborne coatings from regulation.

The commenter explained that if waterborne coatings were excluded from regulation, there would not be any VOC from architectural coatings products left to regulate because waterborne coatings constituted 80 percent of architectural coatings. The remaining 20 percent were solvent-borne coatings which the commenter asserted either did not actually emit any VOC or emitted VOC with a low reactivity rate.

The commenter charged that EPA knew that if an RVOC exemption were included in the architectural coatings rule, most waterborne paint products would be exempted from regulation. In

addition, the commenter stated that the RVOC concept was never raised or discussed at the architectural coatings regulatory negotiation meetings even though EPA was aware of the concept at that time.

Response: The EPA agrees that the RVOC concept was used solely for gathering VOC content information for the 61 categories of household consumer products and was not used in gathering VOC content for any of the other 42 categories of consumer and commercial products including architectural coatings. The EPA disagrees that this methodology of gathering RVOC data for a subset of consumer and commercial products adversely affected the ranking and listing of architectural coatings. Furthermore, EPA believes the use of RVOC for gathering VOC emissions data and in the regulatory development only for household consumer products was justifiable and reasonable. The EPA included RVOC in the regulatory approach for the category of household consumer products for reasons specific to that category which are based on California's regulatory development efforts at the time. The RVOC distinction was not included for purposes of gathering data for any of the coating categories including architectural coatings because EPA has a test method for paints and coatings which is the ultimate arbiter of what is or is not a VOC for a particular paint process. No such test method is available for products covered by the consumer products rule.

In collecting survey information on the VOC content of household consumer products, EPA included a vapor pressure cut-off which excluded those compounds with a vapor pressure of less than 0.1 millimeter (mm) of mercury at 20 ^{O}C. The remainder of VOC which were then reported in the survey were designated RVOC. This approach was developed after analyzing California's regulatory approach at that time which excluded compounds below this vapor pressure cut-off from regulation. In addition, manufacturers of household consumer products who participated in development of the Consumer Products Survey argued that speciated

product composition information was readily available on the basis of RVOC in response to California's regulatory efforts which focused solely on RVOC.

Reportable VOC was developed for categories of household consumer products in California to better distinguish between products to determine which emit less VOC. For example, household consumer products often contain ingredients such as heavy oils or waxes that have extremely low volatility (i.e., may be a solid at room temperature). Since in some cases all similar products may be of equal VOC content (100 percent), it makes sense to compare the higher volatility VOC components to distinguish the products that are lower emitting and can serve as a basis for standard setting. This approach makes sense in light of the fact that a test method, which is the recommended approach for defining what is a VOC and for compliance determination, had not yet been developed for most of the household consumer product categories. The EPA followed California's regulatory approach at that time and requested information on RVOC contents only in the Consumer Products Survey since it appeared that these were the VOC of interest for regulatory purposes.

It is arguable that for consistency in comparisons between product categories, EPA should have included all household consumer product VOC in the emissions inventory rather than just reportable VOC or RVOC. To account for any potential bias that this procedure may have caused to the ranking process, EPA performed a sensitivity analysis by adjusting the VOC estimates for consumer products. Since the commenter asserted that the magnitude of VOC emissions attributed to architectural coatings was overstated by 20 to 25 percent relative to other consumer and commercial products, EPA, for purposes of the analysis, adjusted the VOC content estimates for the 61 household consumer products by doubling the existing RVOC data (which would more than account for the 20-25 percent error claimed by the commenter), then reranking all the consumer and commercial products using the adjusted estimates. The analysis indicated that the use of RVOC

for consumer products had no practical effect on the ranking. Specifically, the criteria scores for aerosol spray paints, non-automotive paint thinners, and several categories of household adhesives would have been increased as a result of doubling the RVOC values, but none of these categories would have displaced any categories originally listed in Groups I through IV from being listed for regulation. Based on this conservative analysis, EPA contends that if an error was made in establishing the emissions inventory for household consumer products, it was a harmless error which did not affect the ranking of products for regulation, including architectural coatings.

For architectural coating products, the RVOC concept is not meaningful or necessary since EPA has a test method which is designed to calculate the VOC content of coatings. The EPA accounts for volatility of solvents through this test method (i.e., Method 24). Specifically, in this test method, a sample of paint is weighed, heated and then reweighed; basically, the difference in weight is calculated to be the VOC content of the coating after the weight of water and any exempt compounds is subtracted out. Solvents that do not volatilize under the temperature and time frame of the test method are not measured as VOC. Since RVOC was not used in gathering emissions information for the architectural coatings industry, none of the effects cited by the commenter as adversely affecting manufacturers of solvent-borne paint occurred. Namely, waterborne coatings were not excluded from the ranking and the solvent-borne paint manufacturers were not placed at a disadvantage in the ranking, as the commenter asserts. In addition, EPA's proposed regulation for architectural coating categories did not employ the concept of RVOC for the same reason it was not used for purposes of gathering VOC emissions data. Therefore, since for the reasons stated in the architectural coatings proposal (61 FR 32729) EPA did not propose to exclude waterborne coatings from regulation, EPA is not obliged to consider what the resulting impacts on solvent-borne coatings would have been as a result of this

exclusion. The concept of RVOC was never brought up in the architectural coatings regulatory negotiation process for the reasons stated above.

The comments that solvent-borne coatings do not emit VOC or that any VOC emitted has low reactivity are addressed in sections 2.1.2.3 and 2.2.1.1 of this BID.

Comment: One commenter in two documents (AIM-IV-D-212, CP-IV-D-35v/AIM-IV-D-212p5) stated that the RVOC classification used in the consumer and commercial product survey was technically inaccurate because the vapor pressure of individual product components and the ability of the product to enter the air in any appreciable degree are not related. The commenter contended that it is the actual vapor pressure of the product that is important and not the vapor pressure of the individual product components. The commenter used waterborne coatings as an illustration. The commenter stated that as the paints dry, the low vapor pressure solvents enter the air just like the high vapor pressure solvents. That is, EPA's argument that VOC which are not RVOCs do not enter the air in any appreciable degree is false.

Response: The EPA agrees that the partial pressures of a product's ingredients determine the total pressure of the mixture, and consequently a compound may volatilize at a different rate as a pure solvent as compared to when it is present in a mixture of solvents. However, for purposes of simplifying the survey effort, and taking advantage of available data within the industry, EPA established the RVOC vapor pressure cutoff on a compound-by-compound basis. The RVOC cutoff helped EPA focus both the survey and the regulatory development effort on those compounds most likely to volatilize. Ideally, a test method is the ultimate arbiter of what is or is not a VOC. In the absence of available test methods, EPA relied on a vapor pressure cutoff as a more crude, but still useful, technique to estimate and regulate emissions. As VOC content test methods are developed for household consumer products, EPA may reevaluate the

use of a vapor pressure cutoff for any future regulatory developments in this area.

Comment: In the definition of RVOC used in the Consumer Products Survey for the purpose of establishing an inventory, the commenter submitted two letters (AIM-IV-D-212, AIM-IV-D-212p5/ CP-IV-D-35v) questioning why the vapor pressure for liquids was required only at 20 ^{O}C and not also required at the liquid's operating temperature (if the operating temperature was higher than 20 ^{O}C). The commenter explained that if the ability of a solid material to sublime must be measured at the use temperature, the vapor pressure of liquids should also be measured at the use temperature.

Response: The reference temperature of 20 ^{O}C was chosen because it is a commonly used reference condition for measuring and expressing vapor pressures, it is consistent with California's vapor pressure cutoff, and it is a temperature at which these household consumer products are expected to be used (i.e., 68 degrees Fahrenheit).

2.1.2.2 Consideration of Biogenic Sources of Volatile Organic Compounds

Comment: One commenter submitted three documents (AIM-IV-D-55, AIM-IV-D-212, CP-IV-D-35v/AIM-IV-D-212p5) stating that it was essential for EPA to list in the Report the specific sources of all VOC, including those from global background, biogenic, and anthropogenic sources, along with the role that each source played in ozone formation. Because EPA listed only anthropogenic sources, the commenter submitted three documents (AIM-IV-D-212, AIM-IV-D-212p5/CP-IV-D-35v, AIM-IV-D-212p6/CP-IV-D-35t) suggesting that Congress was not informed of the insignificance of anthropogenic emissions compared to biogenic emissions and supported the claim by citing statements from EPA's Comprehensive Emissions Inventory, Rethinking the Ozone Problem, and EPA's section 185(b) report to Congress.[5,6] The commenter in three letters (AIM-IV-D-55, AIM-IV-D-212, CP-IV-D-35v/AIM-IV-D-212p5) stated that excluding

the 60 percent of VOC emissions that originated from biogenic sources was contrary to the intent of Congress and to the express language of section 183(e) of the Act. Therefore, the commenter in two letters (AIM-IV-D-212, CP-IV-D-35v/AIM-IV-D-212p5) concluded that EPA should submit a new section 183(e) study that includes VOC emissions originating from biogenic sources.

Response: One objective of the section 183(e) study was to determine the potential of consumer and commercial products to contribute to ozone levels which violate the ozone NAAQS. To assess the role of consumer and commercial product VOC emissions in the ozone nonattainment problem, EPA compared VOC emissions from consumer and commercial products to total anthropogenic VOC emissions on a nationwide basis. This comparison is presented in table 2-2 of the Report. The table includes VOC emission estimates from mobile sources, petroleum marketing, stationary source fuel combustion, forest and agricultural burning, petroleum refineries, organic chemical manufacturing, industrial manufacturing, and consumer and commercial products. Of the 21 million tons per year total, consumer and commercial products were shown to account for 6 million tons, or about 28 percent.

The EPA believes that the inclusion of biogenic emissions in the inventory of VOC emission sources is one possible approach, but does not believe that such inclusion changes the proper analysis for controlling VOC from consumer and commercial products. The Agency estimates biogenic emissions in 1990 to be about 34 million tons per year. Addition of biogenic emissions would change the inventory as shown below in table 2-1.

Addition of biogenic emissions to the inventory would decrease the relative contribution of consumer and commercial products from 28 to 11 percent of all VOC emissions. However, these biogenic emissions are not amenable to control, because they emanate from sources for which there is no practical control option (i.e., forests, swamps, grasslands, etc.); therefore, the proportion of controllable VOC has remained unchanged. Therefore, this 11 percent contribution from consumer and

commercial products is still significant and represents a significant source of potentially controllable emissions. Of the 21 million tons of anthropogenic VOC emissions emitted nationwide in 1990, consumer and commercial products account for 6 million tons, or about 28 percent. Therefore, consumer and commercial products are still among the most significant federally unregulated VOC sources for which additional VOC reductions are achievable. Section 2.2.2 provides a detailed discussion on the potential of consumer and commercial products to contribute to ozone nonattainment.

TABLE 2-1. VOC EMISSIONS IN 1990 (NATIONWIDE)

Emission Source Category	Nationwide Emissions (tons/yr)	Share of Total (percent)
Biogenic Sources	34,000,000	61.3
Mobile Sources (automobiles, etc.)	7,920,000	14.3
Consumer and Commercial Products	6,000,000	10.8
Petroleum Marketing	2,460,000	4.4
Fuel Combustion (stationary sources)	2,300,000	4.2
Forest, Agricultural, and Other Burning	990,000	1.8
Petroleum Refineries	820,000	1.5
Organic Chemicals Manufacturing	550,000	1.0
Industrial Manufacturing	400,000	0.7
Total for All Sources	55,440,000	100.0

Comment: One commenter in five documents (CP-IV-D-35, CP-IV-F-1a, AIM-IV-D-55, CP-IV-D-35v/AIM-IV-d-212p5, AIM-IV-D-212) contended that the EPA inventory should have accounted for all consumer and commercial products, including the following man-controlled biogenic sources:

- All food and beverage products, including meats and produce, as well as grocery items;

- All nursery items, including plants, trees, flowers, and seeds, in addition to landscaping materials and other similar products used commercially;
- Fuel used in homes and businesses for heating and cooking;
- All nursery items and wholesale nursery products used outside of nonattainment areas that could be transported into the nonattainment area; and
- All other human activities of the body involved in VOC output from consumer and commercial products.

In two letters the commenter (CP-IV-D-35v/AIM-IV-d-212p5, AIM-IV-D-212) cited the broad definition of "consumer or commercial product" supported by Congressional legislative history, the requirements in section 183(e)(3)(A)(ii) of the Act, and EPA's inventory results, as presented in chapter 5 of the Report. The commenter (CP-IV-F-1a) asserted that omitting these items from the Report was a gross discrepancy and not in compliance with the Act. The commenter contended that the existing inventory is incomplete without these biogenic sources. The commenter (CP-IV-D-35) contended that if EPA had included all categories in the ranking, most product categories currently slated for regulation would have been exempted.

Response: In addition to the contribution of biogenic VOC to the overall inventory, the commenter raises the question as to whether EPA should enumerate, rank, and possibly regulate plants, shrubs, and other biogenic sources of VOC that could be considered consumer and commercial products according to the definition in section 183(e) of the Act. The EPA has generally interpreted the statutory definition very broadly, and considers products ranging from hair sprays to automotive coatings to asphalt paving materials to fall within the definition of consumer and commercial products. These products differ greatly from the biogenic sources of VOC cited by the commenter.

In each of the categories enumerated by EPA to be consumer and commercial products, the products share at least one characteristic that sets them apart from biogenic sources. In

every case, the products EPA has included as consumer and commercial products are formulated and manufactured using combinations of ingredients. The manufacturers have control over the VOC contents of these products, and, therefore, can reformulate or modify the products to emit less VOC. Conversely, plants, trees, and shrubs are not manufactured and, therefore, have inherent VOC emission characteristics, both in volume and speciation of emissions. These naturally occurring sources cannot be reformulated or modified to reduce VOC emissions. Options to control VOC emissions from plants, trees, and shrubs would be limited primarily to banning products from being sold or distributed which EPA believes would not reflect Congress's intent in enacting Section 183(e).

Once products are ranked and listed for regulation, any regulations must require BAC. Section 183(e) of the Act defines BAC as "the degree of emissions reduction that the Administrator determines, on the basis of technological and economic feasibility, health, environmental, and energy impacts, is achievable through the application of the most effective equipment, measures, processes, methods, systems or techniques, including chemical reformulation, product or feedstock substitution, repackaging, and directions for use, consumption, storage, or disposal" (emphasis added). Clearly, applying BAC to plants, trees, and shrubs would be limited primarily to a ban on the sale or distribution of these items. The EPA does not believe that a ban on such products would be appropriate.

The overriding conclusion is that regardless of whether ranking of these sources was possible, VOC emissions from such sources could not be mitigated through regulation. Accordingly, it is highly unlikely that these sources would ever be listed for regulation. Consequently, EPA's decision not to identify these sources as consumer and commercial products under section 183(e) of the Act has not affected the selection of nor the priorities for those categories EPA did list for regulation.

2.1.2.3 Accuracy of Inventory

Comment: A commenter (CP-IV-F-1a) asserted EPA's ranking was biased because the environmental fate of VOC were considered for certain products (i.e., laundry detergents) and not for others (i.e., paint products). The commenter asserted that just as the VOC in laundry detergents ended up in wastewater and were biodegraded rather than being emitted to the air and forming ozone, the VOC in interior paint products were not necessarily emitted to the air where they could react to form ozone.

Response: In developing a comprehensive VOC emissions inventory for consumer and commercial products, EPA took into account the ultimate fate of the VOC in products (i.e., what portion of the VOC content typically enters the ambient air during use, storage, and disposal and what portion is not emitted due to biodegradation or other environmental fates). Typical use and disposal practices associated with nearly 50 consumer product categories (including paints, primers, and varnishes) were studied to determine which of the categories were likely to enter the wastewater stream. Several categories of household consumer products (e.g., laundry detergents, mouthwashes, general-purpose cleaners, tile and bathroom cleaners) were determined to have a high potential for entering the wastewater stream and undergoing biodegradation rather than being emitted to the air.

Conversely, paints, primers, and varnishes were determined to have a low probability of entering the wastewater stream. The EPA concluded that architectural coatings are not typically disposed of by means of a sanitary sewer system. Consequently, the portion of all architectural coatings that enter the wastewater stream and are biodegraded was considered to be insignificant.

Thus, contrary to the commenter's assertion, no bias against architectural coating products was introduced because all consumer and commercial products used indoors (e.g., hair sprays, furniture polishes, etc.) were treated the same with the exception of a few products (e.g., laundry detergents, tub and

tile cleaners, etc.) that were expected to be largely washed down the drain. Certainly, some waste from low-VOC water-based paints is washed down drains, but it is not expected to be significant enough to make a substantial difference in total emissions. Solvents used in oil-based paints, even in the event that they do enter the wastewater stream, normally would not undergo biodegradation or another fate and, therefore, eventually enter the ambient air.

With regard to the commenter's assertion that VOC emissions from paints used indoors do not enter the ambient air, EPA maintains that close to 100 percent of the VOC from paint is eventually emitted to the ambient air and is available for ozone formation. Recent EPA indoor air studies (A-94-65, items IV-J-12 and IV-J-13) have confirmed that all the VOC contained in paints used indoors is eventually emitted, with long-term experimental data indicating that it may take as long as 3.5 years for all the VOC from waterborne paint applied to gypsum wallboard substrate to be emitted. The same studies showed that greater than 90 percent of the VOC contained in solvent-borne paint is emitted within the first 24 hours, regardless of the substrate. Furthermore, it is reasonable to assume that all the VOC emissions within the house eventually reach the ambient air, since paint container labels routinely recommend that the painted space be thoroughly ventilated during and after the painting operation. Thus, EPA believes that it is valid to assume VOC emissions from architectural coatings are 100 percent available in the atmosphere to react to form ozone.

Comment: A commenter in three documents (AIM-IV-D-212, AIM-IV-D-212p5/CP-IV-D-35v, AIM-IV-F-1c) stated that because EPA failed to perform ambient monitoring tests, EPA's consumer and commercial product inventory is unsubstantiated. The commenter (AIM-IV-F-1c) stated that the section 183(e) study did not address: how much VOC was emitted into an area from the use of a consumer and commercial product, how the emitted VOC was dispersed, nor the ultimate fate of any emitted VOC. The

commenter submitted two letters (AIM-IV-D-212, AIM-IV-D-212p5/CP-IV-D-35v) stating that ambient monitoring is the only basis for measuring the potential of emissions to be part of reactions that form ozone. The commenter stated that indoor emissions are very unlikely to ever form ozone. Since EPA assumed 100 percent availability of VOC both indoors and outdoors without a study, and therefore assumed 100 percent of the reportable VOC for air emission, the commenter contended that the inventory was false and contrary to the letter and intent of the Act. The commenter (AIM-IV-F-1c) concluded that as a result, EPA had no justification for the architectural VOC regulations.

Response: The EPA recognizes the commenter's concern that ambient monitoring is an important element in evaluating contributions of sources to the ozone problem. The EPA initiated a program in 1992 to phase in photochemical assessment monitoring stations (PAMS) in serious, severe, and extreme ozone nonattainment areas. These stations monitor VOC (56 hydrocarbons and 3 carbonyls), oxides of nitrogen, and ozone as well as surface and upper air meteorology. Use of these stations can help nonattainment areas corroborate emission inventories, evaluate what sources may be contributing to emissions, examine the mechanisms of ozone formation within their area, and aid in source receptor modeling. The data can be used to evaluate, adjust, and provide input to the photochemical grid models utilized by the States to develop ozone control strategies and demonstrate their success. The PAMS provide information to evaluate population exposure, expand the data base available to confirm attainment/nonattainment decisions, and develop ambient ozone and ozone precursor trends. The 1997 Federal operating budget for this monitoring program is approximately $14.1 million and all the monitors are expected to be in place by 1998.

These monitoring stations provide valuable feedback for devising cost-effective ozone attainment strategies. However, because of the difficulty in tracking the fate of individual compounds and obtaining precise measurements of trace compounds

involved in ozone chemistry, EPA relies on the conservative assumption that all VOC emitted by consumer and commercial products are available in the atmosphere to react to form ozone. The particular sources of compounds emitted by consumer and commercial products are difficult to identify because they can be widely dispersed, their emissions may react quickly in the atmosphere, and the sources may be masked by other emitters of similar compounds. When conducting ambient monitoring, it is often difficult to establish conclusive relationships between sources (e.g., architectural coatings) and receptors (e.g., ambient monitors). Thus, even if ambient monitoring were performed as requested by the commenter, the particular contribution of architectural coating VOC to the ambient air would be difficult to quantify. In any case, the potential of emissions to become part of the ozone reaction is identified by an analysis of the photochemical properties of the compounds in question, rather than the results of any ambient monitoring. Section 183(e) of the Act directed EPA to determine whether product categories have the potential to contribute to ozone nonattainment and the Agency believes that monitoring of the type advocated by the commenters is not necessary to establish this point.

The commenter's claim regarding indoor emissions entering the ambient air and becoming available for reaction is addressed in a previous comment in this section.

Comment: One commenter in two letters (AIM-IV-D-212, CP-IV-D-35v/AIM-IV-D-212p5) defined availability to form ozone as the conversion from the gross volume of VOC in something measurable (such as a coating) to VOC presence in air at a level above tree height in parts per billion volume during emission and transportation. The commenter explained that the distance above the ground where VOC is measured is important because sunlight and hydroxyl radicals (OH) are necessary ingredients to produce ozone. The commenter claimed that many evaporative VOC are never exposed to direct sunlight and, therefore, cannot produce ozone.

They claimed that the potential for VOC forming ozone indoors is very low because of the lack of direct sunlight; and even if the VOC escape from indoors, they must mix with air and sunlight. The commenter also noted that many compounds with more than eight carbons [e.g., 2-(2-butoxyethoxy)-ethanol, xylenes, etc.] tend to adhere to the first surface they contact where they remain until they are dusted and washed. The commenter argued that when these compounds reach the ground, they are biodegraded.

Response: The EPA's response to the issue of paints used indoors is presented previously in this section.

The EPA disagrees with the commenter's view that compounds with more than eight carbons tend to adhere to the first surface they contact. There are many factors in addition to the molecular weight of the compound that affect the tendency for deposition on environmental surfaces. Other factors, such as water solubility, temperature, and Van der Waals forces affect the ability of specific compounds to absorb and/or adsorb onto surfaces.

Comment: One commenter (AIM-IV-D-212p6i/CP-IV-D-35j) stated their agreement with points made in a presentation by Ralph Engel, President of the Chemical Specialties Manufacturers Association (CSMA), at a 1989 public meeting held by EPA to discuss the prospective regulation of VOC emitted from consumer and commercial products. Mr. Engel stated that the consumer and commercial products category was unique and could not be regulated by traditional approaches or emission control strategies. Mr. Engel added that "Catching Our Breath: Next Steps for Reducing Urban Ozone, "a study by the U.S. Congressional Office of Technology Assessment (OTA) found that "any emission estimates [from consumer products] are subject to potentially large uncertainties."[4] Also, the OTA study excluded consumer and commercial products from its analysis of emissions reduction potential and cost because of the lack of control technology information.

With regard to regulation of the architectural coatings industry, the commenter requested that verification be conducted to support the regulation of the targeted architectural coating products, that these products emitted the amount of VOC as claimed, and to what extent such emitted VOC actually reacted to form ozone. The commenter concluded that EPA lacks specific objective scientific facts to establish that VOC emitted from architectural coatings constitute a measurable and identifiable factor in contributing to ozone exceedance in areas classified as nonattainment.

Response: Based on the lack of existing, reliable inventory data on consumer and commercial products, CSMA worked closely with EPA to develop the most complete and accurate inventory of VOC in household consumer products available to date. The EPA also has data available for the architectural coatings industry that was compiled by the National Paint and Coating Association. As discussed earlier in this section, EPA also contends that all VOC used in architectural coatings ultimately become available in the environment to form ozone. As discussed in section 2.2 of this BID, EPA believes that VOC in paint (and other consumer and commercial products) are reactive and contribute to the ozone pollution problem. Therefore, EPA has concluded that regulation of architectural coatings VOC will contribute to attaining and maintaining the ozone NAAQS in all areas of the country.

Comment: One commenter (AIM-IV-D-214b/CP-IV-D-07b) pointed out that the Consumer Products Survey collected data on the specific VOC contained in various product categories. The commenter claimed that the Architectural Coatings Survey collected no speciated data because EPA and the larger national architectural coatings manufacturers claimed that collecting specific VOC data would unnecessarily complicate the survey process or violate company confidentiality. The commenter stated that the lack of VOC speciation data for architectural coatings made it impossible to account for VOC emissions on a reactivity-adjusted basis. The commenter asserted that a

reactivity adjustment may have reduced the magnitude of emissions from architectural coatings relative to other consumer and commercial products.

Response: The EPA agrees that speciated data would have enhanced the accuracy of the architectural coatings inventory for purposes of applying the reactivity adjustment. However, based on the concerns of participants in the regulatory negotiation process that this type of survey would complicate and slow down the data collection effort, the Regulatory Negotiation Committee decided not to include a request for speciated data in the survey. In addition, information on solvent consumption within the architectural coatings industry is available in the literature and was used to determine the magnitude of highly reactive compounds found in architectural coatings. This issue is discussed fully in section 2.1.1.7. Contrary to the commenter's assertion, EPA was able to make the reactivity adjustment on the architectural coatings category based on the information in the literature. The reactivity adjustment of the inventory data is discussed in section 3.5 of the Report.

2.2 REACTIVITY

2.2.1 Ranking Of Categories On Reactivity Basis For Study

2.2.1.1 Reactivity Study Requirements

Comment: Seven commenters submitted nine documents (AIM-IV-D-02, AIM-IV-D-05, AIM-IV-D-178, AIM-IV-F-1(l), AIM-IV-D-50, AIM-IV-D-214c, CP-IV-F-1a, CP-IV-D-07a, AR-IV-F-1) stating that section 183(e) of the Act requires EPA to perform a specific reactivity study. Two commenters (AIM-IV-D-214c, AR-IV-F-1) claimed that EPA failed to consider highly reactive VOC when conducting the study of VOC emissions from consumer and commercial products required by section 183(e). Several commenters (CP-IV-F-1a, CP-IV-D-35, CP-IV-D-07a, AIM-IV-F-1d, AIM-IV-D-214b/CP-IV-D-07b, AIM-IV-D-212, AIM-IV-D-177, AR-IV-F-1) asserted that a particular type of reactivity ranking could and should have been done as the commenters believe was mandated by Congress.

Two commenters (AIM-IV-D-214c, AIM-IV-D-55) criticized EPA's Report for labeling only 10 of several hundred VOC species found in certain products as "highly reactive," and labeling all other VOC species found in products as "reactive," and contended that EPA made this distinction with "considerable arbitrariness." One commenter (AIM-IV-D-55) further stated that the hundreds of VOC species that EPA classified as reactive are in fact highly disparate in their potential to contribute to ozone formation in nonattainment areas. The other commenter (AIM-IV-D-214c) cited two court cases (Weyerhaeuser Co. v. Costle, 590 F. 2d 1011, 1045-46, 1048 [D.C. Cir. 1978], and BASF Wyandotte Corp. v. Costle, 598 F. 2d 637, 659 [1st Cir. 1979]) to support the contention that EPA must compare the reactivities of each of the different VOC species to satisfy the requirements of section 183(e) of the Act.

According to one commenter (AIM-IV-D-212), the Report specifically failed to consider the reactivity of VOC emissions from paints and coatings. The commenter contended that EPA should have created a peer-reviewed reactivity adjusted scale. A second commenter submitted two letters (CP-IV-D-07a, AIM-IV-D-214b/CP-IV-D-07b) stating that Congress intended the study it mandated in section 183(e) of the Act to entail studies of the relative reactivities of all species of VOC. Two commenters in three letters (AIM-IV-D-212, AIM-IV-D-214c, CP-IV-D-35) questioned why EPA failed to conduct a speciated relative reactivity study of all consumer and commercial product VOC species. One commenter submitted three letters (CP-IV-D-07a, AIM-IV-D-214b/CP-IV-D-07b, AIM-IV-D-214c) asserting that EPA had failed to investigate the relative reactivities of VOC species in consumer and commercial products. As an example, the commenter (AIM-IV-D-214b/ CP-IV-D-07b, CP-IV-D-07a) stated that EPA had not performed its duty to study and report on the relative reactivities of architectural and industrial maintenance coating categories containing mineral spirits (the use of which would be discouraged by regulations targeting solvent-borne paint) versus

those containing glycol compounds (the use of which would be promoted by regulations encouraging the use of latex paint). The commenter continued that EPA was required to report all existing data about the relative reactivity of the mineral spirits found in alkyd coatings and the glycol and other compounds found in latex and acrylic coatings. An additional commenter (AIM-IV-D-02/AIM-IV-F-1[l]) agreed that lower VOC coatings are often formulated with more reactive solvents (i.e., xylene instead of mineral spirits); however, the commenter provided no supporting information.

Some commenters (AIM-IV-D-55, CP-IV-F-1a, CP-IV-D-35) disagreed with EPA's claim that a rigorous analysis of relative reactivities on a compound-by-compound basis was not possible. The commenters stated that EPA must perform the necessary studies to supply any missing data or to replace data that were uncertain or lacking in detail. The commenters cited NRDC v Train, 411 F. Supp. 864, 870 (S.D.N.Y. 1976), to support the position that a lack of data was not an appropriate consideration justifying EPA's failure to consider reactivity of each species of VOC. This commenter and another commenter (CP-IV-F-1a) stated that EPA has a heavy burden to demonstrate that studying the relative reactivities of VOC was impossible. The first commenter (AIM-IV-D-214b/CP-IV-D-07b) cited two cases for this proposition: Sierra Club v. Gorsuch, 551 F.Supp. 785, 789 (N.D. Cal. 1982) and American Lung Assn. v. Browner, 884 F.Supp. 345, 347 (D. Ariz. 1994).

Response: At the outset, EPA notes that the Act does not explicitly define the terms "reactivity adjusted" or "highly reactive" VOC, or stipulate how the Agency should interpret these terms. In addition, the legislative history for section 183(e) does not provide clear guidance as to Congressional intent with respect to how EPA should take relative reactivity into account. The EPA believes that the legislative history does not illuminate precisely what Congress intended, in part because Congress intended EPA to exercise its technical expertise to assess and

account for the relative reactivity of VOC in the manner the Agency considers most appropriate. The EPA believes that it has met all reactivity-related requirements of section 183(e) of the Act and that relative reactivity was taken into account to the extent that currently available scientific data and understanding allow. As required by section 183(e) of the Act, EPA considered reactivity in two instances: (1) in listing consumer and commercial product categories for regulation, and in (2) establishing the priorities for regulation of consumer and commercial product categories. The EPA disagrees that a speciated study of all consumer and commercial product VOC should have been performed; such a study is not required by the Act and would have been impractical to undertake.

Section 183(e)(3)(A) of the Act requires EPA to "list those categories of consumer or commercial products that the Administrator determines, based on the study, account for at least 80 percent of the VOC emissions, on a reactivity-adjusted basis, from consumer or commercial products in areas that violate the NAAQS for ozone." To meet this requirement, EPA used available information to identify 10 classes of compounds as "highly reactive." (Note that these are classes of VOC, rather than 10 individual VOC species as the commenters indicated.) The EPA then identified those product categories known to contain quantities of these highly reactive compounds and estimated the mass quantity of these compounds found in each category. Emissions data for these product categories were adjusted by applying a compound-specific reactivity adjustment factor to the mass emissions of each of the highly reactive ingredients. The EPA thus fulfilled the requirements of section 183(e)(3)(A) of the Act when it published a list of categories of products that accounted for 80 percent of mass emissions as adjusted to account for known quantities of each of the highly reactive ingredients. The EPA believes that its methodology is a valid and reasonable interpretation of the requirements to perform a reactivity-adjustment of VOC emissions.

Section 183(e)(2)(B)(iii) of the Act requires EPA, in determining product categories to be regulated, to consider "[t]hose consumer and commercial products which emit highly reactive volatile organic compounds into the ambient air." Accordingly, EPA established "Emissions of Highly Reactive Compounds" as one of the criteria used to rank consumer and commercial products for possible regulation. Thus, in the study, EPA distinquished between three groups of compounds: highly reactive, reactive, and negligibly reactive. Negligibly reactive compounds, a category established by EPA regulations, are certain listed compounds EPA has formally determined to have insignificant ozone-forming potential and excluded from the definition of VOC (see 40 CFR 51.100 (s)). Compounds that were identified as negligibly reactive were excluded from the consumer and commercial product VOC emissions inventory, and will be excluded from any related regulation. Consumer or commercial product categories known to contain highly reactive compounds were assigned a greater weighting than those product categories that did not contain these compounds. The EPA then factored these weightings into the prioritization for regulation. A greater weighting would imply higher priority for regulation. Chapter 3 of the Report provides a detailed discussion of reactivity and the rationale for the list of highly reactive compounds on which EPA relied.

To identify highly reactive VOC, EPA used available information to identify 10 classes of volatile organic compounds -- some of which represented very broad groups -- as “highly reactive” under most conditions. The EPA proposed "highly reactive" VOC to be those with Maximum Incremental Reactivity (MIR) greater than 4 or Maximum Ozone Incremental Reactivity (MOIR) greater than 1.75 and it has concluded that even moderately large changes in the VOC to nitrogen oxides (NO_X) ratio within an airshed would not invalidate this classification. The EPA also established a classification using the reactivity rate constant for reaction with the hydroxyl radical (k_{OH})

greater than 50,000 per part per million per minute ($ppm^{-1}min^{-1}$) as a criterion to identify "highly reactive" VOC species. To resolve conflicting classifications by the MIR and k_{OH} scales, the latest available results regarding atmospheric photochemistry studies of these VOC were assessed and used by the Agency to classify them as "highly reactive" or "reactive."

The EPA also took into consideration highly reactive VOC under another criterion, “Magnitude of Annual VOC Emissions.” For product categories known to contain highly reactive VOC, EPA adjusted the mass emissions figures for those VOC to reflect their high reactivity.

The EPA subsequently ranked product categories for possible regulation, considering the criteria established by the Agency and advice from the independent NAPCTAC advisory group. In conducting the ranking, EPA gave product categories containing highly reactive compounds a higher priority for regulation. In addressing the two criteria cited above, EPA assigned a range of scores based on the number of tons of highly reactive VOCs emitted per year by a product category. The EPA included the scores from these criteria in the calculation of the total scores for each product category in considering the regulatory priority of each category.

Chapter 3 of the March 1995 Report to Congress provides a more detailed discussion of reactivity and the rationale for the list of highly reactive compounds on which EPA relied. Chapter 4 of the Report to Congress discusses in more detail how the Agency applied each of the criteria.

Although the commenter suggested that EPA should have conducted reactivity studies to supplement uncertain and incomplete reactivity data, this was not reasonable or possible due to time and resource constraints. Section 183(e) of the Act set aside a limited amount of time for EPA to perform the section 183(e) study and report to Congress. Existing reactivity

data on VOC, especially those compounds used to formulate consumer and commercial products, is either largely incomplete or uncertain. There is an enormously large diversity of VOC species emitted by consumer and commercial products. The commenters themselves estimate there are approximately 1,000 different VOC species associated with the architectural coating industry alone. An examination of the VOC speciation data available for consumer products (compiled by EPA and shown in the Consumer Product Survey results) indicated that for about 20 to 30 percent of the VOC species identified in the survey responses, the atmospheric chemistry is unknown and a comparable fraction of survey entries represented VOC mixtures of unspecified composition. Definitive estimation of VOC reactivity is only possible when the atmospheric chemistry of the VOC species is known. Furthermore, to characterize the reactivity of one single VOC compound is expected to require $25,000 and two months of smog chamber testing. Neither the equipment nor the specialized expertise to conduct this type of testing is currently available at EPA. In fact, staff with this specialized expertise as well as smog chamber equipment is in limited supply within the scientific community. In addition, despite much discussion over the years among atmospheric scientists, there has been no broad acceptance, within either the scientific or regulatory communities, of any single relative reactivity scale that could be used to make reliable predictions of the ozone forming potential of specific VOC. One reason that reliable predictions are difficult is that the ozone-formation potential of an individual VOC species varies depending on ambient conditions -- on an absolute scale, and occasionally on a relative scale as well. Factors affecting reactivity include ambient conditions such as VOC-to-NOx ratios, the presence of other VOC, and sunlight intensity. Each of these factors can vary widely. These facts all support EPA’s conclusion that at this time uncertainties, inconsistencies, and lack of reactivity data on individual compounds preclude a more detailed determination of the potential of consumer and

commercial products to contribute to ozone nonattainment of the type demanded by the commenters. The EPA does not believe that Congress intended the Agency to characterize the reactivity of each and every one of the myriad of VOC compounds found in consumer and commercial products within the limited time provided by the Act. In addition, since the study and report to Congress was in part a screening exercise to identify EPA's priorities for regulating categories of consumer and commercial products, it would not seem reasonable to delay initiation of regulatory development efforts to complete extensive reactivity testing. The EPA believes that Congress could not have intended EPA to delay regulation of VOC emissions from consumer and commercial products until it had complete data on each of the approximately 2,300 VOC species found in household consumer products alone.

Contrary to the commenter's assertion, nothing in section 183(e) of the Act requires EPA to consider the relative reactivity of each and every specific compound found in consumer or commercial products. However, establishing the list of classes of compounds which EPA considers to be "highly reactive" required a comparison of the reactivity among specific compounds found in consumer and commercial products and, as noted earlier, EPA made a compound-specific relative reactivity adjustment for known quantities of highly reactive compounds. In this sense, although more limited than suggested by the commenter, EPA included consideration of relative reactivity in the section 183(e) study and report to Congress.

With regard to the commenter's specific assertion that EPA should have reported on the relative reactivities of those coating categories containing mineral spirits and those categories containing glycol compounds, this was a detailed reactivity analysis that was not undertaken by the Agency due to the uncertainties previously discussed with regard to reactivity data. In this case, mineral spirits is a complex mixture of various petroleum fractions. The composition of mineral spirits varies with both feedstock (crude oil) and distillation end

point. As a further complication, feedstock often varies by manufacturer, area of the country as well as time of year. With regards to glycol compounds, the four most common solvents in water-based coatings were identified by Censullo (docket A-94-65, item IV-J-6) as Texanol®, propylene glycol, diethylene glycol butyl ether, and ethylene glycol. This agrees substantially with Harley, *et al*, (docket A-94-65, item IV-J-3) who reported that the principal organic cosolvents in water-borne coatings are ethylene glycol, propylene glycol, and a variety of glycol ethers and esters. Although these compounds require further reactivity assessment, preliminary data by Carter, *et.al*., (docket A-94-65, item IV-J-9) found that propylene glycol produces ozone. Thus, propylene glycol is too reactive to be exempted from regulation as a VOC ozone precursor under the criteria presently used by the EPA. However, propylene glycol cannot be classified as highly reactive because propylene glycol does not produce significantly more ozone as emissions of all other VOC equally, under most atmospheric conditions.

Concerning the allegation that xylene is used in some low VOC paints instead of mineral spirits, EPA already considered in the inventory the amount of xylene used in paints. For the ranking process, EPA considered xylene a highly reactive VOC and adjusted the emission inventory for architectural coatings for the amount of xylene used. Also, because xylene is a HAP listed for regulation under Section 112 of the Act, the EPA expects manufacturers to decrease the use of xylene in formulations.

Lastly, the Report and listing of consumer and commercial product categories for regulation are not final agency actions. As more complete information on the relative reactivity of consumer and commercial product VOC is developed, it can be incorporated into the regulatory program. For example, as a result of the recent delisting of acetone as a VOC (characterization of acetone as “negligibly photochemically reactive” under the definition of VOC), EPA plans to move the category of aerosol spray paints from the first grouping of

consumer and commercial products to be regulated (i.e., regulation required by March 1997) due to the high proportion of acetone found in these products. The EPA believes that this flexibility allows for improvements in the regulatory approach taken by the Agency if supported by additional technical information developed in connection with each rule.

With regard to the judicial precedents cited by the commenters, EPA has concluded that the commenters are mistaken. One commenter cited NRDC v. Train, 411 F.Supp. 864 (S.D.N.Y. 1976), in support of its argument that lack of data is not a sufficient basis for the Agency's alleged failure to consider reactivity in accordance with section 183(e) of the Act. The EPA notes that the NRDC decision turned upon a very specific provision of the Act, not at issue here, which required EPA to list lead as a pollutant. The commenters have cited a decision concerning EPA's reticence to take an action because of lack of data. The EPA lost the NRDC case because the express statutory language did not acknowledge lack of data as a basis for refusal to list lead as a pollutant. Here, however, EPA has concluded that Congress could not have intended for EPA to refuse to regulate VOC emissions from consumer and commercial products absent complete, absolute, unequivocal scientific and modeling data regarding reactivity. In other words, EPA has chosen to act despite what the commenters portray as inadequate data concerning reactivity, and thus has acted in accordance with the NRDC decision.

The EPA presumes that the commenters cited NRDC v. Train because they contend that EPA cannot refuse to perform the reactivity assessments advocated by the commenters based upon lack of data, which in part result from inadequate resources and time to produce perfect information. As discussed earlier in this response, EPA does not believe that section 183(e) of the Act in fact requires the type of reactivity assessment demanded by the commenters. The EPA has concluded that both the statutory language and the limited legislative history indicate that

Congress intended EPA to take relative reactivity of VOC into account in the manner that the Agency determined was reasonable under the circumstances.

The commenters have also cited Sierra Club v. Gorsuch, 55, F.Supp. 785 (N.D. Cal. 1982), and American Lung Assn. v. Browner, 884 F.Supp. 345 (D. Ariz. 1994), because they ostensibly support the commenters' argument that EPA cannot point to inadequate time as a basis for refusal to perform the reactivity assessments demanded by the commenters. The EPA notes that reliance upon these cases for the proposition that EPA has a "heavy burden" to demonstrate that a certain action is not possible is inappropriate. Both cases involved deadline suits to force the Agency to take an action by a specific date. In assessing the Agency's need for additional time, the courts have indicated that EPA bears a burden to show why it is entitled to more time than Congress allotted. This point is irrelevant to the argument made by EPA which is that one reason Congress cannot have intended the type of reactivity assessment demanded by the commenters is that it would be impossible to accomplish within the timeframe allocated by Congress, thereby confirming that EPA's interpretation of section 183(e) of the Act regarding reactivity is more appropriate. Moreover, the commenter's reference to the cases to suggest that there is a "higher burden" for the Agency to overcome in this context is misleading and incorrect. As described earlier, EPA believes that it has performed the reactivity assessment in accordance with the requirements of section 183(e) of the Act.

Finally, the commenters cited Weyerhauser v. Costle, 598 F.2d 1011 (D.C. Cir. 1978) and BASF Wyandotte Corp v. Costle, 598 F.2d 637 (1st Cir. 1979), ostensibly in support of their contention that section 183(e) of the Act obligates EPA to compare the relative reactivities of all VOC species before it can regulate VOC emissions from consumer and commercial products. The EPA presumes that the commenters mean to compare the distinction between the different types of statutory factors at

issue in those decisions to the different factors in section 183(e) of the Act.

The EPA disagrees that these decisions should alter the Agency's interpretation of section 183(e) of the Act. The cases dealt with different statutes with markedly different provisions and are therefore clearly distinguishable. More importantly, however, EPA believes that the decision in the Weyerhauser case, to the extent that it is relevant, in fact supports EPA's contention that Congress intended to grant the Agency discretion to develop the criteria for product listing and regulation based upon appropriate consideration of the factors enumerated in section 183(e)(2)(B) of the Act. The factors in that section are analogous to the "consideration factors" discussed in Weyerhauser and thus, by analogy, EPA is not required to apply such standards except as it deems appropriate. As discussed more fully earlier in this response, EPA believes that it has taken into consideration the relative reactivity of VOC species to the extent practicable and appropriate, in conformity with the statutory provisions of section 183(e) of the Act.

2.2.1.2 Determination of Reactivity

Comment: Some commenters (AIM-IV-F-1d, CP-IV-D-35, AIM-IV-D-212, AR-IV-F-1) cited an article titled “Urban Ozone Control and Atmospheric Reactivity of Organic Gases” (Russell et al., [docket number CP-IV-D-35r/AIM-IV-D-212p6L]). According to the commenters, this article reported that characteristic reactivities of individual VOC could be known with confidence by applying sophisticated computer modeling techniques. The reported research also quantified variability and uncertainties in reactivity estimates using advanced computer modeling techniques and basic engineering assumptions. The article also addressed typical concerns and criticisms of reactivity weighting: the variation of specific reactivities with location as a result of changing atmospheric conditions and the effects of uncertainties in the chemical mechanisms employed.

One commenter (AIM-IV-D-214c) also questioned EPA's reason for not considering relative reactivity (that existing data and methods have “uncertainties” and “limitations” and that additional data could be obtained “only at great expense”) given that the California Air Resources Board (CARB) uses a reactivity-based control strategy to implement its clean fuel/low emissions vehicle regulations.

One commenter (CP-IV-D-35v/AIM-IV-D-212p5) requested the formation of a reactivity scale that acknowledged that some compounds increase ozone (positive reactivity values) while other compounds reduce ozone (negative reactivity values) or have no affect on ozone formation at all (neutral values). Another commenter (AIM-IV-D-178) stated that the costs of obtaining data to determine relative photochemical reactivity would be worth incurring.

Response: Since the study and report to Congress were in part a screening exercise to identify EPA's priorities for regulating categories of consumer and commercial products, EPA judged that the consideration of relative reactivity should be limited to currently available data and should not involve exhaustive testing of relative reactivities of all consumer and commercial products. The reasons that the EPA did not use any of the methods or approaches suggested by the commenters are summarized below.

The EPA agrees that the modeling method cited in the article by Russell *et al.* is available and that this type of method is the most credible of the methods now in existence for use in estimating the reactivity of a VOC species. However, this method can be used to estimate the reactivity of a VOC species only if the atmospheric chemistry of the VOC species is known. As discussed in detail in section 2.2.1.1, there is an enormously large diversity of VOC species emitted by consumer and commercial products and some products are VOC mixtures of unspecified composition. Furthermore, existing reactivity data on VOC are incomplete or uncertain, especially for those compounds used to

formulate consumer and commercial products. Based on these limitations, it appears that the method reported by Russell *et al* can be used on, roughly, only one half of the consumer and commercial product VOC species. This limitation is one of the bases for EPA's conclusion that the uncertainties, inconsistencies, and lack of reactivity data on hundreds of individual compounds in consumer products preclude the Agency from performing the type of reactivity determination advocated by the commenters.

In addition, computer models generally use chemical mechanisms which "lump" chemical species into groups or otherwise treat chemistry in some sort of aggregated fashion. For example, the widely used carbon bond four (CB-4) mechanism treats VOC chemistry according to types of chemical bonds present in organic compounds. Chemical species are characterized according to the mix of bonds found in each species. In the computer model, emissions (of each species) are aggregated for each bond type. This aggregation winds up combining many species and source categories. After the aggregation occurs, the chemistry of the resulting mix is simulated. As a result, the modeling does not provide a ready means for characterizing effects of reducing emissions of an individual compound in a computer simulation. Consequently, EPA believes that the model has limitations in its use for evaluating the effects of reducing specific VOC emissions from a particular source category.

The EPA agrees with the discussion by Russell *et al* regarding uncertainties. However, their analysis, results, and conclusions apply only to VOC species whose atmospheric chemistry, and specifically the chemical pathway through which the VOC molecule reacts in the atmosphere, is known. To further explain, Russell *et al.* computed the reactivity uncertainties from data on rate constant and product yield uncertainties for all specific reaction steps that constitute the "pathway." The pathway, however, is not known for many of the consumer and commercial product VOC emission species. Thus, for these

species, the uncertainties, obviously, will be much greater than those reported by Russell *et al*.

With regard to the comment concerning CARB's use of a reactivity-based control strategy to implement its clean fuel/low emissions vehicle regulations, it should be noted that a long history of research exists in the area of mobile source emissions within California. Since mobile source emissions are fairly well-characterized in terms of reactivity (i.e., reactivity uncertainties, inconsistencies, and lack of data are not prohibitive), the State of California is able to apply a reactivity-based control strategy to implement its clean fuel/low emissions vehicle regulations. Consumer and commercial product VOC emissions, on the other hand, are relatively newly regulated in areas of the country such as California and, as explained previously, the emissions data have many uncertainties which complicate the ability to use reactivity scales such as those reported by Russell *et al.*.

Also, reactivity scales do exist and were considered by EPA. Specifically, one of those scales, the one developed by Dr. Carter, at the University of California, Riverside, and widely cited in technical literature, was used by EPA to derive the reactivity classification described in Chapter 3 of the report to Congress.

As discussed above, EPA believes that it has adjusted for relative reactivity reasonably and sufficiently to fulfill the Congressional directive in section 183(e) of the Act. Because Congress did not stipulate how EPA should perform this adjustment, EPA concludes that Congress intended the Agency to exercise its technical expertise to determine the requisite adjustment for reactivity necessary to regulate consumer and commercial products appropriately. The EPA does not believe that Congress could have intended to delay regulation of VOC emissions from consumer and commercial products indefinitely, pending development of complete information regarding reactivity for all individual species of VOC.

Comment: One commenter submitted two letters (AIM-IV-D-212, CP-IV-D-35v/AIM-IV-D-212p5) contesting EPA's identification of highly reactive VOC. Specifically, the commenter contended that there are highly reactive VOC in nature (e.g., isoprene) that actually reduce ozone formation. According to the commenter, many VOC react with ozone and result in a reduction in ozone concentrations (here the commenter cites both the 1991 report "Rethinking the Ozone Problem in Urban and Regional Air Pollution", by The National Research Council/The National Academy of Science, and "Scientific Basis of the VOC Reactivity Issues Raised by Section 183(e) of the Clean Air Act Amendments of 1990" by Dr. Basil Dimitriades).[6,1] The commenter also noted that EPA has acknowledged in the Report that the k_{OH} method for measuring reactivity does not reflect ozone potential for all VOC.

Additionally, this commenter and another commenter (AIM-IV-D-49, AIM-IV-D-177) claimed that the MIR and MOIR tests are invalid for identifying highly reactive evaporative VOC because they are conducted at levels of NO_X, sunlight, and OH which do not represent air at the border between attainment and nonattainment.

These commenters believe that section 183(e) requires reactivity tests to be performed at the ozone NAAQS and at NO_X levels of 5 to 10 parts per billion, by volume (ppbv). The commenter asserted that the MIR and MOIR tests were not valid for determining which highly reactive VOC to reduce to meet the requirements of section 183(e) of the Act. The commenter explained that these tests were not performed under the same conditions (in terms of NO_X, sunlight, and OH) that existed when air with low levels of NO_X was at the border between attainment and nonattainment.

One commenter (AIM-IV-D-49) asserted that the VOC species' reactivity and amount must be taken into consideration with the amount of NO_X in the environment when selecting the 80 percent of VOC from consumer and commercial products on a reactivity adjusted basis for the purposes of regulation. The commenter

explained that the amount of NO_X in the air directly affects the VOC species reactivity; therefore, the amount of VOC alone is not singularly relevant. The commenter contended that EPA did the reactivity test at the wrong level of NO_X, and, therefore, reached the wrong conclusion and the wrong regulation.

Response: The EPA agrees that in atmospheric conditions where NO_X emissions are the limiting factor in ozone formation, very reactive species of VOC, such as various olefins, can actually react with ozone to reduce ozone levels somewhat. However, the net destruction of ozone by these compounds only occurs in environments where NO_X is very low. In general, highly reactive VOC have quite the opposite effect in urban environments most typical of ozone nonattainment areas where there is ample NO_X, resulting in increases in ozone concentrations.

The EPA agrees that the k_{OH} rate constants associated with various compounds are not perfect indicators of the compounds' relative ozone forming potential. As noted in section 2.3.2.1, the reaction of a VOC species with a hydroxyl radical is generally the first in a series of reactions which produce organic radicals which, in turn, oxidize nitric oxide (NO) to nitrogen dioxide (NO_2). In some instances, products from the reaction of a VOC species with OH are inert or do not participate in subsequent reactions to convert NO to NO_2. Thus, there is not a perfect correspondence between the reaction rate of OH with VOC species and ozone produced. Nevertheless, it is usually a reliable indicator of a compound's relative ozone forming potential. Other approaches for characterizing reactivity, such as the MIR or MOIR methods, circumvent this lack of coincidence between k_{OH} and relative ozone forming potential, by directly measuring (or calculating) incremental changes in ozone accompanying incremental changes in a test compound under a defined set of environmental conditions.

The EPA generally uses k_{OH} data in determining whether a compound is "negligibly photochemically reactive" and therefore excluded from the definition of VOC, and also uses MIR and MOIR

information in this finding, as appropriate, to validate the conclusion. In determining which compounds are "highly reactive" for purposes of the section 183(e) study, EPA used MIR, MOIR and k_{OH} reactivity data as explained in 2.2.1.1.

The EPA believes that the MIR and MOIR tests are valid for identifying the relatively most reactive VOC, under practically all ambient conditions. The dependence of a compound's reactivity on ambient conditions is strong for absolute reactivity but not for relative reactivities. Because EPA used methods based on relative reactivities to classify compounds as highly reactive, EPA's reactivity classification is not dependent on ambient conditions.

In addition, it should be noted that the MIR method, in particular, is constructed to emphasize differences in the relative reactivity of various test compounds. As such, it overstates the importance of differences in reactivity in most instances. This might tend to undercut an argument that a particular compound should not be regulated based on its low relative reactivity according to the MIR test.

Comment: A commenter submitted two letters (AIM-IV-D-212, AIM-IV-D-212p5/CP-IV-D-35v) asking why the list of highly reactive compounds excluded biogenic compounds like isoprene from consumer and commercial products. The commenter wondered if EPA has overlooked biogenic compounds or if EPA's exclusion of biogenic compounds was based upon scientific data or a rationale which EPA did not explain.

Response: Contrary to the commenter's claims, EPA's classification of highly reactive compounds includes biogenic compounds. As examples, consider the biogenic compounds isoprene, formaldehyde, and the pinenes. In the Report, EPA listed 10 classes of highly reactive compounds, including:

- nitrites,
- alkyl amines with less than eight carbon atoms,
- unsaturated esters,

- furan,
- aldehydes with less than six carbons,
- poly-substituted naphthalene with less than 14 carbons,
- alkyl styrenes,
- polyalkyl benzenes,
- olefins with less than 10 carbons, and
- alkyl phenols.

Isoprene, which the commenter believed was excluded from the list of highly reactive compounds, is a five carbon di-olefin and would be included as a highly reactive compound because it is an olefin with less than 10 carbons. Formaldehyde is an aldehyde with less than six carbons so it would also be included as a highly reactive compound. Pinenes, on the other hand, would not be considered highly reactive by EPA's classification because they are cyclic olefins with 10 carbon atoms.

2.2.1.3 Use of Relative Reactivity in Regulations

Comment: Four commenters submitted five documents (CP-IV-D-35, AIM-IV-D-02, AIM-IV-D-212, AIM-IV-F-1[l], AR-IV-F-1) informing EPA that establishment of a relative reactivity scale would allow EPA to control specific VOC species, thereby increasing the effectiveness of consumer and commercial product regulations. The commenters cited an article by Russell *et al.* (attached as CP-IV-D-35r/AIM-IV-D212a/AIM-IV-D-212p6L) that according to the commenters advocated the refinement of current VOC control strategies by controlling specific VOC species rather than the whole class of VOC.[6] The commenters claimed that the article concluded that it was possible, more cost-effective, and economically sound to base regulations on reactivity because the reactivities of compounds differed significantly within a class. One commenter (CP-IV-D-35, AIM-IV-D-212) further stated that the article confirmed earlier statements of scientists who were involved in the OTA report entitled, “Rethinking the Ozone Problem”.[6] The commenter implied that EPA ignored using relative

reactivity as a part of its regulatory strategy even though regulations based on relative reactivity would be more cost-effective. The commenter claimed that EPA disregarded the overwhelming scientific consensus surrounding the relevance of characteristic VOC reactivities in the production of smog. As a result, the commenter contended that EPA will unnecessarily regulate some manufacturers under the section 183(e) regulations.

In contrast, one commenter (AIM-IV-D-189) agreed that knowing the relative photochemical reactivity of individual VOC species is essential for a completely accurate determination of the impact of VOC control strategies on ozone formation but contended that EPA lacks sufficiently reliable information to develop a national VOC control strategy on the basis of the relative reactivity of VOC. Therefore, the commenter asserted that EPA's approach to reduce mass of each VOC species in a proportional manner without singling our particular VOC on the basis of photochemical reactivity is not a serious objection to any rules promulgated under section 183(e) of the Act especially because section 183(e) of the Act only requires the Agency to "consider" photochemical reactivity along with the four other factors in developing consumer and commercial product regulations.

Response: For the same reasons as discussed in sections 2.2.1.1 and 2.2.1.2 regarding EPA's consideration of reactivity in the section 183(e) study and report to Congress, the regulatory program under section 183(e) to date has not considered regulatory strategies that differentiate control requirements among different VOC species based on relative reactivity. The EPA's response to points regarding the Russell article are addressed in section 2.2.1.2.

The EPA disagrees that "Rethinking the Ozone Problem" states that such regulations are feasible at this time.[6] The committee which prepared "Rethinking the Ozone Problem" was established to evaluate scientific information relevant to precursors and tropospheric formation of ozone and to recommend strategies and

priorities for addressing the critical gaps in scientific information necessary to help address the problem of high ozone concentrations in the lower atmosphere. The committee was not charged to evaluate and did not address the technologic, economic, or sociologic implications of current or potential ozone precursor control strategies. Thus, “Rethinking the Ozone Problem” and EPA's response in the section 185(b) report to Congress do not address the policy implications of promulgating regulations based on controlling highly reactive VOC. Although EPA agreed with the findings in “Rethinking the Ozone Problem”, this report did not have any findings regarding the economic implications of reactivity-based VOC control strategies; therefore, EPA could not have ignored implementing the report’s findings in this area.

Currently available speciated reactivity data are not adequate to support the suggested regulations based on substitution of lower reactivity VOC for higher reactivity VOC. An analysis of whether such a system would result in more efficient regulation would need to consider all costs associated with implementing a speciated regulatory system (e.g. monitoring and recordkeeping). Also, it would be necessary to consider the ability of compounds to form ozone over a several-day period under different sets of environmental conditions in designing such an approach and considering its efficiency.

Finally, current EPA policy allows “negligibly photochemically reactive” compounds to be exempted from regulation. This involves showing that the compound is less photochemically reactive than ethane. Anyone may petition EPA to have a compound exempted from the VOC definition by submitting data demonstrating that the compound has a negligible role in tropospheric ozone formation. If a manufacturer can demonstrate this finding, EPA may approve the petition and add the compound to EPA’s list of “exempt compounds” under the definition of VOC in part 51 of chapter I of title 40 of the Code of Federal Regulations [51.100(s)]. In effect, the compound is exempt from

regulation as a VOC. The EPA has exempted more than 100 VOC species (42 compounds and 2 classes of compounds) under this provision.

2.2.2 Potential Of Consumer And Commercial Product VOC To Contribute To Ozone Nonattainment

Comment: One commenter (AIM-IV-D-212p/CP-IV-D-35n) disagreed with EPA's conclusion that VOC from consumer and commercial products contribute to ozone nonattainment. The commenter acknowledged that VOC evaporate from paints and coatings, but contended that VOC from paint and coatings do not contribute to ozone nonattainment.

This commenter submitted two additional letters (AIM-IV-D-212, AIM-IV-D-212p3/CP-IV-D-35f) explaining that EPA's Report set forth selective scientific assumptions to support the Agency's determination that VOC from consumer and commercial products have the potential to contribute to ozone nonattainment. The commenter claimed that EPA should have started with the ozone and ozone precursors found in pristine air and then established what can be added to the air without exceeding the ozone standard. The commenter contended that EPA would determine that none of the man-made evaporative VOC found in consumer and commercial products will contribute to the formation of ozone in pristine air. One commenter in two letters (CP-IV-D-35k, AIM-IV-D-212) claimed that "potential to contribute to ozone nonattainment" should be defined as the amount of additional peak ozone produced when the VOC from consumer and commercial products are added to well-mixed pristine air.

This commenter also submitted two letters (AIM-IV-D-212, AIM-IV-D-212p4/CP-IV-D-35g) that asserted, after the commenter's exhaustive research and communications with this nation's leading atmospheric scientists, that the use of products that contain evaporative VOC does not contribute to the exceedance of the ozone NAAQS. Contrary to the Report, the commenter claimed that many scientists within the Federal government and within academia agree that evaporative VOC, like those found in paints and

coatings, have little or no propensity to cause the exceedance of the ozone NAAQS.

Another commenter (AIM-IV-D-30) asserted that regardless of whether emissions of VOC are linked directly to ozone formation, there is value in lowering the emission of VOC from all products. The commenter noted that logic dictates that preservation of our ecology is negatively impacted by the uncontrolled release of excess amounts of VOC. This commenter thus advocated the broadest possible interpretation of "potential" to contribute to ozone nonattainment.

Response: The EPA has concluded that VOC from consumer and commercial products do contribute to ozone formation in nonattainment areas. Nonattainment areas are often in urban centers where the atmosphere is VOC-limited. Addition of VOC to VOC-limited atmospheres generally results in increased ozone formation. Ozone formation mechanisms are insensitive to the VOC source. Thus, any VOC emitted into a VOC-limited atmosphere may contribute to ozone formation. As the commenter admitted, VOC from paints and coatings evaporate and, thus, EPA believes that they have the potential to enter the atmosphere and participate in ozone-forming reactions.

Section 183(e) requires EPA to determine the potential of VOC from consumer and commercial products to contribute to ozone levels which violate the NAAQS for ozone. The EPA disagrees with the commenter’s interpretation that contribution to ozone levels should be determined from a pristine environment, because it is unrepresentative of the current situation. More information about ozone formation and policy is discussed in section 2.3.2 of this document. Section 183(e) of the Act did not instruct EPA to calculate the "potential" to contribute to ozone attainment in a vacuum, and EPA believes that it would be unreasonable to do so. Congress enacted section 183(e) to remedy the endemic problem of ozone and could not have intended EPA to ignore the existing levels of ozone across the country when making this determination.

Although the commenter claimed that many scientists agree that evaporative VOC do not contribute to ozone exceedances, the commenter failed to provide the names of any of those scientists or references to any publications or research which support the commenter's claim. The EPA's scientists believe that VOC, regardless of its source, will contribute to ozone nonattainment in VOC-limited atmospheres.

Comment: Two commenters submitted four letters (CP-IV-D-35k, AIM-IV-D-212, AIM-IV-D-177, AIM-IV-D-177a) contending that adding VOC to ambient air will in fact reduce ozone. One commenter in three letters (CP-IV-D-35k, CP-IV-D-35m, AIM-IV-D-212) attached charts and illustrations to support the contention that in almost all areas in the country, the addition of VOC does not have the potential to contribute to ozone levels that violate the NAAQS. The commenter claimed that the models proved that the peak ozone level would go down with the addition of the VOC from consumer and commercial products when starting with air containing ozone at levels beneath the ozone NAAQS. The commenter provided an example using Washington, D.C., that purportedly showed that the peak ozone level would be reduced by adding VOC from consumer and commercial products. The commenter further contended that the addition of VOC to nonattainment air would reduce peak ozone in almost all areas of the country except in some severe and extreme nonattainment areas. On the other hand, the commenter claimed that some severe and extreme nonattainment areas are in nonattainment due primarily to NO_X emissions and could never achieve attainment by reducing VOC emissions. The second commenter (AIM-IV-D-177) stated that reducing VOC in attainment areas would increase the sensitivity of the air to NO_X contamination and thereby cause ozone NAAQS violations to occur sooner than otherwise.

Response: While EPA acknowledges that some species of VOC can reduce ozone, the reduction of ozone by VOC occurs in very limited circumstances, that is, with only a small subset of highly reactive VOC under specific meteorological conditions and

in the presence of very low NO_X concentrations. Thus, the reduction of ozone by increasing VOC is a phenomenon that is not widespread and certainly cannot form the basis for an ozone control policy. In addition, there is ample modeling evidence obtained by comparing predictions corresponding to base 1990 emissions to those with “base 2007 emissions” (reflecting net effect of mandated regulations and growth) that decreasing VOC emissions causes predicted ozone to decrease. The Ozone Transport Assessment Group’s (OTAG) modeling analyses in the eastern U.S., modeling performed of Texas, and modeling of various California locations all attest to this conclusion. Ozone trend data also suggest reduced peak concentrations are occurring. Since most of the regulatory effort to date has been to reduce VOC, the ambient information tends to refute the commenter's claims.

The following explanation clarifies the unique situation in which addition of very reactive VOC can be expected to decrease ozone concentrations. This phenomenon is expected to occur in locations where NO_X emissions are the limiting factor, which is often the case in rural attainment areas. In this situation, ozone is limited by availability of NO_2 to photo-dissociate in the presence of sunlight. Further, other reactions involving the organic radicals, besides reacting with NO to form NO_2, become relatively more important. For example, very reactive species of VOC, such as various olefins, can react with ozone. This reaction can have the effect of actually reducing ozone levels somewhat, as well as removing these VOC for possible use in future ozone production where or when NO_X is more plentiful. Such very reactive VOC, however, are not expected to be used in architectural coatings or most other consumer and commercial products.

The notion that increasing “evaporative” VOC will reduce ozone is based on an improper interpretation of the isopleth diagram shown in the commenter’s attached graphs 1 and 2. One has only to compare predicted ozone levels obtained with and

without biogenic emissions in the inventory to discount this notion. For example, modeling simulations in which urban biogenic VOC emissions are first included and then excluded from the calculations generally indicate little effect of the biogenic emissions on the predicted ozone levels. This result is expected from the shape of the ozone isopleths at high VOC:NO_X ratios (Chameides *et al*, 1988,[docket A-94-65, item IV-J-22]).[7]

The commenter's argument about reactive VOC reductions increasing the sensitivity of air to NO_X is also based on a misinterpretation of an isopleth diagram in the area where the VOC:NO_X ratio is very large. The commenter's contention is that more NO_X can be added to attainment air that contains high levels of VOC and low levels of NO_X without exceeding the ozone NAAQS. This situation exists because in the diagram used by the commenter, the ozone isopleth at low NO_X concentration slopes upward as the VOC concentration increases. Decreasing the VOC content of attainment air with low NO_X concentrations results in the ozone NAAQS being exceeded by the addition of smaller quantities of NO_X. Using the example for Washington, D.C., the commenter illustrates that at a VOC:NO_X ratio of 225:1, almost three times as much NO_X could be added to the air without exceeding the ozone NAAQS as at a VOC ratio of 150:1.

The slight upward slope of the ozone isopleths may be due to reactions between ozone and some very reactive VOC species such as limonene, isoprene, or propene. Olefins and other highly reactive species are likely present in the urban mix assumed in the figure. Some very reactive compounds may react with ozone to decrease ozone concentrations especially at high VOC:NO_X ratios. However, EPA believes that this relatively unusual phenomenon is no basis for a national ozone control strategy. Moreover, the commenter contended that emissions from their product are not very reactive. If so, this feature of the isopleth diagram is not applicable to emissions from their products.

For the foregoing reasons, EPA disagrees with the commenter’s assertions that VOC emissions from consumer and

commercial products are in some fashion good for the environment or will negate violations of the ozone NAAQS. As detailed in the Report and elsewhere in this document, EPA has concluded that such emissions do contribute to ozone nonattainment.

Comment: Three commenters in six letters (AIM-IV-D-212, CP-IV-D-35, CP-IV-D-35k, AIM-IV-D-177a, AIM-IV-214b/CP-IV-D-07b, AIM-IV-D-214c) asserted that EPA failed to fulfill the requirements of section 183(e) of the Act which require EPA to consider the potential of consumer and commercial products to contribute to ozone nonattainment. One commenter (AIM-IV-D-214c) alleged that EPA failed to provide quantitative data demonstrating ozone-forming potential for all VOC species emissions associated with consumer and commercial products, EPA failed to demonstrate a causal relationship between emissions of individual VOC species and ozone nonattainment, EPA failed to consider the effect of each VOC species in each airshed, and EPA ignored factors such as the temperature or sunlight intensity in each airshed. This commenter contended that EPA's statement in the study and Report to Congress that a rigorous determination of the potential of consumer and commercial products to contribute to ozone nonattainment was not possible at that time is “invalid as a matter of fact and law.” This commenter also claimed that EPA acknowledged that a complete characterization of the reactivity of a VOC species can be obtained from several smog chamber tests covering the range of VOC:NO_X ratios, VOC composition, and radiation conditions occurring in the various nonattainment atmospheres. This commenter also claimed that “EPA admits in the Report that it failed to perform its nondiscretionary duty to determine the potential of each VOC species to contribute to ozone nonattainment.”

The commenter (AIM-IV-D-214c) cited two cases (EDF v. Browner, 1995 WL 91324 at 4; NRDC v. EPA, 695 F. Supp. 48, 54-55 [D.D.C. 1988] for the proposition that EPA must regulate each species of VOC separately. The commenter also cited two authorities for the proposition that EPA cannot issue regulations

without sufficient causal relationship between the activity regulated and the harm the Agency seeks to avert. (Rogers, Environmental Law: Air and Water, § 3.2(B); ASARCO, Inc. v. EPA, 616 F. 2d 1153, 1162 [9th Cir. 1980]).

One commenter (AIM-IV-D-212p6i/CP-IV-D-35j), claimed that there were no scientific facts to support and justify the proposed regulations for consumer and commercial products. Specifically, the commenter claimed that there had not been a determination sufficient to establish that VOC emitted from the paint and coatings industry constituted a measurable and identifiable factor in contributing to ozone exceedances in areas classified as nonattainment.

Response: The EPA disagrees with the commenters and believes that the Report reflects EPA's proper consideration of the potential of VOC emissions from consumer and commercial products to contribute to ozone formation consistent with section 183(e) of the Act. The EPA contends that ample evidence exists that most VOC in consumer and commercial products have the potential to contribute to ozone nonattainment. Most VOC contribute to ozone formation in VOC limited atmospheres, such as those above the center city sections of most urban areas. Most consumer and commercial products emit VOC during their use. Therefore, EPA reasonably concluded that VOC emitted from consumer and commercial products will have the potential to contribute to ozone formation, and thus to ozone nonattainment.

The commenters contended that the instruction to the Agency to determine the "potential" of VOC emissions from consumer and commercial products to contribute to ozone nonattainment requires the Agency to ascertain whether each species of VOC, in each product, in each airshed, will cause nonattainment. In so doing, the commenters implied that the term "potential" in section 183(e)(2)(A)(i) necessarily connotes a special meaning beyond the ordinary meaning of the word. The EPA notes that the term "potential" is not defined in the statute, and therefore believes that Congress intended the term "potential" to have its normal

meaning of “having possibility, capability, or power.” Thus, in this context EPA was to determine if the VOC’s from such products have the possibility, capability, or power to contribute to ozone nonattainment. In short, the question posed to the Agency we “can” these emissions contribute to ozone nonattainment? As noted above, EPA made this determination. Moreover, EPA notes that the remainder of section 183(e)(2)(A) does not support the reading advocated by the commenters. The initial portion of the provision instructs the Agency to “conduct a study of the emissions of volatile compounds into the ambient air from consumer and commercial products (or any combination thereof)” in order to make this determination. This statement does not direct the Agency to make the determination on a VOC species by VOC species basis, nor even on a product by product basis. In fact, the inclusion of the parenthetical “(or any combination thereof)” indicates that the Agency is authorized to make this determination on an aggregated basis.

Although the commenters implied that EPA should have determined the potential to contribute to ozone formation by conducting smog chamber tests on all VOC species present in consumer products, EPA contends that this procedure would be costly, time consuming, and unnecessary for meeting the requirements of section 183(e) of the Act, as described more fully above in section 2.2.1. Such an analysis would require, for example, substantial additional data on the types and quantities of individual VOC in each product within the broad universe of consumer and commercial products. To obtain this information would have placed an additional burden upon industries that EPA believes was not necessary for the listing process. Also, studies to quantify the reactivity of a large number of individual VOC species would have been required for this analysis. In addition, many complexities make it difficult to make reliable predictions of the ozone-forming potential of individual VOC species. One reason is that this potential varies depending on ambient conditions -- on an absolute scale, and

occasionally on a relative scale as well. These conditions affecting reactivity include ambient conditions such as VOC-to-NOx ratios, the presence of other VOC, and sunlight intensity. Each of these factors can vary widely. Also, in multiple day pollution episodes in an area, a VOC species that has low reactivity (based on a one-day reactivity scale) may continue to form ozone over several days. Even if EPA could have obtained the needed data and accounted for these complications, the results would have been of limited utility. As noted elsewhere in this BID, available computer models generally aggregate chemical compounds or consider them as general categories. As a result, models have limited use for evaluating the effects of reducing emissions of specific VOC species from a particular product category.

The EPA also disagrees with the commenters' use of the judicial precedents regarding regulation of VOC on a species-by-species basis and regarding the alleged insufficient causal relationship between the activity regulated and the harm the Agency seeks to avert. The EPA understands the commenters' argument that EPA failed to demonstrate a relationship between VOC emissions from consumer and commercial products and exceedances of the ozone NAAQS to be that the commenters believe that EPA should have done an analysis on the effect on ozone concentrations on a per product and control strategy basis for each area in the country. As explained in section 2.2.1 of this document, EPA does not interpret section 183(e) of the Act to require a species-by-species assessment of VOC and their potential to contribute to ozone on an area by area basis. The EPA believes that an intensive study to quantify each product's effect on ozone levels in nonattainment areas is inconsistent with Congress's intent in enacting the section 183(e) program. Congress recognized that small quantities of VOC emissions from a very large number of products add up -- and together make up a significant portion of ozone-forming VOC emissions. Congress

created the 183(e) program to reduce the aggregate VOC emissions from consumer and commercial products. It is not necessary, even if it were feasible, to quantify the effect of each product on ozone levels in each nonattainment area to make a reasoned selection of product categories to list for regulation. The EPA believes that Congress could not have intended to require EPA to postpone regulation of VOC emissions until such time as information of the sort demanded by the commenters is available, if ever. The EPA believes that the use of the phrase "potential to contribute" to nonattainment was intended to avoid just this sort of problem with demonstrating causal connection between a given product and a particular episode of nonattainment in a specific geographic location.

Finally, the EPA disagrees with the commenters' characterizations of the statements in the study and Report to Congress. The commenters quoted several statements from the study and Report in which EPA acknowledged that there are presently limitations in the data available and a lack of data on individual compounds regarding the reactivity, and this necessarily precluded a "rigorous" analysis of certain questions. Contrary to the assertions of the commenters, these were not admissions by the EPA that it had in some way failed to perform the study as contemplated by section 183(e). Taken in proper context, these statements were intended to inform the Congress of the limitations imposed by the state of scientific knowledge regarding certain points such as the reactivity of each of the thousands of VOC species in consumer and commercial products. Notwithstanding these limitations, the EPA had sufficient information to make the requisite determination of the potential to contribute to ozone nonattainment.

Comment: One commenter submitted two letters (CP-IV-D-35k, AIM-IV-D-212) criticizing the reactivity scale method that EPA used in the Report as one of two possible methods for accounting for photochemical reactivity when determining the potential of consumer and commercial product VOC to contribute to ozone

nonattainment. The commenter alleged that the reactivity scale method is inappropriate because it uses reactivity data that reflect absolute ozone yields rather than changes in peak ozone formation (incremented reactivity data).

In one letter, the commenter (CP-IV-D-35k) also criticized the Air Quality Simulation Model Method that EPA used in the Report as a method for determining the potential of VOC from consumer and commercial products to contribute to ozone nonattainment. The commenter alleged that the Air Quality Simulation Model Method is inappropriate for determining potential contribution to nonattainment because "EPA's Urban Airshed Model computer model does not yet have usable validity for all VOC reactivity... especially ... for low NO_X conditions..." which are the conditions at which the commenter contends EPA should determine the potential to contribute to ozone nonattainment.

In this same letter the commenter (CP-IV-D-35k) concluded that EPA will not be able to determine potential contribution to nonattainment using the two proposed methods and that a new approach for determining potential, “peer-reviewed by this nation's leading scientists,” is necessary for this determination.

Response: Neither the reactivity scale method nor the air quality simulation method cited by the commenter as being inappropriate was actually used by EPA in its determination of which VOC emissions from consumer and commercial products have the potential to contribute to ozone levels which violate the ozone NAAQS. These two methods were discussed in the report to Congress as being two possible methods. Rather, EPA studied indicators of product categories’ relative potential to form ozone in conducting the commercial and consumer products study, and considered those indicators in prioritizing and listing product categories for regulation. Therefore, these criticisms of the reactivity scale method and the air quality simulation method are not applicable to EPA’s determination.

Although EPA did not use either of the two possible methods described in the report to Congress, EPA would like to correct several misrepresentations concerning these two methods. The reactivity data are "incremental reactivity" (IR) data, and as such, they do reflect change in peak ozone formation, as explained by the developer of the IR concept, Dr. W. Carter, in "Environmental Science and Technology."[8]

As discussed in section 2.3.2 of this document, EPA disagrees with the commenter regarding the appropriateness of EPA's computer model method to determine the potential of consumer and commercial product VOC to contribute to ozone nonattainment. The computer model method, while having uncertainties, has been judged by peer reviewers to be a state-of-the-art modeling method.

The EPA also contends that the approach for determining potential to contribute to ozone that was presented in the Report has been peer-reviewed by this nation's leading scientists. In October of 1996, this approach was published as a technical paper in the "Journal of Air and Waste Management Association."[1] [docket A-94-65, item IV-J-8] As a published paper, it was subjected to the same peer review policy as all other papers submitted to this journal. The fact that, after meeting the peer review requirements of the journal, it was published without changes confirms its technical merit.

Comment: Two commenters in four letters (CP-IV-D-35k, AIM-IV-D-212, AIM-IV-D-212p5/CP-IV-D-35v, AIM-IV-D-177) expressed concern with EPA's definition of potential to contribute to ozone in the Report and in the article "Scientific Basis of the VOC Reactivity Issues Raised by Section 183(e) of the Clean Air Act Amendments of 1990" by EPA's Dr. Basil Dimitriades.[1]

This same commenter in another letter (AIM-IV-D-212p5/ CP-IV-D-35v) asserted that the definition of "potential" should not include any and all VOC which could have a capability to form ozone. The commenter claimed that this definition of "potential" would mean that any insignificant amount of VOC, no matter how

small, could be said to have some "potential" to form ozone which the commenter believes to be incorrect. In the commenter's view, potential to contribute to ozone nonattainment should be defined to mean only the VOC which have the ability to cause ozone nonattainment directly. For example, if only a small amount of VOC is emitted from consumer and commercial products and a large amount of VOC is emitted from biogenic sources and if the emitted biogenic VOC are sufficient by themselves to cause ozone nonattainment, then the commenter claimed that VOC from consumer and commercial products do not have the "potential" to contribute to ozone attainment.

Response: The EPA disagrees with the commenter's contention that biogenic VOC have more potential to contribute to ozone nonattainment than anthropogenic VOC simply because biogenic VOC are present in larger quantities and that VOC from consumer and commercial products therefore have no "potential" to contribute to ozone nonattainment.

The EPA disagrees with the commenter’s view that the potential to contribute to ozone nonattainment should be defined to mean only the VOC which have the ability to cause ozone nonattainment directly. The EPA believes that such an interpretation is inconsistent with Congress’s intent in enacting the section 183(e) program. Congress recognized that small quantities of VOC emissions from a very large number of products add up -- and together make up a significant portion of ozone-forming VOC emissions. Congress created the 183(e) program to reduce the aggregate VOC emissions from consumer and commercial products. Of the remaining uncontrolled emissions from VOC sources, consumer and commercial products represent a significant fraction of anthropogenic VOC emissions (28 percent). Consumer and commercial products, therefore, are a significant source that warrants regulation. The Agency believes that Congress expressly recognized this significance when it directed EPA to regulate VOC emissions from consumer and commercial products in section 183(e) of the Act. The study the Agency conducted

confirms this conclusion. The Agency believes that section 183(e) of the Act explicitly directs EPA to assess the "potential" of consumer and commercial product VOC to form ozone and hence to contribute to violation of the ozone NAAQS, and that its reading of this term is correct.

The EPA also notes that the fact that biogenic or other sources of VOC may be present in larger quantities than consumer and commercial product VOC in some circumstances does not preclude consumer and commercial product VOC from contributing to ozone nonattainment. Even if the ozone NAAQS could be exceeded without the addition of consumer and commercial product VOC, EPA considers consumer and commercial product VOC to have the "potential" to contribute to ozone nonattainment when the addition of consumer and commercial product VOC can cause ozone formation to increase.

2.3 EPA's REGULATORY STRATEGY

2.3.1 National Rule Versus Other Strategies

Issue Overview: This subsection provides a general summary of the commenter's rationale and positions. Some commenters questioned whether EPA is using the appropriate regulatory strategy in its implementation of section 183(e) of the Act, expressing the following concerns. First, commenters asserted that existing control technology available to nonattainment areas is all that is needed for many of these areas to reach attainment. For this reason, they believe it is not necessary to subject these areas as well as attainment areas to nationwide requirements. Second, commenters asserted that if VOC regulation is necessary, it should be done using a CTG[a] rather than a national rule because national VOC controls would be ineffective.

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[a]Although not specifically defined in the Act, a CTG is a guidance document issued by EPA which, under section 182(b)(2) of the Act, triggers a responsibility for States to submit reasonably available control technology (RACT) rules for stationary sources of VOC that are covered by the CTG as part of their State Implementation Plans (SIP).

The commenters argued that national rules would be ineffective because the ozone problem is complex with ozone response to precursor control varying from area to area, thereby requiring varying controls in different areas of the country. Finally, commenters asserted that even if national rules are developed, section 183(e) of the Act does not provide EPA authority to regulate attainment areas in addition to nonattainment areas.

2.3.1.1 Necessity of Additional National VOC Rules

Comment: One commenter submitted three documents (AIM-IV-D-212p6/CP-IV-D35t, AIM-IV-D-212, AIM-IV-D-49) asserting that EPA should not issue regulations applicable to attainment areas plus marginal and moderate nonattainment areas. The commenter suggested that historical designation trends, a report prepared by the OTA of the U.S. Congress, and the section 185(b) report to Congress (attached in part as CP-IV-D-35t3/CP-IV-D-35b/AIM-IV-D-212m/AIM-IV-D-212p6c) all supported the argument that current nonattainment areas will reach attainment under present regulations using existing technology without additional regulations under section 183(e) of the Act. The commenter (AIM-IV-D-212) noted that several nonattainment regions were recently redesignated as attainment areas (including the Bay Area Region in California). The commenter stated that control of consumer and commercial products was not necessary for these areas to achieve attainment because the redesignation occurred under existing regulations.

Another commenter (AIM-IV-D-82) contended that there is no health-based justification for controlling VOC emissions in attainment areas and therefore, that VOC-content standards should be limited to nonattainment areas and nationwide standards should be precluded.

Response: The EPA agrees that the degree of VOC reductions necessary to prevent exceedances of the ozone standard varies regionally. However, it does not agree with the commenter's conclusion that regulations applying to both attainment and nonattainment areas under section 183(e) of the Act are

unnecessary or inappropriate. To achieve effective control of VOC emissions in nonattainment areas from consumer and commercial products such as architectural coatings, automobile refinishing products, and household consumer products, a nationwide regulation targeting the manufacturers of these consumer and commercial products is expected to be an effective and efficient control strategy. A national rule which focuses on manufacturers and importers is an effective approach for reducing emissions from consumer and commercial products which are easily transportable and widely distributed to consumers and contractors for use in locations which vary from day to day. Although many areas of the country are currently in attainment of the ozone NAAQS, EPA believes that it has the authority under section 183(e) of the Act to impose VOC requirements nationwide to reduce emissions in nonattainment areas more effectively.

Although the commenter included the Bay Area Region in California as an example of a nonattainment area that was able to achieve attainment status without reductions from EPA's national VOC rules, it should be noted that the Bay Area was redesignated as an attainment area in June 1995 due to air quality gains resulting from both regulatory and voluntary measures at the Federal, State, and local levels. State and local rules in the Bay Area already include VOC requirements on all three of the sources for which EPA plans to issue national rules: architectural coatings, automobile refinish coatings, and household consumer products. The EPA notes that the State and local rules include standards that are more stringent than those set forth in the regulations developed by the Agency. Despite these efforts, the Bay Area has experienced 43 exceedances and 17 violations of the 1 hour ozone standard since being redesignated to attainment in June 1995. In December 1997, EPA proposed to redesignate the Bay Area from attainment to nonattainment of the 1-hour ozone standard because of these violations.

The EPA notes that many existing nonattainment areas have identified the control of consumer and commercial products, such as architectural coatings, automobile refinish coatings, and household consumer products, in their strategies as an important means to reduce VOC emissions to attain the ozone NAAQS. In fact, the OTAG included in its June 1997 recommendations to EPA, a recommendation that EPA continue to develop, adopt and implement stringent national control measures that meet or exceed emission reduction levels specified by OTAG.[b] In the case of automobile refinish coating, consumer products, and architectural coatings, the group recommended future control requirements in the year 2003 to achieve reductions beyond those expected from these rules in 1998.

2.3.1.2 Appropriateness of Additional National Volatile Organic Compound Rules

Comment: One commenter (AIM-IV-D-212) asserted that EPA was inconsistent to redesignate nonattainment areas that achieved the ozone NAAQS as attainment areas and then to subject such areas to national consumer and commercial product rules. By contrast, another commenter (AIM-IV-D-32) noted that 10 years from now the Portland, Oregon, area is expected to face further growth in the emission of ozone precursors, and will need to develop a new round of control measures for the following decade. The commenter asserted that VOC reductions produced by Federal control measures will reduce the demand for new local rules at that time and will thus help alleviate ozone nonattainment in the future.

Response: The EPA disagrees that it is inconsistent for the Agency to require VOC reductions from products nationwide where some of those products will be sold in attainment areas. As explained in sections 2.3.1.1 and 2.3.1.5, a national rule which

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[b]OTAG is a group made up of State, Federal, industry organizations and environmental groups charged by EPA with developing consensus recommendations regarding implementation of the Act as amended in 1990 related to ground-level ozone problems in the United States.

focuses on manufacturers and importers is an effective approach for reducing emissions from consumer and commercial products which are easily transportable and widely distributed to consumers and contractors for use in locations which vary from day to day. A national rule helps to eliminate the potential problem of noncompliant materials being transported into an area with controls. A rule applicable only to selected areas would thus cause significant enforcement problems as noted by one commenter. It also helps to eliminate problems for manufacturers in the tracking and distribution of products. Consequently, EPA has determined that nationwide regulation of the manufacturers of certain consumer and commercial products including automobile refinish coatings, architectural coatings, and household consumer products is the most effective and efficient regulatory strategy to achieve reductions in VOC emissions from these categories of products in nonattainment areas. As discussed elsewhere in this BID, EPA has authority to regulate both nonattainment and attainment areas (including recently redesignated areas) to achieve these reductions under section 183(e) of the Act.

In addition, after nonattainment areas achieve attainment, these areas must develop plans to demonstrate maintenance of the ozone NAAQS over the long term. The EPA believes that the rules designed to reduce ozone nonattainment will have the incidental benefit of assisting areas that to maintain compliance with the NAAQS. Maintenance of the ozone NAAQS may require additional control measures, particularly as areas grow in population and in economic prosperity. To accommodate growth, therefore, EPA believes that additional controls of existing sources may be necessary as well as requiring that emissions from new sources are minimized. Since the VOC emissions from consumer and commercial products are related to population, for areas to remain in attainment as population increases, regulation of the VOC emissions from consumer and commercial products may be useful. The EPA agrees with the second commenter that these rules will have the additional benefit of further reducing VOC

emissions and hence the potential need for more ozone control measures in the future in certain areas.

2.3.1.3 Use of Control Techniques Guidelines

Comment: One commenter (AIM-IV-D-177) stated that, if VOC emissions from consumer and commercial products really did need to be controlled, a CTG would be the only appropriate regulatory solution. Another commenter (CP-IV-D-34) does not want national rules or CTGs but Federal regulations that apply only to products that contribute to ozone formation in ozone nonattainment areas.

Eight commenters (AIM-IV-D-33, AIM-IV-D-28, AIM-IV-D-93, AIM-IV-D-161, AIM-IV-D-162, CP-IV-D-11, CP-IV-D-13, CP-IV-D-33) expressed their support for national rules over a CTG approach. One commenter (AIM-IV-D-28) acknowledged that, under the national rule, some manufacturers that distribute products exclusively within an attainment area will encounter unintended regulatory costs. However, three commenters (CP-IV-D-11, CP-IV-D-13, CP-IV-D-33) stated that national rules are an effective way to reduce VOC from the consumer products category. One commenter (CP-IV-D-11) supported national rules because they enable the control of VOC emissions in both attainment and nonattainment areas. The latter commenter stated that issuing CTGs in lieu of national regulations would require that States with ozone nonattainment areas adopt minimum requirements for those specific nonattainment areas. According to the commenter, this approach would discourage States from implementing a statewide regulation and would, therefore, result in fewer emission reductions.

Two commenters (AIM-IV-D-28, CP-IV-D-11) also pointed out that recent meteorologic studies indicate that ozone precursor emissions (i.e., VOC and NO_X) in attainment areas contribute to ozone exceedances in nonattainment areas and that this justifies controlling VOC in both attainment and nonattainment areas. A third commenter (AIM-IV-D-96) noted that national rules will aid in reducing anthropogenic VOC emissions which are partially responsible for ozone formation and the exceedance of the ozone NAAQS across the country. This commenter also asserted that

national rules will also help to reduce the amount of precursor VOC transported from ozone attainment areas into nonattainment areas throughout the country.

In addition, another commenter (AIM-IV-D-28) stressed that a CTG approach would not preclude the use of "non-compliant" products in nonattainment areas as well as a national rule and therefore might not achieve any environmental gains. Another commenter (AIM-IV-D-32) argued that a national rule would be more effective than equivalent State or local measures because it eliminates the problem of noncomplying materials leaking through the boundary of an area with State or local controls.

One commenter (CP-IV-D-13) stated that a CTG is not an effective way of adopting limits for consumer and commercial products. Another commenter (AIM-IV-D-33) pointed out that a CTG approach is more appropriate for high volume emitters which are more likely to be found in nonattainment areas, and have easily definable sources and processes.

One commenter (CP-IV-D-11) stated that a CTG-based approach would also complicate both rule development and rule enforcement as it is possible that each nonattainment area could adopt slightly different regulations. One commenter (AIM-IV-D-162) explained that many facility owners and manufacturers operate and distribute in different States, and multiple CTGs would create numerous compliance difficulties.

Another commenter (AIM-IV-D-28) stated that distribution-based products, such as architectural coatings, should be regulated on a national basis because under a CTG approach national producers would have to maintain multiple product lines and therefore would incur an unnecessary economic burden. One commenter (CP-IV-D-13) also stated that national rules would provide product manufacturers with consistent regulatory requirements rather than relying on State-specific interpretation of a CTG.

One commenter (AIM-IV-D-161) preferred a national rule because having multiple regulatory authorities with many

variations of rules would produce needless complexity. To maintain competitiveness in response to this array of regulations, companies might be forced to offer different formulations in different parts of the country. Because each regulatory authority can modify the VOC content limits and disrupt long term planning, companies would find it more challenging to maintain an effective research and development program. The commenter also explained that manufacturers cannot always control where the product will ultimately be sold because distribution from the manufacturer to the final sales location frequently occurs through a central warehouse owned by a distributor, chain, mass merchandiser, etc. For most manufacturers control of the final destination of the product is impossible. Thus, products can be shipped without a manufacturer's knowledge into areas where the product does not meet the local regulatory limit.

Another advantage of national rules, according to this commenter (AIM-IV-D-161), is that for manufacturers and raw material suppliers the financial return from research and development activities is improved when those activities result in products with potential for broad distribution throughout the nation. For example, the commenter noted that in recent years with the anticipation of a national architectural coatings rule, raw material suppliers have been actively striving to provide lower VOC alternative technologies for many of the higher VOC traditional coatings and to solve the problems previously associated with lower VOC technologies. These activities have reduced the cost of lower VOC technologies for all manufacturers, because the sales volume of low VOC technologies can now be anticipated to be significantly higher.

The commenter (AIM-IV-D-161) also contended that adoption of national rules will substantially reduce the costs associated with complying with a large number of differing State and local regulations. The commenter explained that State, regional, and local districts hold meetings and workshops to discuss possible

rules and amendments to existing rules which the regulated community must participate in to provide a full input into the regulatory process. Average cost for participating in one such meeting with travel and manpower expense totaled can be as much as $1,667. Each State, region, and district may have numerous such meetings for each proposed rule or amendment. Even after the rule development process, the commenter noted that there are additional costs associated with informing local personnel and customers of the rule provisions and impact. Expand this to include numerous regulatory authorities throughout the country plus all of the additional nonattainment areas which would need to adopt a CTG and the costs of CTGs instead of national rules can become enormous to each regulated company.

The commenter (AIM-IV-D-161) explained that the necessity to develop and maintain inventory and distribution tracking systems is a significant cost burden for manufactures. Because of the complexity and variety of the rules adopted by numerous regulatory authorities, manufacturers need complex computer programs to manage the distribution of product. Such complex management systems can cost between $250,000 and $500,000 and require sophisticated computer expertise as well as constant data management. As each new product is developed, it must be evaluated for compliance with each of the regulatory requirements throughout the country.

The commenter (AIM-IV-D-161) asserted that the cost burden associated with complying with all of the different State and local regulations can be reduced by adoption of national rules. The commenter asserted that these costs will escalate astronomically if EPA adopts a CTG because then each nonattainment area will need to adopt a rule which frequently results in rule variations and differences in rule interpretations.

The commenter (AIM-IV-D-161) noted that complying with the significant number of rule variations and variations in rule interpretations throughout the country is a technical,

administrative, and logistic problem. Adoption of CTGs will continue and increase the complexity of this situation because CTGs require each nonattainment area to formally adopt rules with limits at least as stringent as the CTGs. During the adoption process various areas may adopt rules with different variations creating a complex situation requiring a complex and expensive computer system and full-time staff dedicated to compliance determinations to manage products. Smaller companies doing business in multiple locations would be at a particular disadvantage keeping informed and managing the informational needs.

Response: In exercising its discretion to consider a CTG as a regulatory alternative under section 183(e) of the Act, EPA recognizes that its specific purpose is to reduce emissions of VOC in ozone nonattainment areas and in some cases a CTG can be substantially as effective as a national regulation, particularly for some of the commercial products scheduled for regulation under section 183(e)of the Act. In fact, in some instances, a CTG may be more effective because it can target end users rather than suppliers of the product and, therefore, can base emission reductions on add-on control technologies, application equipment specifications and work practice standards. A national rule, on the other hand, is limited to requirements on the manufacturers, processors, wholesale distributors, or importers of consumer or commercial products and thus precludes many effective strategies permissible with a CTG approach.

The EPA's position for establishing nationwide rules for consumer products, automobile refinish coatings, and architectural coatings rather than CTGs is summarized in section 2.3.1.5 and its rationale is discussed in the notice of final listing of these products (section II.C.2 of the notice). For these types of consumer and commercial products, which are highly transportable and are used in locations which vary from day to day, EPA believes that regulations which target products used solely in nonattainment areas, such as through a CTG or a

Federal rule that only applies in nonattainment areas, will not be as effective as a national regulation targeting all manufacturers of all the products. This is because the transportability of the products tends to decrease rule effectiveness due to the likelihood of unregulated or "higher VOC" products being bought in attainment areas and used in nonattainment areas. In contrast, a national regulation that applies to products in both attainment and nonattainment areas could require modification of the products everywhere. The EPA believes that this could prove critical to ensure effective enforcement and implementation of VOC controls in all areas. For consumer and commercial products used primarily by homeowners, contractors, and a wide variety of other types of consumers, effective enforcement of requirements for the product would be much more difficult than for a national rule because of the potential transport of products from attainment to nonattainment areas. The EPA believes that it would be difficult and inefficient to enforce a ban on the importation of noncomplying products into nonattainment areas because of the easy transportability of such products, limitations on enforcement resources, and the sheer number of products involved. Furthermore, as noted by several commenters and as discussed in section 2.3.1.5 of this BID, the EPA believes that regulations targeted only at nonattainment areas could impose significant additional burdens upon regulated entities to achieve the goals of section 183 (e). In addition, since the ability for a CTG to require add-on controls, work practices, and equipment specifications for architectural coatings and household consumer products is limited or nonexistent, one of the key potential advantages of a CTG approach would not be realized for these product categories.

The EPA notes that a number of commenters raised points that EPA considers valid but are not independently forming the basis for the Agency's decision (e.g. desire to ensure ozone NAAQS attainment nationwide, and the desire of manufacturers to have

more uniform standards across the nation). The EPA considers these incidental benefits that help provide additional justification for the Agency's actions.

Comment: One commenter in two documents (AIM-IV-D-212, AIM-IV-D-212p6/CP-IV-D-35t) referred to the section 185(b) report to Congress, which the commenter claimed demonstrated that a nationally based control approach, NO_X-only, VOC-only, or NO_X and VOC, was not likely to be an efficient means for reducing ozone everywhere. The commenter acknowledged that the ozone problem was complex, and response to precursor control could vary greatly with each area. The commenter asserted that even EPA concluded that national rules may not be productive in controlling ozone.

The commenter in three documents (AIM-IV-D-212, CP-IV-D-35, AIM-IV-F-1d) also cited findings of the Southern Oxidants Study which indicated that in the South, VOC controls would be ineffective and NO_X controls would be more effective in decreasing ozone. The commenter concluded that a "one size fits all" rule is not appropriate if the goal was regulating only those consumer and commercial product VOC emissions that contribute to ozone levels which violate the ozone NAAQS.

The commenter (CP-IV-D-35m) stated that national VOC controls are wrong scientifically and should not be promulgated. The commenter in two documents (AIM-IV-F-1d, CP-IV-F-1a) quoted an EPA scientist (Dr. Basil Dimitriades) who raised questions about national VOC control in an article in “Environmental Week” (AIM-IV-D-212d). According to the commenter, the article stated that regional or metropolitan ozone attainment strategies might be more productive than nationwide strategies. According to the commenter, Dr. Dimitriades based this statement on studies which indicated that in some areas, and under certain conditions, NO_X control was more effective than VOC control.

Response: The commenter is correct that the section 185(b) report to Congress noted that a nationally based control approach, whether NO_X only, VOC only, or combined VOC and NO_X, may not be an efficient approach for reducing ozone everywhere.

This conclusion is not the same as saying that no national regulations are appropriate. Rather, this conclusion means that it would be inefficient for EPA to mandate control of VOC everywhere to the exclusion of NO_X, or vice versa. In addition, it would be inefficient to limit control strategies to national approaches since some regional or local controls may be more beneficial. Extending the commenter's argument to its logical conclusion would imply that the report suggests that national emission standards for automobiles are not effective. This suggestion is not an appropriate conclusion to draw from the section 185(b) report to Congress since State-by-State regulation of automobiles would complicate distribution and enforcement, thereby creating problems for manufacturers, regulators, and consumers.

It is also not appropriate to conclude from Dr. Dimitriades remarks that national VOC rules are inappropriate. Dr. Dimitriades remarks are correct that in some areas, and under some circumstances, NO_X control may be more effective than VOC control and that regional or metropolitan strategies might be more productive. As noted above, there are other factors that influence the effectiveness of different control strategies. Dr. Dimitriades remarks are premised on the assumption that the regional or metropolitan strategies are not complicated by transport of noncompliant materials or products from neighboring areas and States. Consequently, decisions on control strategies must also include consideration of practical enforceability of different strategies as well as potential for creating distribution problems for manufacturers and for consumers.

The EPA believes that a combination of Federal, State and local measures is the best strategy for areas to achieve ozone precursor reductions. In the case of consumer and commercial products such as architectural coatings, State representatives have recommended that EPA develop and implement Federal control measures to augment their implementation plans. States recommend national rules because they can supplement local programs and are

critical to reducing compliance problems associated with transport of noncompliant consumer and commercial products into nonattainment areas from neighboring areas and neighboring States. An added benefit is that Federal national rules save State resources which then can be devoted to local regulatory development efforts to reduce emissions which contribute to ozone within a particular State.

As discussed in section 2.3.2, EPA believes that both VOC and NO_X control strategies are needed to help areas attain the ozone NAAQS. Although there may be areas where VOC control is not needed to attain the ozone NAAQS, section 183(e) of the Act gives EPA the authority to establish national standards in both attainment and nonattainment areas in order to more effectively reduce those VOC emissions from commercial and consumer products which occur in nonattainment areas.

2.3.1.4 Most of the Nation is Already in Attainment

Comment: One commenter (AIM-IV-D-212) alleged that it is senseless to submit the entire nation to VOC emission reduction rules for controlling ozone when most of the nation has already attained the ozone standard. The commenter (AIM-IV-D-212) referred to figure 1-1 on page 6 of the Office of Technology Assessment report, "Catching Our Breath: Next Steps for Reducing Urban Ozone."[4] The map showed that the areas in the country that were in attainment represented a greater portion of the nation than those areas in nonattainment. The commenter concluded that nonattainment was thus a regional and a local problem not a national one. The commenter (AIM-IV-D-212) cited EPA's National Air Pollutant Emission Trends, 1990-1994, Report (Trends Report) that reflected that of the total of 6,313,000 tons of emissions from solvent utilization, 73 percent were emitted from sources in only 17 States. The commenter contended that the Trends Report indicated that sources in 16 States emit a very small amount of solvents per year, and several States (e.g., Alaska and Hawaii) did not have any sources of solvent emissions. Because only a few areas of the country were affected by the VOC from consumer

and commercial products, the commenter contended national rules were not appropriate. Another commenter (AIM-IV-D-16) stated that it was senseless for EPA to apply rules for achieving the ozone NAAQS in areas that are already in attainment.

Response: The EPA maintains that it is appropriate for the Agency to regulate VOC emissions from products sold in attainment areas to reduce their potential to contribute to ozone nonattainment and to protect the public health and welfare generally. As of May 9, 1997, 90 areas are designated as ozone nonattainment areas. These areas are located primarily in Southern California, the Northeastern United States, and around the Great Lakes. Although they comprise a small fraction of the nation's total land mass, over 111 million people or 42 percent of the nation's population live in these nonattainment areas. As population increases and economic growth occurs, it is expected that even more areas will be in need of VOC reductions to reach attainment or to maintain attainment status.

As discussed in section 2.3.1.5 of this document, EPA has authority to regulate manufacturers and distributors in both attainment and nonattainment areas to ensure effectiveness of the reductions achieved in nonattainment areas. In addition, modeling often indicates high emission reduction targets may be necessary to meet the ozone NAAQS in the nonattainment areas. Some States have run out of effective control activities on the local level and may require additional measures, including national rules, to reach attainment.

Although the commenter claimed that the Trends Report reported that several States (Alaska and Hawaii) had no VOC emissions from solvent utilization, the emission estimates for Alaska and Hawaii included only onroad vehicle and fossil-fuel steam electric utility emissions. Rather than indicating no emissions from solvent usage, the report indicated no data were available for these two States. The Agency also believes that the commenter missed the larger issues presented in the Trends Report such as the continued persistence of ozone nonattainment,

the number of people exposed to unacceptable levels of ozone, and the serious health effects of exposure to excessive ozone.

Comment: One commenter (AIM-IV-D-212) asserted that to impose regulations on attainment areas was inconsistent with the economic and scientific facts. The commenter referred to table 1-39 and figure 1-8 of The Rauch Guide to the U.S. Paint Industry (AIM-IV-D-212l). The commenter concluded that areas with a high volume of paint shipments and sales experienced a high number of ozone exceedance days. The commenter stated that 60 percent of all paint shipment and sales occurred in 14 States and more than 30 of the remaining States had little or no involvement with the ozone problem. The commenter implied that EPA should regulate paint VOC emissions only in the 14 States where the bulk of paint shipment and sales occurred rather than promulgating a national rule.

Response: The Rauch Guide cited by the commenter relates shipments and sales to the locations where paint is manufactured and not to the locations where paint is used. Section 183(e) of the Act does not regulate emissions from the manufacturing of architectural coatings or other consumer and commercial products, rather, it targets emissions from the products themselves, since the products will be introduced into commerce and therefore potentially emit VOC in nonattainment areas. Therefore, the location of manufacturing plants is irrelevant for purposes of the regulations under this section.

Comment: Four commenters in five letters (AIM-IV-D-02, AIM-IV-D-08, AIM-IV-D-26, AIM-IV-D-82, CP-IV-D-34) opposed national rules for consumer and commercial products because they would be costly and would impose an unnecessary burden on consumers and businesses in attainment areas. Three commenters in four letters (AIM-IV-D-02, AIM-IV-D-26, AIM-IV-D-82, CP-IV-D-34) provided three examples of these costs and burdens. The first commenter (AIM-IV-D-02) stated that a national rule would place a formulation burden on hundreds of small businesses that manufacture and sell consumer and commercial products only

in attainment areas and, therefore, do not contribute to exceedance of the ozone NAAQS. The second commenter (AIM-IV-D-26) stated that consumers in attainment areas would be forced to forego the benefits of lower cost, higher quality products. The third commenter (AIM-IV-D-82, CP-IV-D-34) submitted two letters contending that EPA has not fully considered in recent rulemakings the impacts its rules have on raw material producers selling raw materials in attainment areas. The commenter (AIM-IV-D-82) cited the automotive refinishing rule as an example. The second commenter (AIM-IV-D-26) also argued that national rules benefit large manufacturers because of the economy of scale derived from large judiciously located manufacturing plants. For these reasons the commenters contended that VOC-content standards for consumer and commercial products should be limited to nonattainment areas and nationwide standards should be precluded.

In contrast, three commenters (AIM-IV-D-30, AIM-IV-D-117, CP-IV-F-1g) argued that national rules for consumer and commercial products would be beneficial to everyone -- both attainment and nonattainment States and both national and regional manufacturers. One commenter (AIM-IV-D-30) stated that a multitude of regulations, from individual States and on a national basis, create an environment that made doing business very difficult for a national or regional company. As a result, the commenter urged EPA to include as many State concerns in its rule making as possible. The commenter also noted that the release of VOC is the same regardless of location and all businesses should have to meet the same emission requirements. Another commenter (AIM-IV-D-117) stated that timely and firm action by EPA is needed to control emissions from architectural coatings because State-by-State control in the Mid-Atlantic region is ineffective and the ozone nonattainment areas in this region cannot meet their attainment deadlines without strong national rules in place.

Response: The Agency believes that a national rule that regulates products manufactured for sale and distribution in both attainment and nonattainment areas is necessary to ensure the reduction of VOC emissions from products that are easily transportable and used by a wide variety of consumers in an infinite number of locations, such as is the case with the consumer products rule. The Agency's rationale for issuing national rules is discussed in depth in section 2.3.1.5 of this BID.

The EPA agrees that a single national regulation for a category of products is preferable to a patch work of differing regulations that will cause tracking and distribution problems for regulated entities and will pose administrative and enforcement problems for the Agency and for States. The EPA notes, however, that some States may still exercise their option to enact more stringent regulations to address more localized ozone problems.

With respect to the specific comments on potential cost impacts of rules, EPA disagrees that these factors raise issues for consideration at the time of the Study. The EPA examines the economic impacts of regulations at the time of rulemaking because it is only at that point that it is possible to evaluate such impacts. In this case, the commenter presupposed that there are significant adverse economic impacts of any rule. The EPA does not agree that it is possible to anticipate the economic impacts and benefits of any rules issued under section 183 (e) of the Act in advance of development of the rules. The EPA has considered the economic impact of the proposed standards for the automobile refinish coatings rule, the consumer products rule, and the architectural coatings rule in the rulemakings on these standards rather than in the study.

Comment: One commenter (AIM-IV-D-212) stated that in applying the same regulations nationally, EPA failed to recognize meteorological and climatic differences that may affect air quality. The commenter used Southern California as an example.

According to the commenter, Southern California has low wind speeds, summertime maximum mixing height averages that are the lowest in the U.S., and abundant sunshine. The commenter stated that few other areas in the nation have similar geography and meteorological conditions, yet EPA would impose the same rules across the country even though emissions of ozone precursors vary considerably among the major metropolitan areas.

Response: The EPA's goal in developing national rules for certain categories of consumer and commercial products is to control effectively emissions from these products in all nonattainment areas. The Agency's goal is the same for the entire nation, regardless of the local climate or meteorological conditions of particular areas which helped contribute to their nonattainment status. These factors entered into the Agency's consideration of what constitutes "best available controls" or "BAC." For example, EPA did not choose one of the options considered for BAC for coatings in the automobile refinish coatings rule due to limitations in drying times for certain products in humid and cold areas of the country. More to the point, EPA did not determine that BAC for architectural coatings would be a rule equivalent to that necessary or appropriate only for Southern California.

The EPA agrees with the commenter that certain areas of the country may need more stringent air quality requirements that go beyond current requirements at the national level. This is already the case for requirements in Southern California for both architectural coatings and automobile refinishing. For both of these product categories, the SCAQMD of Southern California has some of the most stringent VOC requirements in the country. The success of those regulations at targeting VOC reductions and the ability of manufacturers to meet those VOC limits are among the factors that EPA has taken into account in the development of national rules. The EPA did not, however, believe that equivalent rules would be appropriate nationwide under current BAC analysis.

2.3.1.5 Authority to Regulate Attainment Areas

Comment: Five commenters in nine documents (CP-IV-D-35, AIM-IV-D-55, AIM-IV-D-82, AIM-IV-D-165, AIM-IV-D-08) AIM-IV-D-212, AIM-IV-D-214b/CP-IV-D-07b, AIM-IV-D-214c, CP-IV-F-1a) stated that section 183(e) of the Act authorizes regulation of VOC only in ozone nonattainment areas. The commenters asserted that section 183(e) of the Act does not authorize a national VOC emission standard. Two commenters (AIM-IV-D-82, AIM-IV-D-212) stated that EPA misinterpreted the Act and was authorized to issue CTGs or promulgate regulations concerning VOC in consumer and commercial products applicable only to nonattainment areas. One commenter (AIM-IV-D-82) stated that if Congress intended section 183(e) of the Act to apply to both attainment and nonattainment areas, it would not have authorized EPA to use CTGs, which apply only to nonattainment areas. Therefore, the commenter reasoned that EPA is precluded from regulating emissions in attainment areas.

One commenter (AIM-IV-D-212p6/CP-IV-D35t) asserted that a national rule to control architectural coatings was contrary to the express language of section 183(e) of the Act, and contrary to Congressional intent as well. Two commenters in three documents (AIM-IV-D-212p6/CP-IV-D35t, AIM-IV-D-212, AIM-IV-D-49) referred to the legislative debate pertaining to Senate Conference Report 1630, as set forth in the Congressional Record, which allegedly reflected that it was the intent of Congress that these rules be applied only in nonattainment areas. The first commenter in two documents (AIM-IV-D-212, AIM-IV-D-212p6/ CP-IV-D-35t) asserted that the intent of Congress was to focus primarily on areas classified as severe and extreme.

One commenter (CP-IV-D-34) questioned whether EPA has authority under section 183(e) to regulate products in areas that do not exceed the ozone NAAQS. The commenter stated that the structure and language of the Act suggests that Congress intended EPA to regulate consumer and commercial products that have an impact on ozone nonattainment areas only. Another commenter

(AIM-IV-D-08) urged EPA to evaluate other alternative methods to control ozone in the noncompliant areas. The commenter preferred regulations that applied only to nonattainment areas.

Response: The EPA disagrees with the conclusion of the commenters that section 183(e) of the Act does not permit the Agency to promulgate rules that apply to both attainment and nonattainment areas. The EPA interprets section 183(e) of the Act to permit the Agency to promulgate rules that apply nationwide. The EPA bases this interpretation both upon the statutory language of section 183(e), and upon the Congressional directive to utilize any system or systems of regulation necessary to achieve the appropriate reductions. In particular, the EPA believes that the transportability of products and the difficulties attendant upon tracking their ultimate place of use compel the nationwide scope of the final rule for consumer products, architectural coatings and automobile refinish coatings.

First, the express statutory language of section 183(e) of the Act does not preclude regulation of products in attainment areas. To the contrary, in section 183(e)(2)(A) and section 183(e)(3)(A)of the Act, Congress explicitly directed EPA to examine VOC emissions "into the ambient air" without restriction regarding whether such air was in attainment or nonattainment areas. Moreover, EPA believes that no such distinction between attainment and nonattainment areas is appropriate because section 183(e)(2)(A)(ii) of the Act requires EPA to assess the "potential to contribute" to ozone NAAQS violations wherever they may occur. Although commenters argued that the “potential to contribute” clause links the VOC emissions only to those products used in nonattainment areas, EPA believes that the language of the statute compels no such reading and that it would be illogical given that VOC emissions in attainment areas can contribute to nonattainment in adjoining nonattainment areas.

In section 183(e)(3)(A) of the Act Congress also explicitly granted EPA broad powers to reduce emissions into the ambient air in order to combat ozone nonattainment. These powers provided that to meet the objectives of section 183(e), EPA may "by regulation, control or prohibit any activity, including the manufacture or introduction into commerce, offering for sale, or sale of any consumer or commercial product which results in emission of [VOC] into the ambient air." In section 183(e)(4) Congress explicitly provided that to meet the objectives of the provision, EPA may "include any system or systems of regulation as the Administrator may deem appropriate." The EPA believes that Congress thereby granted the Agency discretion to determine which measures would best obtain reductions, including regulations, controls, or prohibitions, and to determine the appropriate geographical scope for such measures to achieve the goal of emissions reductions and ozone NAAQS attainment in nonattainment areas. Inherent in this authority is the power to determine that a national rule with nationwide applicability across both attainment and nonattainment areas is the appropriate means to obtain the requisite reductions.

In addition, section 183(e)(3)(A)of the Act expressly directs EPA to promulgate regulations that "require best available controls." In accordance with the definition of that term in the statute, EPA is to consider "technological and economic feasibility, health, environmental and energy impacts" and is to consider, among other things, "the most effective equipment, measures, processes, methods, systems or techniques" to obtain the reductions. The EPA believes that it is reasonable to conclude that Congress did not intend to preclude the Agency from taking into account the relative effectiveness of the available means to obtain reductions that would be applicable to all areas or only to nonattainment areas, and to make its determination as to the proper geographic scope of the rules based upon appropriate factors. The EPA has determined that national rules that apply nationwide to both attainment and

nonattainment areas are the best available controls to insure that reductions in VOC emissions occur for certain categories of products.

The EPA has concluded that a national rule is the more effective approach for reducing emissions from consumer products, automobile refinish coatings and architectural coatings for the following reasons. First, EPA believes that a national rule is an appropriate means to deal with the issue of products that are, by their nature, easily transported across area boundaries, widely distributed, and widely used by varied types of end-users, such as the general public and the building-trade contractors. For many such products, the end user uses them in different locations from day to day. Because the products themselves are easily transportable, a national rule would preempt opportunities for end-users to purchase such consumer and commercial products in attainment areas and then use them in nonattainment areas, thereby circumventing the regulations and undermining the decrease in VOC emissions in nonattainment areas. The EPA, therefore, believes that a national rule with applicability to products regardless of where they are marketed is a reasonable means to ensure that the regulations result in the requisite degree of VOC emission reduction.

Second, EPA believes that rules applicable only in nonattainment areas would be unnecessarily complex and burdensome for many regulated entities to comply with and for the Agency to administer. The potentially regulated entities under section 183(e) are the manufacturers, processors, wholesale distributors, or importers of consumer or commercial products. The EPA believes that regulations that would differentiate between products destined for attainment and nonattainment areas should adequately insure that only compliant products go to nonattainment areas. For such a rule to be effective, EPA believes that this would necessitate requiring regulated entities to track their products and control their distribution, sale, and

ultimate destination for use to insure that only compliant products go to nonattainment areas. The EPA notes that for architectural coatings and consumer products, regulated entities do not currently track or control distribution of their products once they sell them to retail distributors. Although the EPA recognizes that some product lines in some product categories may only be distributed regionally in areas that are already in attainment, the large majority of the product lines will be distributed nationally. Regulations targeted only at nonattainment areas could thus impose significant additional burdens upon regulated entities to achieve the goals of section 183(e).

By comparison, existing State regulations in some instances permit regulation not only of the types of entities which are regulated under section 183(e) of the Act, but also a broader range of entities including retail distributors and end users. Given the limitations of section 183(e) as to regulated entities, EPA believes that regulations applicable to both attainment areas and nonattainment areas is a reasonable means to ensure use of complying products where necessary, while avoiding potentially burdensome impacts and less reliable mechanisms to achieve the goals of section 183(e). Several of the trade associations of the industries for whom EPA has proposed national rules (i.e., architectural coatings, consumer products and automobile refinish coatings) have supported national rules that apply to all areas as the most efficient regulatory mechanism from the perspective of marketing and distribution of products. The EPA's consideration of this factor, however, is not meant to imply that it would be inappropriate for States to develop more stringent levels of controls where necessary to attain the ozone standard. Instead, the national standard is expected to reduce the number of States needing to develop separate rules for these categories.

Third, the EPA believes that national rules with nationwide applicability may help to mitigate the impact of ozone and ozone precursor transport across some area boundaries.

Recent modeling performed by OTAG and others suggests that in some circumstances VOCs emitted outside nonattainment area boundaries can contribute to ozone pollution in nonattainment areas -- for example, by traveling relatively short distances into neighboring nonattainment areas. The EPA has recognized the potential for VOC transport in the December 29, 1997, Guidance for Implementing the 1-hour Ozone and Pre-Existing PM_{10} NAAQS concerning credit for VOC emission reductions towards rate of progress requirements (see docket A-94-65, item IV-B-5). The guidance indicates that the EPA may give credit for VOC reductions within 100 kilometers of nonattainment areas. In addition, the June 1997 recommendations made by OTAG supported the EPA's use of VOC regulations that apply to both nonattainment and attainment areas to implement section 183(e) of the Act for certain products. The particular product categories OTAG cited for national VOC regulations are automobile refinish coatings, consumer products, and architectural coatings. The EPA believes that regulation of products in attainment areas is necessary to mitigate VOC emissions that have the potential to contribute to ozone nonattainment in accordance with section 183(e) of the Act.

The EPA notes that some commenters asserted that one clause in section 183(e)(3)(A) of the Act compels the conclusion that Congress intended EPA to regulate consumer and commercial products only in nonattainment areas. That subsection of the Act instructs EPA to list the products that account for 80 percent of the VOC emissions "from consumer or commercial products in areas that violate the NAAQS for ozone." The EPA believes that this clause pertains not to the scope of the regulations that EPA may choose to impose, but rather to the listing process itself. Thus, EPA believes that this provision of the statute requires the Agency to regulate the categories of products that account for 80 percent of the VOC emissions in nonattainment areas, but does not necessarily control whether EPA is to regulate such products only in nonattainment areas. Because EPA has otherwise

determined that a national rule with applicability in both attainment and nonattainment areas is the best means to obtain necessary VOC emission reductions intended by Congress, the Agency believes that the language in question does not preclude that strategy.

Finally, the arguments in this section supporting EPA's authority and rationale for regulating both nonattainment and attainment areas under section 183(e) of the Act are not intended to imply that EPA would not consider using its discretion to develop a CTG for a category in lieu of a regulation. The EPA recognizes that characteristics of distribution and use will vary among categories of products. Therefore, EPA intends to use its discretion to determine the most efficient and effective mode of regulation for each of the categories under section 183(e) of the Act.

Comment: One commenter (CP-IV-D-35) contended that by promising States a SIP emission reduction credit based on the forthcoming national regulation of consumer products, EPA may be forcing States to include the regulation of VOC from consumer products in their SIP plans with no consideration of whether or not VOC reductions from those products were necessary for that State to attain the ozone NAAQS.

Response: The EPA disagrees with the commenter's assertion that promulgation of national rules will "force" States to include consumer product regulations in their SIPs in order to get credit. States have theoption to seek SIP credit for VOC emission reductions within their jurisdictions. Each state's plans contain different assortments of measures to achieve the emission reduction goal that is designed to achieve the NAAQS or to maintain good air quality. These measures may include state or local requirements as well as federally implemented programs, such as standards for motor vehicles.

Since several section 183 (e) rules will be federally implemented and were initially expected to be finalized prior to 1996, EPA provided guidance to the states that in their SIP plans

they could “take credit” for the amount of reductions projected to be attributable to the nationwide rules. The EPA anticipates that many States with nonattainment areas will claim credit for the VOC emission reductions that will result from the regulations. For example, 14 states are currently relying on anticipated reductions in architectural coating VOC emissions from EPA’s national rule in their rate-of-progress plans. The EPA notes that nothing in section 183(e) of the Act precludes a State from enacting its own more stringent consumer product regulations and from seeking additional SIP credit for any resulting reductions. Some states, such as California, may need to implement more stringent standards to meet their air quality goals.

2.3.1.6 Role of National Rules in Achieving Uniform Regulation

Comment: One commenter agreed that although uniform commerce was a desirable goal, the commenter (AIM-IV-D-49) asserted that the proposed architectural coating regulations would not achieve uniform regulation across the States. Another commenter (AIM-IV-D-96) noted that legal problems could develop if States repealed their rules in favor of national rules that were less stringent than the State rules. The Act contains provisions that prohibit rolling back implemented control programs. As a result, portions of current State programs that are more stringent than those in national rules, are likely to remain in effect. Another commenter (AIM-IV-D-212) quoted from the 1990 Act Leg. Hist. (1177, 1268) to support the position that Congress viewed national uniformity as a government aspiration but not a legislative mandate. Two commenters in three documents (CP-IV-D-35, CP-IV-F-1a, AR-IV-F-1) stated that the goal of section 183(e) of the Act was preventing the exceedance of the ozone standard and not national uniformity in VOC regulations. Both commenters (CP-IV-D-35, AR-IV-F-1) argued that uniformity could be addressed through the State administration and State consultation provisions of section 183(e)of the Act.

Four commenters (AIM-IV-D-189, AIM-IV-F-1o, AIM-IV-D-185, AIM-IV-F-1k) supported a uniform national rule instead of local or regional regulation of ozone nonattainment areas only. Several commenters (CP-IV-D-10, CP-IV-D-40, CP-IV-D-42, CP-IV-D-44 to 46, CP-IV-D-48 to 56, CP-IV-F-1g, CP-IV-F-1k) stated that national rules bring consistency between State requirements and this consistency eases the burden on interstate commerce and reduces the difficulty of complying with different State and local regulations.

Twelve commenters (CP-IV-D-01, CP-IV-D-02, CP-IV-D-04, CP-IV-D-06, CP-IV-D-42, CP-IV-D-46, CP-IV-D-48 to 51, CP-IV-D-53, CP-IV-F-1j) stated that national rules ensure consistency in product formulations throughout the country. According to these commenters, national rules are more cost-effective for the manufacturers who will not need to develop multiple formulations for all their products to meet each state regulation. One commenter (AIM-IV-D-08) acknowledged that national rules bring some consistency to product formulation, labeling, and marketing and contended that national rules will not completely eliminate the problem because some State will maintain their own rules that may be more stringent than the national rules. The commenter contended that the costs for compliance under national rules will increase because there will be more products regulated than under existing State regulations.

Three commenters (AIM-IV-D-189, AIM-IV-F-1o, AIM-IV-F-1k) contended that a uniform national rule is consistent with Congressional intent and that Congress recognized the benefits associated with not disrupting interstate commerce with conflicting State regulations. One commenter (AIM-IV-D-185) stated that differing State standards clearly raised significant barriers to interstate commerce and created logistical difficulties for manufacturers. The commenter explained that when a patchwork of standards evolves under State initiatives, manufacturers need to produce different products for different State and local markets. In addition, manufacturers need to make

fundamental adjustments in the procurement of raw materials and packaging materials, in the preparation of promotional literature and bulletins, in production planning, and in notifications to the trade of pricing and other changes. The commenter encouraged expeditious action by EPA in finalizing the national architectural coatings VOC rule to promote uniformity nationwide and to relieve individual States of the need to develop unique standards.

One commenter (AIM-IV-D-189) urged States to follow the procedures of section 183(e)(9) of the Act, which requires that States first consult with EPA before developing rules that differ from the national rule. The commenter stated that this language is very broad and should be invoked if the State rule differed in any way.

Response: The EPA agrees that the main purpose of rules promulgated under section 183(e) of the Act is to reduce VOC emissions effectively and efficiently in nonattainment areas utilizing "best available controls." A side benefit of regulations that apply both in attainment and nonattainment areas, however, is that it promotes consistency in regulations, thereby reducing the administrative burden of complying with differing State standards. The EPA believes that the legislative history indicates that uniformity was an issue that Congress considered significant in its deliberations concerning section 183(e), even if it did not explicitly direct the Agency to ensure such uniformity. To date, consistency has already been promoted because many States which intended to develop their own regulations for categories of household consumer products as well as architectural coatings have instead relied on the forthcoming rules that apply nationwide. The EPA does not expect regulations issued under section 183(e) of the Act to provide complete uniformity in requirements across the country because some States may need to implement more stringent standards to meet their air quality goals. The consultation provisions of section 183(e)(9) of the Act are designed to promote uniformity in such cases where

States or local areas need to adopt requirements other than those promulgated by EPA. This section requires EPA to maintain and provide relevant information, studies, and regulations to any State who requests it. This service is expected to help States consider options for regulation which will be consistent with those existing in other States or local subdivisions. With regard to the commenters who raised the issue of states not rolling back existing State rules that are more stringent, EPA agrees that States cannot do so if there will be adverse environmental effects. The EPA does not anticipate, however, that areas with more stringent State rules will be encouraged to revoke them because they will continue to desire the emission reductions from such rules. The EPA anticipates that the promulgation of national rules may, however, minimize the need for additional States to enact consumer product rules.

2.3.2 Nitrogen Oxides Versus Volatile Organic Compounds Emissions Control Strategies

Issue Overview: This subsection provides a general summary of the commenters rationale and positions. Some commenters argued that VOC alone do not have the potential to cause exceedances of the ozone NAAQS and therefore, a Federal regulation to reduce VOC emissions is not justified. Since NO_X is the source of all ozone in the ambient air, according to the commenter any uniform Federal rules aimed at ozone abatement should control NO_X emissions, not VOC emissions from consumer and commercial products.

The commenter justified this position by pointing out that VOC alone in pristine air cannot form ozone. Ozone is formed only where NO_X is also present. Depending on the existing ratio of VOC to NO_X in local areas, the commenter asserted that reducing VOC emissions can have a variety of effects on ozone. Volatile organic compound emission reductions can increase ozone, decrease ozone, or have no effect. Therefore, a control strategy based on national emissions reductions of VOC will not be uniformly effective and is not justified. If national reductions

of precursor emissions are required by the Act, NO_X should be the target because all studies agree that substantial NO_X emission reductions will reduce ozone. The commenters argued that EPA should examine recent data and studies available since the enactment of the Act and conclude that VOC emissions from consumer and commercial products do not have any significant potential to contribute to ozone levels that violate the ozone NAAQS. The technical arguments supporting this position are included in the comments summarized in the following sections.

2.3.2.1 Control Strategy is Flawed: Nitrogen Oxide Control is Needed to Reduce Ozone

Comment: Two commenters asserted in six letters (AIM-IV-D-212, AIM-IV-D-212mm/ AIM-IV-D-212p6h/ CP-IV-D-35h/ CP-IV-D-35k3, AIM-IV-D-49, CP-IV-D-35k, CP-IV-D-35m, AIM-IV-D-177) that EPA's strategy is to reduce the peak ozone concentration by examining polluted air and determining the level of precursor emissions that must be removed to achieve attainment. The commenter argued that the only appropriate interpretation of section 183(e) of the Act is to determine which precursors can be added to pristine air and at what levels without exceeding the ozone NAAQS. The commenter claimed that this second interpretation would result in a NO_X-only control strategy. These two interpretations of section 183(e) of the Act are referred to in the comments as the "two sciences" for ozone regulation. As part of this argument, the commenter also stated that EPA is ignoring findings of recent studies including "Rethinking the Ozone Problem," "the Southern Oxidants Study" (AIM-IV-D-212g), and "Ozone Precursor Relationships in the Ambient Atmosphere."[6,9]

Two commenters in five letters (AIM-IV-D-212, AIM-IV-D-55, AIM-IV-D-49, AIM-IV-D-155, CP-IV-D-35) claimed that the findings and recommendations of "Rethinking the Ozone Problem" were ignored by EPA. The authors questioned the effectiveness of a VOC-only control strategy, stated that control of NO_X may be necessary, and discussed the importance of reactivity in ozone

formation. Another commenter (AIM-IV-D-214c) referred to "Rethinking the Ozone Problem" which the commenter alleged revealed that ozone exceedances were caused primarily, if not exclusively, by NO_X emissions, not VOC emissions.[10] One commenter in three documents (AIM-IV-D-212, CP-IV-D-35, AIM-IV-F-1d) cited findings of the "Southern Oxidants Study" for the proposition that NO_X controls would be more effective in the rural south, and in the south anthropogenic NO_X had a greater impact on formation of ozone than anthropogenic VOC.[16]

One commenter (AIM-IV-D-212) contended that EPA's policy goal should be the control of NO_X, not VOC. The commenter used isopleth charts to illustrate that increasing the NO_X concentration caused the ozone concentration to increase. According to the commenter (AIM-IV-D-212p/CP-IV-D-35n, AIM-IV-D-212p4/CP-IV-D-35g, CP-IV-D-35m), in many areas of the country, ozone attainment could only be reached through NO_X controls. A second commenter (AIM-IV-D-49) attached section 3.8 of the section 185(b) report to Congress which also noted the necessity of NO_X controls.

One commenter submitted two letters (AIM-IV-D-212, AIM-IV-D-212k/AIM-IV-D-212mm/AIM-IV-D-212p6h/CP-IV-D-35h/ CP-IV-D-35k3) pointing out that according to charts from "Rethinking the Ozone Problem" and "Ozone Precursor Relationships in the Ambient Atmosphere," increasing NO_X concentrations caused the exceedance whereas changes in VOC concentration were almost irrelevant.[10,17] The commenter (AIM-IV-D-177a) cited a study by Chameides, et al., which suggested that the level of NO_X, not VOC, determined the ozone levels in the world.[17] The commenter stated that almost all VOC incremental reactivity went to zero or negative value at high levels of VOC and low levels of NO_X.

A commenter (CP-IV-D-35m) stated that starting with nonattainment air, an isopleth chart to determine which precursors need to be removed to meet the ozone NAAQS showed: (1) most reduction of NO_X caused a decrease in peak ozone; (2) sometimes the initial reduction in NO_X caused an increase in

peak ozone but additional decreases in NO_X eventually caused decreases in peak ozone and the direction was always toward true attainment; (3) a decrease in peak ozone occurred for a decrease in NO_X on a national level; (4) benefits or cost were possible for a national NO_X rule; and (5) national NO_X rules should be promulgated.

One commenter (CP-IV-D-34) stated that EPA should consider exempting products used in NO_X-limited areas. The commenter explained that NO_X-limited areas are areas that have an overabundance of VOC relative to NO_X. The commenter explained that NO_X is needed with VOC in the presence of sunlight to produce ozone. The commenter believes that in these areas the additional VOC emissions do not have an appreciable impact on ozone formation.

Another commenter (AIM-IV-D-115) referenced the 1991 National Research Council (NRC) study titled "Rethinking the Ozone Problem in Urban and Regional Air Pollution," which concluded that NO_X emissions should be controlled in addition to, or instead of VOC control.[10] In light of this study, the commenter stated that EPA should focus more on NO_X reductions, especially in nonattainment areas, instead of controlling VOC emissions to unrealistic levels. The commenter predicted that the current set of architectural coatings VOC regulations will ultimately cause an increase in ground level ozone, instead of a decrease.

Response: The EPA's ozone reduction strategy is to control both NO_X and VOC emissions. The EPA's policy is consistent with recent scientific studies and with the Congressional mandate of the Act as a whole in which Congress has directed the Agency to combat ozone through measures directed at both VOC and NO_X. Ozone control is a complex problem that must consider a number of local factors, including meteorological conditions, the relative concentrations of NO_X and VOC in the air, and the proximity of emission sources to one another. The EPA recognizes that NOx control is an effective means for reducing ozone. The EPA's

policy also recognizes that VOC control, with or without NOx control, is essential or beneficial in many areas for reducing peak ozone concentrations. The EPA believes that the current ozone policy is a scientifically valid strategy, and that the commenters have mischaracterized EPA's ozone control policy and the past results of the policy.

This group of comments focuses on the commenters' interpretation of the roles of ozone precursors (VOC and NO_X) in the formation, accumulation, and transport of ozone and the commenters' theory that there are "two sciences" for ozone regulation. The EPA understands the conclusion of the comments to be that because a control strategy based on VOC emission reductions will not be uniformly effective, EPA should regulate only NO_X. The commenters premise these arguments on the fact that, in many cases, reducing NO_X rather than VOC emissions maybe a more effective means for attaining the ozone NAAQS.

To address these arguments, outlined below is a discussion of the roles of NO_X and VOC in the chemistry leading to high ozone concentrations and the role of meteorology and relative location of sources in influencing mixing of VOC and NO_X emissions (and, therefore, the chemistry leading to ozone formation). A discussion of the limitations on the use of isopleth charts for determining control strategies is also presented.

2.3.2.1.1 Roles of Nitrogen Oxides and Volatile Organic Compounds in chemistry of ozone formation. Ozone (O_3) would be present in the troposphere even in the absence of anthropogenic NO_X or VOC emissions. Its presence results from interchange with the stratosphere, and is sustained by the chemical and physical properties of ozone itself and the presence of other naturally produced compounds. More specifically, ozone (like NO_2) photolyzes in the presence of sunlight. In the presence of naturally-occurring water vapor (H_2O), photolysis of ozone leads to an equilibrium among ozone, water vapor and hydroxyl radicals (OH). As shown in the subsequent discussion, OH play a crucial

role in the accumulation of ozone to levels greater than the level specified in the ozone NAAQS.

Introducing NO emissions to the atmosphere results in the NO being oxidized to NO_2 by the following reaction:

$$NO + O_3 = NO_2 \qquad (1)$$

Sunlight however, causes the resulting NO_2 to photodissociate back into NO and O_3.

$$NO_2 + (\text{sunlight}) = NO + O_3 \qquad (2)$$

Photodissociation of NO_2 is a major potential source of ozone in the troposphere. However, in the absence of VOC emissions, ozone concentrations greater than the level specified in the ozone NAAQS are unlikely. Instead, an equilibrium among O_3, NO_2 and NO exists as a result of the interaction of reactions (1) and (2).

For high ozone concentrations to occur, a third factor is needed in addition to NO_x emissions and sunlight. This factor must serve as an alternate to reaction (1) for converting NO to NO_2. Volatile organic compound emissions provide the means for converting NO to NO_2 without using up the ozone formed in reaction (2). This conversion occurs as a result of a series of reactions, initiated by the reaction of VOC with OH.

$$\text{VOC} + \text{OH} = (\text{Organic Radical Products}) + \text{More OH} + (\text{Other Products, e.g., formaldehyde}) \qquad (3)$$

and

$$\text{NO} + (\text{Organic Radical Products}) = \text{NO}_2 + (\text{more Organic Radicals}) + (\text{Other Products, e.g., nitrous acid}) \qquad (4)$$

The “organic radicals” shown on the right-hand side of composite reactions (3) and (4) can, in subsequent reactions, form more OH. The resulting OH drives reactions (3) and (4) through several more cycles. In reactions (3) and (4), formaldehyde and nitrous

acid are identified as products. These compounds are important because, like NO_2 and ozone, they photodissociate in the presence of sunlight. Additional OH are among the products formed as a result of this photodissociation. This additional OH drives production of ozone still further through reactions (3), (4) and (2).

On sunny days in polluted areas, such as cities, reactions (2), (3) and (4) can result in concentrations of OH several orders of magnitude greater than present in background air. A useful metaphor is to picture the cycle of reactions represented by reactions (2) through (4) as a "wheel of reactions." The size (diameter) of the wheel grows as concentrations of OH (and ozone) increase. This growth will continue until one or more of the three factors fueling the process (sunlight, VOC emissions, NO_X emissions) becomes limited.

In locations where VOC emissions are the limiting factor (low VOC:NO_X ratios), the reaction of NO with ozone to form O_2 [reaction (1)] becomes increasingly important as the means for converting NO to NO_2. This reaction suppresses ambient ozone levels through scavenging by NO. This reaction also suppresses OH production (and, therefore, the ease with which subsequent VOC emissions can lead to high ozone) by reducing ozone available to photo dissociate to form OH.

In locations where NO_X emissions are the limiting factor (high VOC:NO_X ratios), ozone is limited by availability of NO_2 to photodissociate in the presence of sunlight [reaction (2)]. Further, other reactions involving the organic radicals with NO to form NO_2 and more organic radicals [reaction (4)] become relatively more important. For example, very reactive species of VOC, such as various olefins and aldehydes, can react with ozone. This reaction can have the effect of actually reducing ozone levels somewhat, as well as removing these VOC for possible use in future ozone production where or when NO_X is more plentiful.

2.3.2.1.2 Meteorological conditions and the orientation of precursor sources to one another determine the effectiveness of a control strategy. Roles of VOC and NO_X in the chemistry of ozone formation can be effectively conceptualized using an ozone isopleth diagram. Chart 2 attached to a July 10, 1995 letter from Mr. Robert Mitchell to Administrator Browner (Docket item AIM-IV-D-212) is a good example of such a diagram. These diagrams are generated by repeatedly estimating maximum predicted ozone after varying initial concentrations assumed for VOC and for NO_X. Relative importance of initial conditions and meteorology versus emissions occurring for each simulation (i.e., "post-8 a.m. emissions") are kept constant for all simulations used to construct the diagram. Further, the diagrams assume that the emissions are instantly and perfectly mixed in the atmosphere so that the chemistry can proceed in accordance with the relative amounts of VOC and NO_X emitted across relatively large areas.

Contrary to the assumptions underlying Chart 2, mixing of precursors is often likely to be limited by prevailing meteorological conditions. This limitation can lead to different conclusions about the relative importance of initial conditions versus "post-8 a.m. emissions" in different parts of a modeling domain. For example, if the trajectory assumed in the model generating the isopleths traversed an area where "post-8 a.m. emissions" are dominated by sources of NO_X, the resulting isopleth diagram would be shaped very differently. Such a diagram would likely lead to a conclusion that VOC availability would be the most limiting factor, at ratios that are higher than those implied in Chart 2. (AIM-IV-D-212k2, AIM-IV-D-212mm2, AIM-IV-D-212p6h2, CP-IV-D-35h2).

Effects of limited mixing described in the preceding paragraph can be illustrated by constructing isopleth diagrams which reflect different mixes of "post 8 a.m. emissions" injected into the cloud of pollution. This has been illustrated by Milford *et al.* (1989).[10] These authors show that, for a given

2-day episode (August 30-31, 1982) in the Los Angeles basin, the shapes of predicted ozone isopleth diagrams vary as a function of location, starting location, and subsequent trajectory of the cloud of pollution. The diagrams suggest that, for the simulated episode, reducing VOC is likely to be more effective than reducing NO_X to reduce ozone in Los Angeles County. Further downwind, however (San Bernardino, Riverside Counties), reducing either or both precursors appears to be a viable approach for reducing predicted ozone during the simulated episode. The point of this discussion is that the chemistry of ozone formation can be significantly affected by prevailing meteorological conditions as well as by the orientation of VOC and NO_X sources to one another. These conditions control how readily VOC and NO_X emissions mix. This mixing, in turn, affects the chemistry of ozone formation. Thus, it may be overly simplistic to assume ozone formation in an urban area is VOC- or NO_X-limited on the basis of a single isopleth diagram which assumes perfect mixing throughout the area.

Meteorological conditions vary daily. Further, the effects of varying meteorology on ozone formation differ depending on the orientation of VOC and NO_X sources to one another. The significance of this interaction between meteorological conditions and source orientation relative to drawing conclusions about the importance of VOC versus NO_X controls in reducing ozone has been illustrated in modeling studies, as well as in different reviews and analyses of monitored air quality data. For example, in its study of Regional Ozone Modeling for Northeast Transport (ROMNET), EPA concluded that a NO_X-oriented strategy appeared more effective than a VOC strategy in reducing peak predicted daily maximum ozone in the Washington/Baltimore area on 6 of 15 days modeled. A VOC-oriented strategy was more effective on 6 of the 15 days. Both strategies appeared about equally effective on the remaining three days.[11]

Modeling in Atlanta has suggested that NO_X controls will be needed to meet the ozone NAAQS on most of the days examined.

Further, NO_X controls are usually shown to be more effective than VOC controls in reducing peak predicted ozone to levels near the ozone NAAQS. However, on some of the modeled days (e.g., July 8, 1988, August 10, 1992) reducing VOC emissions appears to be more effective in reducing predicted ozone.[12] Another finding in the Atlanta modeling, as well as in applications elsewhere, is that the initial effect of moderate NO_X reductions may not always be beneficial (e.g., July 31, 1987 results). That is, under some conditions, controlling NO_X makes predicted ozone worse initially, until additional NO_X controls lower the predicted ozone. It is probably not reasonable to expect NO_X controls to be implemented all at once. Thus, this increase in ozone formation could be a realistic scenario. Isopleth diagrams generated for the Atlanta modeling studies suggest that reducing VOC emissions will mitigate most, if not all, of the detrimental effect arising from initial efforts to reduce NO_X under meteorological conditions like those of July 31, 1987.

Modeling results showing variable responses of predicted ozone to VOC and NO_X controls as a function of location and time appear to be corroborated by the observational studies performed to date. For example, Cardelino *et al* have examined ambient data obtained during a 1990 field study in Atlanta, and applied their relative incremental reactivity (RIR) approach to the data to assess likely sensitivity of observed ozone to changes in observed NO_X and VOC levels.[13] On one of the six days examined, these authors found peak ozone likely to be more sensitive to changes in VOC rather than NO_X. On the other five days, ozone levels exhibited some sensitivity to changes in VOC, but were more sensitive to changes in NO_X.

Blanchard *et al.* have reviewed ambient air quality data from the Los Angeles Basin, San Francisco Bay Area, San Joaquin Valley and the Lake Michigan area. These authors have applied a “smog produced algorithm” to assess geographic and temporal patterns regarding whether ozone formation appears limited by available VOC or NO_X.[14] The results often suggest that NO_X is a limiting

factor to further production of ozone. Nevertheless, the authors conclude that factors limiting ozone production vary as a function of time and location.

Because ozone formation is greatly affected by meteorological conditions and source/receptor orientation, ozone formation may be limited by VOC or by NO_X at different times and locations. Modeling results suggest that under some circumstances, detrimental effects can occur from piecemeal implementation of NO_X controls. Results suggest that VOC emission reductions could mitigate some undesirable effects of piecemeal NO_X controls in urban areas. Thus, even though NO_X control may be a more effective means of reducing ozone levels on many of the worst days in many locations, reduction of VOC emissions is still necessary to reduce peak ozone concentrations under the variety of meteorological and source receptor conditions in urban areas.

2.3.2.1.3 Limitations in the use of isopleth charts for determining control strategies. The commenter uses the isopleth charts to illustrate that EPA's goal should be preventing saturation of the air by NO_X. The NO_X and VOC concentrations shown on the isopleth diagrams depict initial concentrations, generally in the middle of downtown.

Isopleths are a series of constant ozone lines generated by a model. Isopleth charts are generated by carrying out a large number of model simulations in which the initial concentrations and anthropogenic emissions of VOC and NO_X are varied systematically, whereas all other model inputs are held constant. The isopleths show the downwind, peak 1-hour ozone levels as a function of the concentrations of VOC and NO_X for a hypothetical urban area.

City-specific ozone isopleths can be used to estimate the reduction in VOC or NO_X levels needed to achieve the ozone NAAQS in a specific urban area. The first step is to determine the early-morning VOC:NO_X ratio for the urban area in question and the maximum 1-hour downwind ozone concentration. Both the

VOC:NO_X ratio and the peak ozone concentration are obtained from air monitoring data. These two values define a point on the isopleth surface and, from this point, the percentage reductions in VOC and/or NO_X needed to achieve the ozone NAAQS can be determined.

An examination of the isopleth chart attached by the commenter reveals, for a VOC concentration of 0.5 ppmC, for example, increasing NO_X leads to increased ozone until VOC:NO_X ratios of about 8:1 are reached. Further NO_X increases, leading to lower VOC:NO_X ratios, inhibit ozone formation. Thus, in this example, there is a "critical" ratio (in the range of 8:1) at which the NO_X effect on ozone changes direction. Besides this "critical" ratio, an "equal control" VOC:NO_X ratio also exists, above which the reduction of NO_X is more beneficial in terms of ozone reduction than an equal percentage reduction in VOC. This ratio, for the isopleths attached by the commenter, is roughly 10:1 for low levels of control and as high as 25:1 for the levels of control needed to reduce ozone to 0.12 ppm.

Using the isopleth charts for determining control strategies has some limitations, the most serious of which is that predicted emissions reductions are critically dependent on the initial VOC:NO_X ratio used in the calculations. This ratio cannot be determined with any certainty because it is expected to be quite variable in time and space in an urban area. Another limitation is that these charts have limited spatial and temporal scopes of application. They are generally 1-day models. Another problem with the use of morning VOC:NO_X ratios is the failure to account for photochemical evolution as urban emissions are carried downwind. As demonstrated in simulations by Milford *et al* (1989) and in smog chamber studies by Johnson and Quigley (1989), an urban plume that is in the VOC-controlling regime (low VOC:NO_X ratio) near the city center can move increasingly into the NO_X-controlling regime (high VOC:NO_X ratio) as the air parcels age and move downwind.[10,15] This progression occurs because NO_X is photochemically removed from an aging plume more rapidly than

VOC, causing the VOC:NO_X ratio to increase. As demonstrated by Milford *et al.* (1989), the implication of this evolution is that different locations in a large urban area can show very different ozone sensitivities to VOC and NO_X changes.[10] The commenter's position does not recognize the dynamic nature of the process and assumes that the composition of urban air remains static. Unlike the commenter's approach, EPA's approach recognizes that ozone formation may be limited by VOC or by NO_X at different times and different locations. Thus, even though NO_X control may be an effective means for of reducing ozone levels on many of the worst days in many locations, reduction of VOC emissions is still necessary to reduce peak ozone concentrations under the variety of meteorological and source receptor conditions that occur in urban areas. Thus, the commenter's suggestion that EPA exempt products used in NO_X-limited areas is impractical.

2.3.2.2 Contribution of Biogenic VOC Sources versus Anthropogenic Sources to Ozone Nonattainment

Comment: Four commenters submitted seven documents (AIM-IV-D-212, CP-IV-D-35, AIM-IV-D-214c, AIM-IV-D-177a, AIM-IV-D-55, AIM-IV-D-49, AR-IV-F-1) supporting their contention that biogenic VOC is more prevalent in the atmosphere than anthropogenic VOC. Two commenters submitted three documents (AIM-IV-D-212, CP-IV-D-35, AR-IV-F-1) citing findings of the "Southern Oxidants Study" that vegetation was a significant source of VOC in the rural south and in urban areas and complete elimination of manmade VOC would leave areas of metropolitan Atlanta in exceedance. Two commenters (AIM-IV-D-214c, AR-IV-F-1) referred to "Rethinking the Ozone Problem" which revealed that the primary sources of any VOC contribution to ozone nonattainment were biogenic.[6]

Two commenters submitted four documents (AIM-IV-D-49, AIM-IV-D-55, AIM-IV-D-177, AIM-IV-D-177a) asserting that control of VOC will not work because there is so much naturally emitted VOC already in the air. One commenter (AIM-IV-D-177a) noted that natural VOC was about 60 percent of total VOC. Two commenters

(AIM-IV-D-55, AIM-IV-D-49) asserted that only 7 percent of evaporative VOC was manmade and controllable and that the other 93 percent of evaporative VOC comes from biogenic sources and is not controllable. One commenter (AIM-IV-D-177) cited the Amazon rain forest as an area with high VOC levels and low ozone levels.

Response: The EPA understands the commenters to be saying generally that control of VOC will not work because there is so much naturally emitted VOC already in the air. The EPA disagrees with the commenters' interpretation of the factual information and their conclusion that control of anthropogenic VOC is therefore unnecessary. Section 2.3.2.1 presents a more detailed discussion of the chemistry of ozone formation, focusing on the role of VOC versus NO_X in the formation of ozone. This response focuses on the role of biogenic VOC in the formation of ozone and builds on the earlier response.

According to national estimates consistent with estimates used in the OTAG study, biogenic emissions are, indeed, a major fraction of total (anthropogenic and natural) VOC emissions on a typical summer day. Nationwide, biogenics comprise about 79 percent of the total 1990 VOC emissions on a typical summer day. Emissions from all consumer and commercial products comprise about 6 percent, while architectural coatings comprise about 0.5 percent of total estimated VOC in 1990. The EPA notes that VOC from consumer and commercial products do, however, constitute 28 percent of the anthropogenic, and hence the controllable, portion of the VOC inventory. Within the inventory of consumer and commercial products emissions, it will be necessary to obtain reasonable reductions from many categories of sources in order to achieve the aggregate benefits of VOC emission reductions contemplated by section 183(e) of the Act.

However, the use of total emission estimates overstates the importance of biogenic emissions in the production of ozone. Biogenic VOC generally are less important than anthropogenic VOC because biogenic VOC are usually emitted in the presence of limited amounts of NO_X, resulting in a limited amount of ozone

formation. Moreover, under the right conditions, biogenic VOC tends to scavenge ozone from polluted air as well as form new ozone. Anthropogenic VOC, on the other hand, are usually emitted in the presence of NO_X, resulting in more ozone formation and are generally unreactive with ozone under most conditions. Thus, VOC emissions from consumer and commercial products will play a proportionately greater role in ozone formation than is indicated by the percentage of total national emissions.

These factors should be kept in mind when assessing the relative importance of naturally-emitted versus anthropogenic VOC. Approximately 60 percent of natural VOC consists of very reactive olefins such as isoprene, α-pinene, and other terpenes, which can react with ozone and, therefore, can have the effect of reducing ozone levels somewhat. However, different VOC react at differing rates in the troposphere resulting in differing tropospheric lifetimes. The lifetimes of most VOC with respect to reaction with OH and ozone are in the range $\approx$1 hour to $\approx$10 years. In large part, because of these differing tropospheric lifetimes and rates of reaction, VOC exhibit a range of reactivities with respect to the formation of ozone (Altshuller and Bufalini).[16] For example, according to EPA's *Criteria Document for Photochemical Oxidants* (U.S. EPA 1996), the lifetime of isoprene (a very reactive natural species of VOC which, in the presence of NO_X, can lead to ozone formation) is 1.3 days and 1.7 hours respectively in reactions with ozone and OH present at average ambient concentrations.[17] In contrast, under the same conditions n-octane (an anthropogenic VOC) has a lifetime of greater than 4,500 years with ozone and 1.7 days with OH. Therefore, in many cases, more anthropogenic VOC remain available to produce ozone when NO_X availability ceases to be a limiting factor (i.e., as in many urban areas). Very reactive VOC, such as isoprene, are not expected to be widely used in architectural coatings or most other consumer and commercial products.

Thus, anthropogenic VOC emissions (often occurring in the presence of NO_X at low VOC:NO_X ratios) can be a more important source of ozone than natural VOC (often occurring with very limited NO_X at high VOC:NO_X ratio) than might at first be surmised from inventory estimates. Under NO_X-limited conditions, ozone is formed rapidly and fairly close to the sources of NO_X.

Comment: Two commenters in three letters (AIM-IV-D-212, AIM-IV-D-177, AIM-IV-D-212p3/CP-IV-D-35f) claimed that EPA did not want to prevent the exceedance of the ozone standard as mandated by law, but to justify regulations based upon reducing ozone levels in nonattainment areas by reducing VOC levels. One commenter (AIM-IV-D-177) explained that EPA's policy required computer modeling at a level of NO_X so high that permanent attainment could not be achieved. Although a temporary local attainment might be achieved by controlling VOC, the level of NO_X allowed by EPA's policy could lead to ozone nonattainment in downwind areas. The commenter concluded that controlling VOC based on Urban Airshed Model (UAM) computer modeling results did not make scientific sense for preventing exceedance of the ozone NAAQS. The commenter alleged that EPA's VOC policy only served to ensure large amounts of VOC regulations to provide work for the regulators and to control American industry.

Response: As discussed in section 2.3.2.1, VOC emissions play a significant role in development of high concentrations of ozone. The EPA’s ozone control policy is based on recognition that the science of ozone formation, transport, and accumulation is complex. In designing control strategies it is necessary to consider a number of local factors, including meteorological conditions, the relative concentrations of NO_X and VOC in the air, and the proximity of emission sources to one another. The EPA’s policy recognizes that in certain areas NO_X controls are very effective in reducing peak ozone concentrations, while in other areas they may not be effective and VOC controls are necessary. The EPA believes that the ozone policy is a scientifically valid strategy and that the commenter has

mischaracterized EPA's ozone control policy and the past results of the policy.

Contrary to the commenter's claims, EPA expects both local and downwind ozone to improve as a result of these regulations. Effectiveness of VOC controls in reducing highest concentrations of ozone in and near cities can be inferred by examining ozone trends reported between 1987 and 1996 in the U.S. EPA's *National Air Quality and Emissions Trends Report, 1996* (docket A-94-65, item IV-J-11). During this 10-year period, estimated VOC emissions were reduced nationally by about 18% (despite considerable population and economic growth during this period) whereas NOx emissions increased slightly (~3%). Thus, downward trends in high ozone concentrations near cities are attributable to reductions in VOC emissions. During 1987-96, both the incidence in which ozone exceeded the concentration (0.12 ppm) specified in 1-hour national ambient air quality standard (NAAQS) as well as the magnitude of high observed concentrations decreased. The trend data indicate that the typical 2d high 1-hour daily maximum ozone concentration observed at numerous sites has been reduced by about 13% during a period in which VOC emissions have been reduced. Further, the incidence of observations in excess of the concentration specified in the 1-hr NAAQS (0.12 ppm) has been reduced by about 65 - 70%. Since predicted ozone has decreased using VOC controls, EPA believes the current policy has been demonstrated to be effective.

The current policy, as expressed in the SIP regulations and the Act, also requires the control of NO_X in many instances. The relative degree of NO_X and VOC control required is determined using computer models based on local air quality conditions. The Agency's policy with respect to computer modeling for both control strategy demonstrations and national policy studies is to use NO_X levels that actually exist today in the ambient air. The EPA disagrees with the commenter's position that ozone modeling should be conducted assuming a relatively NO_X-free environment, which does not exist in our polluted cities today. However, as

noted in section 2.2.2 of this document, computer modeling was not used to form the basis of EPA's determination under section 183(e) that emissions from consumer and commercial products have the potential to contribute to ozone levels which violate the NAAQS. As explained in section 2.3.2.1 of this document, control of NO_X alone is not a practical solution to the ozone problem.

Comment: One commenter submitted three documents (AIM-IV-D-49, AIM-IV-D-177a, AIM-IV-D-177) asserting that a national VOC rule would be economically counterproductive. The commenter (AIM-IV-D-177a) referenced a paper submitted by another commenter, "Economic Analysis of Ozone Reduction" (CP-IV-D-35m). The premise of the analysis is that VOC control will not achieve the ozone NAAQS. Therefore, widespread and stringent NO_X controls will be required after implementation of VOC controls has been exhausted and the level of NO_X control required will be greater than if NO_X were the only pollutant controlled initially. The commenter (AIM-IV-D-49) explained that the economic loss would be 100 percent of the total cost of any national VOC regulation, plus an extra cost for increased NO_X controls. Thus, explained a second commenter (CP-IV-D-35m), national VOC controls were the maximum cost approach for complying with the ozone NAAQS. This commenter asserted that starting with VOC control was a mistake and regulating evaporative VOC had been a national financial disaster.

As part of an argument that VOC controls are ineffective, one commenter (CP-IV-D-35m) stated that national VOC controls created only cost to the nation. The commenter asserted that considering which precursors need to be removed from nonattainment air, rather than which precursors could be added to attainment air could create rules that were wrong and costly. The commenter concluded that all VOC rules would be economically counterproductive and stated that no cost effective VOC rules are possible.

Response: The EPA disagrees with the commenter's claims that VOC controls are economically counterproductive because the control measures are ineffective. The EPA's ozone control program, which relies on a combination of regional, local, and Federal control measures, has been effective in improving ozone attainment and is expected to achieve further improvements in ozone air quality. Specifically, modeling evidence shows that decreasing VOC emissions causes predicted ozone to decrease. Ambient monitoring data shows that reduced peak ozone concentrations are occurring despite economic growth. Ozone trends data show that reductions in peak ozone concentrations are occurring across the country. Monitoring data from more than 700 sites show that composite averages of the second highest maximum 1-hour ozone concentrations have shown a clear, steady, downward trend over the past 10 years. These downward trends apply also to the number of daily exceedances of the standard. Since historically the control policies placed greater reliance on VOC control, the trend of ozone reductions confirms that VOC control has been effective in many areas of the country.

According to the commenter's own admission, several areas of the country have achieved attainment. Recent studies have shown that in some areas of the country, a combination of NO_X and VOC controls will be required. In other areas, control of upwind sources of NO_X may be necessary to achieve attainment. The controls will be implemented through a combination of regional and local control strategies considering local air quality conditions and the most cost-effective mix of NO_X and VOC controls.

2.3.2.3 Role of Combustion Sources in Ozone Nonattainment

Comment: Two commenters in six documents (CP-IV-D-35k3, CP-IV-D-35v/AIM-IV-D-212p5, AIM-IV-D-212, AIM-IV-D-212k/ AIM-IV-D-212p6h/CP-IV-D-35h/AIM-IV-D-212mm, AIM-IV-D-177 and AIM-IV-D-177a) claimed that fuel combustion sources cause the exceedance of the ozone NAAQS because combustion is the major source of NO_X and anthropogenic VOC. Controlling NO_X emissions

from combustion sources with existing technology would enable all ozone nonattainment areas to achieve attainment. One commenter (AIM-IV-D-177) inferred that regulations should focus on the development of new combustion processes that produce less emissions and that NO_X could be controlled by using electric automobiles.

Response: The EPA agrees that the major source of NO_X is combustion processes. According to the Trends Report, in 1996, 95 percent of the anthropogenic NO_X emissions came from combustion sources with 30 percent coming from onroad vehicles. This report also stated that the 1996 biogenic NO emissions were estimated to be 1.55 million short tons using the Biogenic Emissions Inventory System -- Version 2 (BEIS2). Another report (Biogenic Emissions of 1995) estimated 1995 biogenic emissions of nitric oxides at 1.5 million short tons using BEIS2.2. Thus, biogenic NO emissions account for almost 7 percent of the total NO_X and approximately 88 percent of the total NO_X emissions are produced by manmade combustion.

The EPA has several other programs already in place to reduce levels of NO_X nationwide that contribute to ground-level ozone (smog), acid rain, and other environmental problems.

First, EPA introduced tighter tailpipe standards for cars in 1994 that were phased-in on car models through 1996. Tighter tailpipe standards will substantially reduce emissions of VOC and NO_X, the main components in the formation of ground-level ozone. In addition, EPA is currently developing regulations in partnership with the State of California and leading manufacturers of heavy-duty engines that will significantly reduce emissions of nitrogen oxides from cars and trucks.

Second, large sources of nitrogen oxides, such as power plants, that are located in nonattainment areas, are generally required to apply stringent controls (e.g., RACT, as defined by the Act).

Third, EPA has promulgated new rules for NO_X under the Acid Rain Program. These regulations will result in substantial additional NO_X reductions.

Fourth, in September 1994, the 11 Northeastern States and the District of Columbia that comprise the Ozone Transport Commission, have agreed to plans to reduce NO_X emissions by 35 percent from 1990 levels. The reductions will help significantly reduce ozone levels in the Northeastern United States.

These programs are expected to reduce NO_X and VOC emissions from both mobile and stationary sources significantly and thereby reduce ground-level ozone. However, EPA projects that additional VOC control from noncombustive sources such as consumer and commercial products will be required to achieve the ozone NAAQS in all parts of the country. To achieve the ozone NAAQS using NO_X control alone as suggested by the commenter would require that ambient NO_X levels throughout the nation be reduced to less than 5 ppbv. The Agency does not know of technology that can be applied at a reasonable cost to reduce the remaining NO_X to such low levels. The commenter's self-acknowledged "futuristic approach" to NO_X control is impractical because it calls for technology that is not yet existent. For example, the commenter contended that converting to electric automobiles would solve the ozone problem. Although electric automobiles have been manufactured on a limited scale, this technology is still impractical for widespread use. In addition, electric vehicles will also rely on power plants to charge the batteries. Thus, the commenter’s suggestion will not solve the problem of eliminating NO_X emissions. Carrying the commenter's argument to its logical conclusion calls for replacing most or all internal combustion engines, fossil fuel-fired power plants, industrial boilers, and incinerators with alternative technologies.

Comment: Two commenters on four occasions (AIM-IV-D-212, CP-IV-D-35v/AIM-IV-D-212p5, CP-IV-F-1a, AIM-IV-D-177a) claimed: (1) NO_X in the presence of sunlight forms ozone, (2) natural

sources do not produce enough NO_X to exceed the ozone NAAQS, (3) the ozone NAAQS is exceeded because of the presence of manmade NO_X, and (4) VOC from consumer and commercial products do not contribute to exceedance of the ozone NAAQS because evaporative VOC alone do not cause ozone. Therefore, the commenters conclude that evaporative VOC should not be controlled under section 183(e) of the Act.

Two commenters in four letters (AIM-IV-D-212, CP-IV-D-35v/AIM-IV-D-212p5, AIM-IV-D-177a, AIM-IV-D-212k/ AIM-IV-D-212mm/AIM-IV-D-212p6h/CP-IV-D-35h/CP-IV-D-35k3) claimed that there is a difference between "combustive" VOC and "evaporative" VOC. Combustive VOC are generated through combustion of materials such as fuels, waste, etc. Evaporative VOC are generated from the use and production of chemicals as well as the use of consumer and commercial products such as architectural coatings, cleaning products, personal care products, pesticides, adhesives, etc. According to the commenters, combustive VOC are worse than evaporative VOC because the combustion process produces both NO_X and VOC and combustive VOC are more reactive than evaporative VOC.

Third, one commenter in three letters (CP-IV-D-35k3, AIM-IV-D-212, AIM-IV-D-212k/AIM-IV-D-212p6h/CP-IV-D-35h/ AIM-IV-D-212mm) claimed that some natural highly reactive VOC help prevent the buildup of NO_X and ozone. One commenter in two letters (CP-IV-D-35v/AIM-IV-D-212p5, AIM-IV-D-212) cited “Rethinking the Ozone Problem” and “Scientific Basis of the VOC Reactivity Issues” which stated that many VOC reacted directly with ozone resulting in a reduction of the ozone concentration.[1,6] The commenter implied that EPA should by regulation require manufacturers to replace the ozone-forming VOC in their products with other VOC that would react with either NO_X or ozone in such a way as to remove them from the air.

Response: As discussed in section 2.3.2.1, EPA agrees that NO_X in the presence of sunlight will form low concentrations of ozone in an otherwise unpolluted atmosphere. In an otherwise

unpolluted atmosphere a natural equilibrium exists between NO, NO_2, and ozone that prevents the buildup of high concentrations of ozone. However, other components, such as VOC, present in the air disrupt this equilibrium causing ozone to accumulate. Volatile organic compounds are clearly understood to be a necessary ingredient in the complex series of reactions that lead to ozone generation. The fact that VOC are not a necessary ingredient for every one of these reactions (e.g., the photolysis of NO_2) is irrelevant. Both NO_X and VOC control will be needed to achieve attainment.

The EPA acknowledges that combustion sources emit both NO_X and VOC, while evaporative sources emit only VOC. The EPA has been regulating both mobile and stationary combustion sources of VOC, as well as evaporative VOC sources, for years. However, the amount of NO_X and VOC emissions reductions obtained from regulating combustion sources (e.g., automobiles) has not been great enough to enable some areas of the country to achieve the ozone NAAQS. In many of these areas, evaporative VOC emissions from such sources as architectural coatings are one of the largest unregulated sources of VOC emissions. Thus, EPA contends that evaporative VOC sources still matter and must be controlled if the ozone NAAQS is to be achieved in all parts of the nation.

While EPA acknowledges that some VOC are highly reactive and do react to reduce ozone through various mechanisms, this scenario occurs only in very limited cases, with only a few species of VOC (not VOC species typically used in consumer and commercial products), and under specific meteorological conditions. This phenomenon does not occur generally in the ambient air.

The commenter's suggestion that EPA should, by regulation, require manufacturers to substitute certain ozone-forming VOC used in their products with other VOC that would react with either NO_X or ozone to remove them from the air is impractical. Ozone chemistry is extremely complex. How a VOC reacts with a reactive species, such as NO_X or ozone, depends on the

concentration of the reactive species and the rate constant for reaction of the VOC with the reactive species. In general, the ambient atmospheric concentrations of OH, nitrate radicals, and ozone are variable, depending on time of day, season, latitude, altitude, etc. Thus, all VOC do not react the same and even a single VOC will react differently under different atmospheric conditions. Moreover, a VOC cannot necessarily directly replace another VOC in terms of properties and functions within the products or processes in which the compound is used. Therefore, it is not technically feasible to ban broad classes of chemicals and mandate the use of a limited set of VOC in commerce.

2.3.2.4 The Role of Long-Range Transport of Nitrogen Oxides in Ozone Nonattainment

Comment: One commenter submitted three documents (CP-IV-D-35m, AIM-IV-D-212, AIM-IV-D-212k/AIM-IV-D-212mm/AIM-IV-D-p6h/CP-IV-D-35h/CP-IV-D-35k3) stating that another reason to focus on control of NO_X is to reduce the long range transport of NO_X and ozone. One document (CP-IV-D-35m) asserted that to stop downwind exceedances of the ozone NAAQS, the transport of NO_X and ozone must be stopped by controlling NO_X. The commenter concluded that because the reaction of NO_2 and sunlight was almost the only source of ozone in the troposphere, eliminating NO_X would stop the formation of ozone and its transportation. The commenter explained that controlling anthropogenic VOC was unnecessary because biogenic VOC were present almost everywhere.

The other two letters (AIM-IV-D-212, AIM-IV-D-212k/AIM-IV-D-212mm/AIM-IV-D-212p6h/CP-IV-D-35h/CP-IV-D-35k3) stated that EPA's approach of controlling VOC greatly increased the transport of ozone and NO_X. The commenter explained that EPA assumed the air was fully saturated with NO_X and that most VOC reacted with NO_X, so reducing VOC would reduce the peak ozone formed in core urban areas. However, the commenter contended that NO_X-saturated air was always (in the presence of strong

sunlight and adequate heat) in nonattainment because of the presence of biogenic VOC, which were ignored in EPA's model.

Response: Section 2.3.2.1 provides responses to the comments concerning the relative role of VOC and NO_X in the formation of ozone. This response will address only the commenter's arguments that control of NO_X is more effective for control of long range transport of NO_X and ozone than control of VOC.

The EPA agrees that the transport of ozone can contribute to ozone nonattainment. The EPA also agrees that additional NO_X emissions reductions are essential to reduce long range transport problems. Ozone transport has been most problematic and most studied in the eastern States, and plans have been proposed for a regional NO_X emission reduction strategy. However, control of transported ozone and NO_X will not solve the ozone problem universally. Control of VOC beyond current State and Federal VOC control measures will be necessary to achieve attainment in many areas - particularly those with longstanding and serious problems with nonattainment.

Ozone nonattainment can be a function of two components: locally formed ozone and transported ozone. Historically, most control strategies have focused on controlling locally formed ozone by controlling local NO_X and VOC sources in the immediate vicinity of nonattainment. The Clean Air Act Amendments of 1990 recognized that certain downwind areas receive transported ozone and ozone precursors that can contribute to nonattainment. Many of these areas may be close to violating the NAAQS due to local emissions even after applying all reasonably available controls, and the additional contribution of transported ozone can lead to periods of nonattainment.

More recently, exhaustive modeling studies of the eastern States by OTAG and others have explored the transport phenomenon. These studies have concluded that control measures mandated by the Act for ozone nonattainment areas will provide ozone reductions in many nonattainment areas. However, some areas will

remain in nonattainment, and new nonattainment problems may arise due to economic growth. The studies predict that regional NO_X reductions will decrease ozone concentrations across broad regions and will be more effective in reducing long-range ozone transport than will VOC reductions.

The EPA has recognized the role of NOx in the ozone transport problem. On November 7, 1997 (62 FR 60317), EPA issued a proposed rulemaking requiring certain eastern States to adopt NO_X emission reduction measures as needed to mitigate the transport of ozone and NO_X across State boundaries. Considering the state-by-state emission budgets, an overall NO_X emission reduction of 35 percent is targeted for the 23-State region.

The modeling conclusions about the importance of ozone transport do not mean that VOC reductions are not also needed. The OTAG study concluded that attaining the NAAQS will require local VOC and/or NO_X controls in addition to the recommended regional NO_X controls. The OTAG modeling suggested that reduction of VOC emissions will be most effective in and near urban core areas and will be necessary to control the component of locally produced ozone that contributes to nonattainment. The OTAG States recommended national rules for architectural coatings, consumer products, and automobile refinish coatings to help achieve the needed VOC reductions.

In conclusion, the commenter is incorrect that the control of anthropogenic VOC emissions is unnecessary to attain the ozone NAAQS. The VOC emitted in close proximity to NO_X will generally react to form ozone. Depending on the relevant conditions, this ozone may contribute to nonattainment. To achieve and maintain the NAAQS will require a program to address both local and transported ozone effectively. Control of anthropogenic VOC, therefore, will continue to be a vital part of the strategy to reduce ozone pollution, particularly in urban settings.

Ozone is usually the most significant component of transport into an urban nonattainment area, rather than transport

of precursors (like isoprene, other species of VOC or NO_X). Much of the ozone formed during the day can survive aloft overnight. A lack of vertical mixing at nighttime effectively insulates the ozone from the earth's surface, precluding natural removal mechanisms such as dry deposition. In addition, there is a general lack of NO_X aloft at night to remove ozone. The next day, the ozone aloft mixes with ground level emissions of VOC and NO_X. All other things being equal, this mixing likely accelerates ozone formation on the second day of an episode. The acceleration of ozone formation results from the ozone being available to photo dissociate to form an elevated level of OH early in the day. The increased OH speeds initiation of the reactions that lead to ozone formation. This accelerated initiation of ozone formation reactions, in turn, may sometimes lead to higher ozone formation on subsequent days of a multi-day episode. Thus, transport of ozone can negatively impact an area's ability to achieve and maintain the ozone NAAQS.

2.3.2.5 A VOC Regulatory Approach Has Been Based on Flawed Data

Comment: One commenter in two letters (AIM-IV-D-212, CP-IV-D-35) asserted that a VOC regulatory approach had been ineffective in reducing ozone levels in many metropolitan and urban areas. The commenter quoted from “Rethinking the Ozone Problem” to support this position.[6] According to the commenter, the report found that:

> [d]espite the major regulatory and pollution-control programs of the past 20 years, efforts to attain the ozone NAAQS largely have failed. The EPA's approach to ozone control, originally developed in 1971, has relied largely upon unverified estimates of reductions in precursor emission; EPA has not required systematic measurements of ambient precursor concentrations. Systematic measurements of NO_X and VOC are needed in addition to ozone measurements to determine the extent to which precursor emissions must be controlled and to verify the effectiveness of the control measures undertaken. Over the past two decades, the substantial reductions in ozone concentrations predicted to result from the VOC emission reductions in major urban centers have not occurred.

According to the commenter, “Rethinking the Ozone Problem” noted that EPA's approach has depended heavily on VOC reductions estimated on the basis of speculative "emission inventories" that significantly underestimate anthropogenic VOC emissions from mobile sources and fail to account adequately for biogenic VOC. The commenter stated that “Rethinking the Ozone Problem” also found that "past ozone control strategies may have been misdirected" in relying almost exclusively on VOC emission reductions.[6] As a corrective measure, two commenters in four letters (AIM-IV-D-49, AIM-IV-D-55, AIM-IV-D-212, CP-IV-D-35) stated that the report made this recommendation: "To substantially reduce ozone concentrations in many urban, suburban, and rural areas of the U.S., the control of NO_X emissions will probably be necessary in addition to, or instead of, the control of VOC."

According to the commenter (AIM-IV-D-212, CP-IV-D-35m, CP-IV-D-35), “Rethinking the Ozone Problem” continues, "The result is an overestimate of the effectiveness of VOC controls and an underestimate of the efficacy of NO_X controls. If the anthropogenic VOC inventory is as badly underestimated, as recent studies indicate, areas that were previously believed to be adversely affected by NO_X controls might actually benefit from them."

The commenter also attached an article from “Environmental Week” (AIM-IV-D-212d). The article stated that EPA was biased toward VOC reductions for control of ozone even though VOC controls may not work and NO_X controls were more effective in controlling ozone in some situations. The commenter (AIM-IV-F-1d, AIM-IV-D-212d) also quoted the article as saying that the models EPA used to predict effectiveness of various mitigation efforts needed to be improved and the emission inventories used in the models underestimated anthropogenic VOC.

Response: While EPA acknowledges the validity of some criticisms of the data used in the past, EPA does not agree with the conclusions of the commenters that control of VOC emissions

has been ineffective or is unnecessary. To enhance the ozone control program, EPA has supported and contributed to efforts to improve the understanding of ozone formation mechanisms in the ambient air and to develop better data and analytical tools with which to evaluate control strategies. The focus of current program enhancements includes: (1) enhancement of the ambient data bases used to design and check the progress of strategies, (2) a focus on improving emission inventories, and (3) regional and local application of the most comprehensive and defensible air quality models. The EPA has relied on "Rethinking the Ozone Problem" and other scientific studies to formulate these improved strategies.[6] Nothing in "Rethinking the Ozone Problem," or any other credible scientific study, however, has suggested that the control of VOC is not a necessary component of an ozone control program.[6] Although NO_X control is an important component of an ozone control program, controlling only NO_X is an insufficient strategy for achieving the ozone NAAQS.

Although air quality data clearly attest to a current situation where a number of U.S. metropolitan areas are in nonattainment with respect to ozone, EPA can demonstrate that a VOC regulatory approach has been effective in reducing ozone levels in many metropolitan and urban areas. As discussed by Cox and Chu, results of trend analyses for 43 cities, normalized for meteorological differences, between 1981 and 1991, show that high peak 1-hour daily maximum ozone concentrations were typically reduced by about 11 percent over this period.[18] In most cases, observed reductions in high daily maximum ozone were deemed to be statistically significant, providing evidence that decreasing VOC emissions causes predicted ozone to decrease. Since most of the regulatory effort to date has been to reduce VOC, the ambient information tends to refute the commenter's claims that VOC do not cause ozone pollution.

Furthermore, this downward trend coincides with a period of substantial population and economic growth. In the absence of effective emission control programs, the demographic growth would

have led to increased emissions and attendant increases in ozone. Thus, considerable "progress" has been achieved by averting increases in ozone concentrations in the face of demographic factors which would have otherwise increased ozone levels.

The precise extent to which various source categories have been understated in the emission inventories is unclear, and adequate data currently are unavailable to revise the emissions models or estimates. The most likely causes are understatement of emissions from mobile sources (including nonroad mobile sources), commercial/consumer solvents, and point sources (caused by ineffective regulations, poorly-characterized fugitive emissions, and small sources that historically have been exempt from State emission regulations). Shortcomings in emissions estimates have arisen from incomplete scientific understanding and inadequate emphasis on inventory studies.

The 1990 Amendments to the Act put a much higher premium on accurate inventory compilations than had been true formerly. The EPA has accelerated and enhanced its efforts to upgrade the inventory process and has directed increased support to States to assist them in utilizing new findings in SIPs. For example, mobile source models are upgraded periodically to reflect new findings on evaporative and exhaust emission components, in addition to incorporating changes stemming from combustion technology in new automobiles. In fact, EPA is planning to release MOBILE6 for use in the summer of 1998.

In addition to improving highway vehicle emission estimates, EPA is planning to develop a SIP-related nonroad emissions inventory model to meet the needs of providing an accurate inventory of nonroad mobile source emissions (e.g., diesel engines in large construction operations).

The EPA has also issued several volumes (EPA, 1991 c-g) of Emission Inventory guidance procedures and held national workshops on preparing inventories.[19] The EPA has taken numerous other steps to upgrade inventories including steps to enhance the consistency and quality control aspects of the inventory process.

The EPA has also undertaken a multi-disciplinary effort structured to develop consistency among EPA's various research and operation arms and to incorporate the latest research and technical efforts into the inventory process.

Past ozone precursor control approaches have relied on the best science available. The EPA will continue to improve the inventories used in their control approach so that current and future ozone precursor control strategies will always be based on the best available science.

The EPA agrees that NO_X controls in addition to, or instead of, VOC controls are likely to reduce ozone in many areas. However, in certain cases NO_X controls might not be effective in reducing ozone. Possible exceptions are not necessarily limited to New York and Los Angeles urban cores. Application of gridded photochemical models on a case-by-case basis is required to determine the efficacy of NO_X controls, because the ozone response to precursor reductions is area specific. The 5-City UAM study (EPA, 1990a) supports the general assertion that NO_X controls: (1) may be beneficial in many places (e.g., Atlanta and several parts of the northeastern U.S.) and (2) might not be effective in reducing ozone in other areas (e.g., Dallas-Fort Worth and New York).[20] The 5-City UAM study illustrates that ozone response to controls of VOC or NO_X is area-specific. The five-City UAM study investigated only a limited set of meteorological conditions.

Contrasting ozone responses from VOC and NO_X controls for specific days in Atlanta and Dallas-Fort Worth illustrate variability in the response of predicted ozone to changes in VOC and NO_X. Modeling of the relative benefits of VOC and NO_X control, to the base case (i.e., zero control) throughout the Atlanta domain illustrates that VOC controls result in limited benefits that are restricted to the center of the Atlanta domain; whereas NO_X controls result in more widespread and more pronounced reductions in peak ozone predictions throughout most of the domain. The Dallas-Fort Worth results show greater peak

ozone reductions for VOC controls, and several areas which exhibit ozone increases due to NO_X controls.

2.3.2.6 The EPA's Air Quality Models

Comment: Three commenters (AIM-IV-D-177a, CP-IV-D-35m, AIM-IV-D-49) listed three problems with photochemical air quality models based on the Carbon IV mechanism such as the UAM and Regional Oxidant Model (ROM). Two of these commenters (CP-IV-D-35m, AIM-IV-D-177a) also asserted that the ability of the model to provide accurate speciated VOC reactivity was very poor. The commenters asserted that the model incorrectly calculated the conversion of VOC to reactive VOC as a function of NO_X concentration, resulting in poor results at the high VOC and low NO_X levels. These commenters stated that this error overstated the required VOC reductions for attainment, greatly increasing the perception that VOC reductions were necessary. One commenter (AIM-IV-D-49) cited the section 185(b) report to Congress that pointed out that the weakness of the chemistry used in the model affected the accuracy of the model.

Response: Air quality models operate on sets of input data that characterize the emissions, topography, and meteorology of a region and produce outputs that describe air quality in that region. Mathematical models for photochemical air pollution were first developed in the early 1970s and have been improved, applied, and evaluated since that time.

Several grid-based photochemical air quality models have been developed to simulate ozone production in urban areas or in larger regions. These models differ primarily in their treatment of specific atmospheric processes, such as chemistry, and in the numerical procedures used to solve the governing system of equations. The Act mandates the use of three-dimensional (grid-based) air quality models such as UAM in developing SIPs for areas designated as extreme, severe, serious, or multistate moderate.

Uncertainties arise in photochemical modeling from the basic model components (chemical mechanism and numerical techniques in

solving the governing equations) and from inputs to the simulations that reflect the particular episode (boundary and initial conditions, emissions inventory, wind field, and mixing depth). While, as noted by the commenter, these limitations are legitimate sources of uncertainty, they are even more applicable to some of the evidence used by the commenter. For example, the isopleth diagrams that the commenter uses to make his argument are subject to similar limitations because they are either generated by these models or by the same fundamental concepts as used in these models.

The EPA addresses the uncertainties in models by using sensitivity studies. Sensitivity studies aim to determine the range of uncertainty in model predictions corresponding to ranges of uncertainty in the basic model components and input quantities. Such studies are valuable to pinpoint those quantities to which model predictions are most sensitive and, therefore, in directing future efforts in reducing the uncertainty in key parameters. These studies are also valuable in assessing the sensitivity of future air quality changes to uncertainties in the base case episode. It is not possible to state general, widely applicable levels of uncertainty for photochemical model inputs and parameters. These will depend on the particular region being modeled, and, in the case of meteorological and emissions inputs, may even depend on the time of day during the simulation. All model application exercises should include, to the extent possible, an analysis of the uncertainties in model inputs and parameters.

In conclusion, the computer models, while not perfect representations of meteorological conditions nor atmospheric chemistry, provide a far more complete description of their effects than any other means of analysis available. Application of grid models using different chemical mechanisms and differing means of generating meteorological inputs consistently leads to a conclusion that, under some conditions, ozone is sensitive to reductions in anthropogenic VOC emissions. The UAM has been

reviewed by Scheffe and Morris in "A Review of the Development and Application of the Urban Airshed Model."[21]

The UAM is the most widely applied and broadly tested grid-based photochemical air quality model. The model is described in a number of sources, including a multi-volume series of documents issued by the U.S. EPA (1990a,b,c; 1992b) and a comprehensive evaluation by Tesche *et al* (1993).[20,22-25] The UAM has been applied to many urban areas in the United States and Europe, and most of these studies have included some form of performance evaluation (see summary in Tesche et al., 1993, table 6-2).[25] The UAM is continuing to undergo revision to increase its accuracy as we better understand the atmospheric chemistry.

Evaluations of UAM's performance have been carried out for a number of geographic areas. Evaluations conducted since 1985 have indicated mean differences between predicted and measured ozone values of 20 to 40 percent when paired in space and time (Roth et al.).[26] The prediction of peaks exhibits relative errors that are smaller than the average error, with a tendency toward underprediction. The leading cause of underprediction in urban areas is the discovery that mobile source VOC emissions are significantly underestimated. In September of 1996, EPA published updated guidance for State and local agencies to use in developing motor vehicle emission inventories using Highway Performance Monitoring System datasets and state-of-the-practice Travel Demand Model outputs.[27] Through this guidance and complementary activities, EPA will improve and confirm the accuracy of mobile source emission inventories, leading to better ozone prediction by the models.

The concentration of NO_2 predicted by the UAM is generally within 30 to 50 percent of the measured NO_2 in UAM applications. This discrepancy between predicted and measured NO_2 has remained consistent over the history of modeling applications (Roth et al.).[26] Thus, the UAM is no better or worse than other models at predicting NO_2. Typically, the UAM predicts a lower

concentration of NO_2, generally on the order of 20 to 40 percent below what is actually measured (Roth et al.).[26]

Comment: Two commenters (CP-IV-D-35m, AIM-IV-D-177a) asserted that EPA requires the use of the UAM to determine which control techniques to use to control ozone. One commenter (CP-IV-D-35m) claimed that section 183(e) of the Act does not require the use of the UAM. These commenters (CP-IV-D-177a, AIM-IV-D-35m, AIM-IV-D-49) on three occasions concluded that the UAM concentrates on which precursors need to be removed from the air in a discrete nonattainment area to attain the ozone NAAQS whereas section 183(e) of the Act focuses on what can or cannot be added to "natural air" and still remain in attainment with the ozone NAAQS. One commenter (CP-IV-D-35m) explained that the UAM model had a software defect in the critical VOC:NO_X ratio that seriously compromised its use for supporting section 183(e) regulation.

Response: The EPA disagrees with the commenters' interpretation of the requirements of the Clean Air Act of 1990. First, contrary to the commenter's claims, the Act mandates the use of photochemical grid models for demonstrating how serious, severe, and extreme ozone nonattainment areas can attain the ozone NAAQS.

Also, EPA contends that the focus of the Act is on how to achieve attainment of the ozone NAAQS in all parts of the country. The only practical way to accomplish this goal in nonattainment areas is to start with current conditions and reduce the emission of ozone precursors.

The software defect in the UAM alleged by the commenter is due to the limitations of the model at the low NO_X conditions that exist in some attainment areas. The UAM is not designed for modeling the effect of precursors on ozone formation in pristine air. Rather, it is designed for modeling how changes in precursor emissions affect ozone formation in air that is typical of current atmospheric conditions. As also noted in section 2.2.2 of this document, EPA disagrees that section 183(e) requires EPA to make its determination starting from natural

pristine air. Furthermore, although UAM was discussed in the report to Congress, it was not used as the basis of any determinations under section 183(e).

2.3.2.7 The EPA Study Incorrectly Evaluated the Cost Effectiveness Ranking Criterion

Comment: One commenter in two documents (CP-IV-D-35, CP-IV-D-35m) stated that EPA's method, which is to estimate the cost per ton of VOC removed for potential control options, is not a valid measure of cost effectiveness. Two commenters (CP-IV-D-35, AIM-IV-F-1) claimed that EPA was required by law to evaluate the effect of consumer product emission reductions on ozone concentrations in each individual nonattainment area and list for regulation under section 183(e)(3) only those products that have the greatest impact on ozone reduction for the least cost. This study would require air quality modeling and a determination of the cost per unit of ozone reduction. If such a study were done, one commenter (CP-IV-D-35) contended that EPA would conclude that VOC from consumer and commercial products do not contribute to ozone formation. The commenter claimed that such an analysis was required by three authorities: section 183(e) of the Act, section 309 of the Act, and EO 12866.

Response: The EPA believes that it properly applied the cost effectiveness criterion of section 183(e) and that the cost-per-ton approach used in the report to Congress is the correct approach for applying the cost-effectiveness criterion. The EPA continues to believe that VOC from consumer and commercial products do have the potential to contribute to ozone formation. Moreover, EPA disagrees that an assessment of cost per unit of ozone reduction is legally required in order to list and rank consumer and commercial products for regulation under the authorities cited by the commenter.

Ozone attainment is a local responsibility, and the national VOC emission control programs [like the Motor Vehicle Control Program, New Source Performance Standards, and section 183(e)] are designed to support the State programs by requiring the best available controls for sources that are national in scope. Cost

per ton of VOC removed is the most appropriate method of evaluating the effectiveness of these national, technology-based programs. For the report to Congress, this method involved assessing available information on potential control technologies for the products that emit VOC during use and giving the highest priority to those products that could be controlled at the lowest cost.

The commenter's suggested approach would also have been extraordinarily resource and time intensive.Such an analysis would require, for example, substantial addditional data on the types and quantities of individual VOC in each product within the broad universe of consumer and commercial products. To obtain this information would have placed an additional burden upon industries that EPA believes was not necessary for the listing process. Also, studies to quantify the reactivity of a large number of individual VOC species would have been required for this analysis. In addition, many complexities make it difficult to make reliable predictions of the ozone-forming potential of individual VOC species. One reason is that this potential varies depending on ambient conditions -- on an absolute scale, and occasionally on a relative scale as well. These conditions affecting reactivity include ambient conditions such as VOC-to-NOx ratios, the presence of other VOC, and sunlight intensity. Each of these factors can vary widely. Also, in multiple day pollution episodes in an area, a VOC species that has low reactivity (based on a one-day reactivity scale) may continue to form ozone over several days. Even if EPA could have obtained the needed data and accounted for these complications, the results would have been of limited utility. As mentioned previously, available computer models generally aggregate chemical compounds or consider them as general categories. As a result, models have limited use for evaluating the effects of reducing emissions of specific VOC species from a particular product category.

Finally, EPA believes that an intensive study to quantify each product's effect on ozone levels in nonattainment areas is inconsistent with Congress's intent in enacting the section 183(e) program. Congress recognized that small quantities of VOC emissions from a very large number of products add up -- and together make up a significant portion of ozone-forming VOC emissions. Congress created the 183(e) program to reduce the aggregate VOC emissions from consumer and commercial products. It is not necessary, even if it were feasible, to quantify the effect of each product on ozone levels in each nonattainment area to make a reasoned selection of product categories to list for regulation. Nothing in the statute implies that the specific ambient impact of these emissions must be assessed other than to give priority to the products that emit "highly reactive" VOC.

The EPA also believes that additional air quality modeling is not needed to justify the benefits of regulating these products. The Ozone Transport Assessment Group recently completed the most comprehensive modeling analysis of ozone transport and control ever conducted. The goal of the group was to develop a consensus ozone control strategy for achieving the ozone standard over a 37-State region of the eastern U.S. The group, which included more than 700 public and private sector stakeholders, recommended a series of control measures, including national standards for reducing emissions from the use of consumer and commercial products. Modeling analysis showed the need for VOC reductions and the need for national control strategies for reducing NO_X and VOC. The OTAG study confirms that EPA's regulatory approach for consumer and commercial products should be implemented.

Finally, EPA believes that the modeling analysis recommended by the commenters is not legally required by section 183(e), section 309, or EO 12866. The reasoning is explained below for each of these authorities.

Section 183(e). Nothing in the structure or language of section 183(e) implies that an air quality modeling study is

required to assess cost-effectiveness. In fact, nowhere does the Act or the legislative history of section 183(e) provide guidance on how EPA should evaluate cost-effectiveness in this context. Therefore, EPA believes that Congress intended the Agency to exercise its discretion and expertise in assessing the relative cost-effectiveness of controls, as evidenced by the authority it gave the Agency to establish the relevant criteria. Based on the current national strategy for ozone control and the factors discussed above in this response, EPA believes that the cost per ton of precursor removed approach is a reasonable and appropriate exercise of this discretion. Section 183(e) requires EPA to take into consideration cost effectiveness, and the Agency concludes that it has done so in a fashion consistent with the language of the statute.

Section 309. Section 309 requires the Administrator to review and comment in writing on the environmental impact of certain legislation and actions of other Federal agencies. When activities are found to be unsatisfactory from the point of view of public health or welfare, EPA is required to refer its finding to the Council on Environmental Quality. The policy review provisions of section 309 do not apply to regulations that are promulgated by EPA. Thus, section 309 does not require EPA to perform any additional economic or impact assessments or judgments that are not already required to promulgate a rule under section 183(e).

Executive Order 12866. The EO applies to significant regulatory actions, as defined by the order. For regulatory actions which are considered significant regulatory actions within the meaning of the order, EPA submits the action and supporting information to OMB for review. For the announcement of the consumer and commercial product report to Congress, list and schedule, OMB designated this action as a “significant regulatory action” within the meaning of the order because this action is likely to lead to rules which may meet one or more of the criteria. The EPA submitted this action to OMB for review in full compliance with this order. For the consumer products and

architectural coatings rules, OMB designated these regulatory actions as “significant regulatory actions” within the meaning of the EO. Thus, EPA submitted these actions including the economic impact analyses to OMB for review under this order. For the automobile refinish coatings rule, OMB designated this regulatory action as a “not significant regulatory action” within the meaning of the order.

2.3.2.8 Effect of VOC Controls on Peak Ozone Concentrations

Comment: Two commenters submitted six documents (AIM-IV-D-49, AIM-IV-D-212, CP-IV-D-35, AIM-IV-D-177a, CP-IV-D-35k, CP-IV-D-35m) supporting their contention that VOC controls will harm the environment. The commenters used isopleth charts to illustrate that decreasing VOC emissions from consumer and commercial products in all attainment air and nonattainment air that was not VOC-limited increased peak ozone levels. Therefore, reducing VOC from consumer and commercial products would increase peak ozone in most of the United States, and no VOC controls should be promulgated for consumer and commercial products.

Response: The EPA agrees with the commenter regarding the relative ineffectiveness of VOC controls in NO_X-limited atmospheres. The EPA disagrees, however, with the claim that the atmosphere above "almost all areas in the country" is NO_X-limited and with the claim that control of consumer and commercial product VOC will be counter effective. By the commenter's admission, conditions in "severe" and "extreme" problem areas are VOC limited, and this, sometimes, is true even in Atlanta, which has a less than “severe”/”extreme” ozone problem. Thus, Chameides and Cowling, in the “Southern Oxidants Study” cited by the commenter, state that "the (Atlanta) data showing NO_X-limitation are flawed...and some ozone exceedances in Atlanta are characterized by NO_X-limitation and others by VOC-limitation."

The commenter’s judgment that responsibility for a problem already in existence lies solely and wholly with the NO_X emissions is in disagreement with EPA’s view that VOC also have

"responsibility" for a nonattainment problem. Atmospheric conditions vary both within and among problem areas so that either one of the two ozone precursors, VOC or NO_X, can be "responsible" for ozone nonattainment in some areas or some area sections or for some of the time.

2.3.3 Miscellaneous Regulatory Issues

Comment: One commenter (CP-IV-D-35m) contended that there were at least four possible ways to interpret and implement the intent of section 183(e) of the Act. The commenter stated that the best choice would be for EPA to agree that the VOC from consumer and commercial products do not have the potential to contribute to the exceedance of the ozone NAAQS. As an alternative, the commenter suggested that EPA delay action on regulations under section 183(e) of the Act until completion of the section 183(e) study as required by Congress. The commenter stated that EPA could use the North American Research Strategy for Tropospheric Ozone (NARSTO) project (to which EPA is an active signatory and participant) to study the science of VOC potential or EPA could commission the National Academy of Sciences to do a study. The commenter suggested as a third alternative that Congress could hold hearings on section 183(e) of the Act to revise or clarify those provisions that were deemed appropriate or necessary. As a final alternative, the commenter suggested the issue could be elevated to a national discussion. The commenter recommended that any effects pertaining to the SIP process be addressed at the same time, if appropriate.

Response: The EPA disagrees that there alternative means for the EPA to comply with section 183 (e) of the Act. Having determined that consumer and commercial products have the requisite potential to contribute to violations of the ozone NAAQS, it is incumbent upon the EPA to follow the statutory directive to regulate such products. The EPA has demonstrated that VOC from consumer and commercial products do have the potential to contribute to the exceedance of the ozone NAAQS (see section 2.2.2). The EPA has conducted the section 183(e) study as required by Congress (see section 2.2.1) and has concluded

that emissions from consumer and commercial products are significant and that emission reductions are appropriate. In addition, the Agency has considered all of the statutory factors in developing the criteria for regulation of consumer and commercial products and in prioritizing categories for regulation. Therefore, EPA has concluded that the statutory criteria for regulating commercial and consumer products clearly have been met and will proceed with the regulatory process as outlined in the March 23, 1995 Federal Register notice.

Comment: One commenter (AIM-IV-D-212) contended that using VOC to improve products was discouraged by EPA's unsubstantiated claim that VOC caused air pollution. Because EPA failed to perform concrete, specific scientific tests to support its charge, the commenter contended that the products did not contribute to air pollution and should not have been discouraged.

Response: As discussed in section 2.3.2.5, there is ample evidence that decreasing VOC emissions causes predicted ozone to decrease. Since most of the regulatory effort to date has been to reduce VOC, the ambient information tends not to support the commenter's claims that VOC do not cause air pollution.

Comment: One commenter (IV-F-1d) referred to a 1996 article by David Lewis, an EPA employee at EPA's National Exposure Research Lab in Athens Georgia.[28] The article discusses how EPA administrators loaded EPA employees down with paperwork resulting in less science coming out of EPA. The commenter quoted the article as saying that EPA "must develop a broad vision of the science needed and take bold steps to acquire and apply it. This will require more than just improving ORD. It means making fundamental changes in structure and mission of EPA as a whole so that the science leads, rather than trying to catch up, with the promulgation of environmental regulation." Later in the article it is stated "Congress has placed on the national agenda the need to rectify EPA's inadequate basis for supporting its regulatory process with sound science." The commenter continued by quoting from a September 27, 1994 document (memorandum) from Mr. Bruce

Jordan to Dr. Basil Dimitriades. The commenter stated that Mr. Jordan recommended certain changes to the scientific report that Dr. Dimitriades was submitting. The commenter asserts that EPA had a specific goal in mind and that Dr. Dimitriades changed his report to meet those goals.

Response: As described elsewhere in this comment response document, EPA considers the section 183(e) study and report to Congress to be based on appropriate use of science. The commenter's remarks concerning the September 27, 1994 memorandum are a mischaracterization of the contents of that document. The memorandum in question conveys comments on the report to limit the scope of the paper to address the scientific issues pertaining to section 183(e) of the Act. The memorandum accordingly included recommendations to make clarifications to the report to ensure that there would be no confusion that the report was addressing anything other than the scientific issues of section 183(e) of the Act.

Comment: One commenter (AIM-IV-D-212) noted that EPA had not addressed the seasonality of emissions. The commenter explained that paint sales and use were weather sensitive and followed an annual pattern of peaking in the good weather summer months and ebbing in the fall and winter. The commenter stated that in California and the Southwest, paint applications during spring months, before the hot summer, would lead to less paint emissions during summer months.

Response: Reducing VOC emissions during the ozone season by applying paint at times other than the ozone season is not a practical approach. Practicality issues preclude EPA from restricting the seasons when VOC emissions are allowed. Section 183(e) of the Act provides EPA only with the regulatory authority to regulate manufacturers and distributors and no ability to dictate when paint is going to be applied. In addition, regulations that attempt to control consumption or user habits are considered to be impractical and undesirable. Therefore, EPA concluded that limits on the amount of VOC

incorporated into the products would be the most feasible and least disruptive control measure.

Comment: The commenter (AIM-IV-D-177) claimed the environmental movement and the policies of EPA should have addressed the relationship of environmental sustainability and population levels. The commenter stated that most activities regulated by EPA would not cause an environmental problem at one level of population but would at a higher level. The commenter concluded that VOC at one level of use by a stable population became huge at a much higher population level.

Response: The Agency agrees with the commenter's conclusion that VOC at one level of use by a stable population may become huge at a much higher population level. Thus, as nonattainment and even attainment areas grow in population, for certain types of consumer and commercial products, national VOC regulations become a more important tool in assisting States, regions, and localities achieve attainment of the ozone NAAQS. This point is discussed more in section 2.3.1 of this document.

2.3.4 Economic And Social Impacts Of National VOC Rules

Comment: One commenter (AIM-IV-D-212) attached the following two reports to their comments: "Preliminary Report to Dunn-Edwards Corporation: A Bio-Psycho-Social Perspective on Some Implications of VOC Regulation" (AIM-IV-D-212p6q/CP-IV-D-35s4) and "Stepping Stones - A Technical Paper Introducing Some Theoretical Dynamics in ... A Preliminary Report to Dunn-Edwards Corporation: A Bio-Psycho-Social Perspective on Some Implications of VOC Regulation" (AIM-IV-D-212p6r/CP-IV-D-35s5). The authors state that the reports explore their "analysis of social trends in American culture and some implications of environmental policy, VOC regulation in particular, on the nation's future." The authors assert that EPA needs to analyze, anticipate, and factor in the unintended social consequences of VOC regulations and recommendations. The reports presents claims that the results of EPA's current approach to control of VOC have, in effect, placed urban cores and economically fragile rural areas further into an "at-risk" social development process.

The commenter asserted that entry-level crafts and manufacturing jobs are frequently the very jobs that utilized products containing VOC; thus, the VOC issue was closely linked with keeping the social development process intact. The commenters also asserted that environmental regulations that resulted in employer flight or demise, due to increased operating/compliance costs or outright banning of product use, are a form of environmental injustice that EPA must consider carefully.

The commenter submitted two letters (AIM-IV-D-212, AIM-IV-D-212p4/CP-IV-D-35g) claiming that in California, 29 years of evaporative VOC regulations resulted in a loss of jobs. The commenter explained that this loss in job base in turn led to a loss of tax revenues to the State. As a result, the commenter continued, poverty and hunger increased and the ability to provide for the health and welfare of citizens declined. Thus, the commenter maintains that VOC emission controls contributed to the problems of hunger and malnutrition.

Another commenter (AIM-IV-D-166) opposed national rules that applied to attainment areas because the effort required to enforce such activity is counter-productive and would eliminate business for smaller companies, increase costs for mid-size companies, protect the market for major corporations, and hurt the consumer.

Response: The Agency believes that national rules proposed under section 183(e) of the Act will not have a significant primary or secondary economic impact as described by the commenter. The Agency acknowledges that by establishing a set of product-specific standards for VOC content, national rules have cost implications for producers of the affected products. Manufacturers of consumer and commercial products that do not meet the VOC levels in the national rules or use another compliance option in the rule will be required to reformulate products or remove products from the market. Each option imposes costs, some of which will be passed on to other members of society (consumers) in the form of higher prices, and some of which will be borne directly by manufacturers.

The cost of reformulation includes the resources that must be devoted to creating a compliant product, e.g., research and development expenditures plus any net changes in the variable cost of producing the new product. Variable costs may be affected by changes in the material composition of the new product. The cost for each noncompliant product depends on the level of effort required to develop a new product and how these expenditures are incurred over time. Economic impact analyses completed by EPA for the automobile refinish coatings, consumer products, and architectural coatings rules have indicated that it is highly unlikely that the rule will have a significant economic impact on a substantial number of small entities. The EPA also does not expect these rules to have significant secondary impacts, given the expected primary economic impacts. See the economic impact analyses for these rulemakings for more detailed information on these analyses.

2.4 CONSTITUTIONAL AND OTHER MISCELLANEOUS LEGAL ISSUES

2.4.1 Clean Air Act Issues

2.4.1.1 Ultra Vires Consideration of Regulatory Criteria

Comment: One commenter (AIM-IV-D-214c) asserted that the consideration of allegedly nonstatutory factors in establishing regulatory criteria to list and schedule consumer or commercial products for regulation by EPA officials were actions ultra vires and hence give rise to causes of action against the officials. The commenter cited a number of judicial precedents which ostensibly support its claim.

Response: The EPA disagrees with the commenter’s conclusion that the actions are ultra vires. As explained more fully in section 2.1.1.2 of this 183-BID, section 183(e)(2) of the Act does not restrict EPA’s consideration of additional factors in establishing criteria for regulating consumer and commercial products.

Section 183(e)(2)(B) of the Act provides only that EPA “shall take into consideration” certain enumerated factors in deciding upon the proper criteria. The provision does not

dictate the criteria themselves. The EPA concludes that it has discretion to decide how many criteria to establish, what the criteria should be, and whether and to what extent the criteria should precisely mirror the considerations Congress enumerated in section 183(e)(2)(B) of the Act. Most importantly for purposes of this discussion, so long as EPA considers the factors Congress did enumerate in the statute, the statute does not preclude EPA's additional consideration of any other factors or criteria that EPA deems reasonable and necessary to fulfill its statutory obligation to regulate consumer and commercial products. The EPA believes that actions permitted by the statute itself can never give rise to a claim for ultra vires actions.

2.4.1.2 No Legal Justification for Regulation of Area Sources.

Comment: One commenter (AIM-IV-F-1c) in a public hearing indicated his belief that section 183(e) of the Act does not authorize the regulation of "area sources" and, in particular, that EPA cannot now regulate "area sources" through section 183(e) of the Act because of flaws that the commenter perceives in an unspecified 1989 report from the Office of Technology Assessment, presumably "Catching Our Breath: Next Steps for Reducing Urban Ozone."[4]

Response: The EPA believes that the commenter misconstrues EPA's obligations under section 183(e) of the Act. Section 183(e) of the Act directs EPA to regulate consumer and commercial products that generate VOC emissions. By their nature, of course, individual consumer or commercial products such as a single can of paint contain only a limited amount of VOC. The statute clearly indicates, however, that Congress decided that such products in the aggregate cause sufficient environmental harm to necessitate regulation of their VOC content. Thus, Congress has made the determination that EPA shall consider regulation of consumer and commercial products. Whether consumer and commercial products are "area sources" or not is therefore irrelevant to EPA's obligations under section 183(e) of the Act. Whether Congress based its

determination in whole, in part, or not at all, on the report questioned by the commenter does not obviate EPA's duty to regulate the VOC content of consumer and commercial products imposed by Congress.

2.4.2 Procedural Issues

2.4.2.1 Regulations Void Ab Initio

Comment: Two commenters (AIM-IV-D-214c, AIM-IV-D-214b/CP-IV-D-07b) have asserted that EPA's regulations promulgated pursuant to section 183(e) of the Act are based upon deficient procedures and are therefore of no force or effect because a court could declare them void ab initio. One of the commenters explained that the regulations should be void ab initio for several reasons. First, the commenter stated that EPA could issue no regulations unless and until EPA completes a study and listing that comply with the statutory requirements of section 183(e) of the Act. Second, the commenter asserted that EPA must determine which method of regulation would be most effective for consumer and commercial products on the basis of the environmental impacts of such method, and that EPA had failed to consider the environmental impacts in compliance with section 183(e) of the Act, EO 12866, and the Unfunded Mandates Reform Act (UMRA). Third, the commenter noted that EPA is to make rulemaking determinations based upon economic feasibility, and that EPA failed to perform economic feasibility studies in accordance with EO 12866, UMRA, and the Regulatory Flexibility Act (RFA).

Response: The EPA disagrees that the consumer and commercial product regulations are void ab initio because it has complied with the requirements of the statutes enumerated by the commenters. As explained more fully in section 2.1.1.1 of this 183-BID, EPA performed the study and the listing in accordance with the requirements of section 183(e) of the Act. As required by the statute, EPA conducted the study to determine the potential for VOC emissions from consumer and commercial products to contribute to ozone levels which violate the ozone NAAQS, and establish criteria for prioritizing the products for regulation.

In prioritizing the products for regulation, EPA considered the factors enumerated in the statute and exercised its discretion to establish the exact criteria and their application to the categories of products to determine the schedule for regulation of products. The EPA thus performed the study and listing as directed by the statute.

With regard to the commenter's second point, EPA believes that it has determined the best method to regulate the categories of consumer and commercial products consistent with the objectives of section 183(e) of the Act and other operative provisions. That section explicitly empowers EPA to choose "any" regulatory remedy to alleviate VOC emissions that the Administrator deems appropriate, including registration, labeling, self-monitoring and reporting requirements, prohibitions, limitations, and economic incentives. Section 183(e) of the Act further instructs EPA to promulgate regulations that require the "Best Available Controls" to achieve reductions. The statutory definition of "Best Available Controls" gives the Administrator explicit discretion to consider a number of factors in determining how best to obtain VOC emission reductions, including but not limited to technological and economic feasibility, and health, environmental, and energy impacts.

In the case of consumer products, architectural coatings, and automobile refinish coatings, EPA has determined that the most effective control of VOC emissions, taking into account the range of operative factors, can be achieved through limitation of the VOC content of the products at the time of manufacture. The commenter might argue that other types of regulatory controls might result in greater reductions and hence greater positive environmental impacts, or disagree with the Agency's perspective on which products to regulate, in which order, and to what degree, but EPA believes that a national rule requiring a set of VOC content limits for certain categories of products is appropriate to meet the objectives of section 183(e) of the Act. Contrary to the commenter's assertions, EPA specifically

considered the “environmental impacts” of each rule in determining that it was the best available control method for the product category. For example, in the proposed national rule for consumer products, EPA explicitly explained that the regulations as proposed would obtain a 20 percent reduction of VOC emissions from this category of products and that this would have a beneficial effect by helping to reduce tropospheric ozone and thereby helping to alleviate ozone NAAQS nonattainment and to protect human health. See April 2, 1996 Federal Register (61 FR 14531 and 14534).

Similarly, EPA disagrees with the commenter’s claims that the Agency did not comply with requirements to consider the economic feasibility of the regulations. As discussed more fully in section 2.3.2.7 of this BID and in the preambles for the final consumer products rule, architectural coatings rule, and automobile refinish coatings rule, EPA has complied with the applicable requirements of EO 12866, UMRA, and the RFA, concerning economic analysis of the regulations.

2.4.2.2 Conflict of Interest

Comment: One commenter (AIM-IV-D-49b) expressed concern that the participation of an employee of an automobile company as the chairman of a meeting of a committee reviewing a document concerning ozone precursors constituted a conflict of interest. The implication of the commenter’s assertion is that because automobiles are a major contributor to ozone nonattainment in certain areas, the participation of an employee of an automobile company on the committee could constitute a conflict of interest and that such individual could skew the outcome of the committee’s work to the detriment of manufacturers of consumer and commercial products. The committee in question was the Clean Air Scientific Advisory Committee of the Science Advisory Board (CASAC). The meeting in question occurred on July 20-21, 1994, and the purpose of the meeting was to review the draft of a report entitled “Air Quality Criteria for Ozone and Related Photochemical Oxidants.”

Response: The EPA rejects the implication of the commenter's assertions regarding bias or conflict of interest. Congress provided for the creation of CASAC as an independent scientific review committee to provide an opportunity for objective evaluation of scientific issues. See section 109(d)(2)(A) of the Act. The EPA uses CASAC to provide a balanced, independent perspective on scientific aspects of various actions taken by the Agency. To accomplish this, the committee must necessarily have representatives from various industries and groups with expertise and experience in various aspects of air pollution. It is precisely this balance that EPA believes adds credence and reliability to the recommendations of CASAC. To suggest that the committee members should only represent industries, groups, or perspectives approved by or satisfactory to a certain member of a potentially regulated community is neither sensible nor legally required.

In addition, EPA disagrees with the implication of the commenter's statements that an individual who chaired a meeting of the CASAC could in some fashion skew the outcome of the meeting to the detriment of the commenter's industry. As with all committees, the recommendations of CASAC reflect the consensus of the committee members and no one member controls the outcome of the committee's positions. Moreover, even if there were some possibility of a single member influencing the process to any degree, the recommendations of CASAC are merely advisory in nature. See section 109(d)(2)(C) of the Act. No decision of CASAC results in direct impacts upon regulated entities as the Agency merely takes such information into account in its own decision making process. The EPA notes that in the case complained about by the commenter, the supposed connection between the alleged impropriety and the ultimate impact upon the commenter is particularly attenuated. The meeting in question only addressed one report that was taken into account by the Agency. The EPA's determinations regarding regulation of consumer and commercial products are not based upon this one report alone, and thus the Agency believes that it is

unreasonable to suggest that any alleged bias therein in fact affected the commenter in any significant way.

2.4.2.3 Information Disclosure

Comment: One commenter (CP-IV-F-1a) expressed concern that members of the public did not have an opportunity to make a comparison of the various categories of consumer products or the products themselves during the process of product listing and scheduling for regulation. The commenter asserted that all such information should have been provided at the time of the section 183(e) study and report to Congress. The commenter took issue with EPA's stated intention to provide data regarding each category of product at the time of promulgation of rules applicable to such category. The commenter expressed concern that EPA was not providing the public with adequate information and may never do so. The implication of the commenter's assertions is that EPA could not perform the listing of categories of consumer products and could not schedule those categories for regulation before providing the public with all data the commenter contends are necessary to support those actions.

Response: The EPA disagrees with the commenter's assertions. First, as a factual matter, the Agency believes that the report to Congress in fact did provide information of the type to which the commenter refers. The report included explicit discussions of such topics as: (1) the findings of the Agency relevant to consumer and commercial products, (2) the comprehensive emissions inventory which detailed the relevant data for the various categories of consumer and commercial products, and (3) the explanation of the criteria EPA had developed to list and regulate consumer and commercial products. Nevertheless, the Agency made clear at the time of the report to Congress that it would continue to collect additional data in connection with the development of consumer product regulations, and that based upon such data the Agency may reassess the product listing and schedule. See March 23, 1995 Federal Register (60 FR 15264, 15265). The EPA stated explicitly that the public will

have an opportunity to comment on the listing and schedule at the time EPA proposes a product category regulation, at which time interested parties will have an opportunity to examine the data utilized by the Agency to reach its determinations. Given that the Agency could not develop perfect information on each and every category of product short of taking the same steps necessary to develop a regulation, the Agency believes that this is a practical and reasonable approach. If information subsequently developed indicates that a category of product should not be regulated, or should be regulated later in the schedule, EPA intends to act upon such information.

Second, EPA also specifically disagrees with the commenter's assertions that the data utilized by EPA were unavailable to the public. The EPA developed the data it deemed necessary to list and schedule the consumer products for regulation and then shared this information with the public. The EPA provided the data to the NAPCTAC, a committee made up of 12 members including representatives from the Agency, industry, State and local agencies, public interest groups and academia, for the ranking process. The NAPCTAC held an open meeting to discuss product listing and scheduling and shared the data with members of the public. Attendees at this meeting included representatives of the commenter. Furthermore, EPA provided all of its information to the public when it announced its initial listing of products, and has solicited comment on that information in the course of the individual consumer product regulation development. Only after consideration of these comments has the Agency made any final decisions based upon the information.

Finally, EPA disagrees with the commenter's interpretation of section 183(e) of the Act regarding the supposed obligation to provide complete data at the time of the report to Congress. Section 183(e)(2)(A) of the Act directs the Agency to conduct a study and submit a report to Congress that addresses two enumerated objectives: (1) determination of the potential to contribute to ozone nonattainment of VOC emissions from such products, and (2) establishment of the appropriate criteria to

regulate such products. The EPA believes that this statutory provision thus obligated the Agency to engage in a listing exercise based upon the information available to it. The statute does not obligate EPA to provide any particular type of data at any particular time, but rather leaves to the Agency's discretion the question of what data to take into account for purposes of listing the products and scheduling them for regulation, subject to the requirements of section 183(e)(2)(B) of the Act to take into consideration the enumerated factors as it develops regulatory criteria. The Agency believes that the adequacy of the report to Congress and the data therein are issues that are solely within the power of Congress to decide, as demonstrated by the legislative history of the Act and judicial precedents.

2.4.3 Constitutional Issues

2.4.3.1 Regulation of Consumer and Commercial Products is an Unconstitutional Restraint on Trade

Comment: One commenter (AIM-IV-D-212p6/CP-IV-D-35t, AIM-IV-D-212) asserted that consumer and commercial product regulations issued by EPA under section 183(e) of the Act constitute "an effort to place substantial restraints on interstate commerce." The commenter's reasoning was that consumer and commercial product regulations will provide market advantages to "national and international manufacturing companies" because such companies already produce products that are in compliance with the proposed consumer and commercial product rules. The commenter explained that the rules would thus give unfair advantage to some companies over other companies whose products do not comply. In the architectural coatings industry, the commenter claimed that "regional and local manufacturers" which "are involved in interstate commerce" would be hampered in their competition with the other companies whose products already comply. The commenter opined that there "may be a high probability" that other industries subject to consumer and commercial product regulations would likewise incur restraints on trade as a result of the regulations. Because of this alleged differential treatment, the commenter concluded that the consumer

and commercial product regulations result in a "substantial restraint of trade."

Response: To the extent that the commenter implies that the consumer and commercial product regulations required by section 183(e) of the Act violate the Commerce Clause of the Constitution, EPA believes that the commenter misconstrues the nature of that clause. The Constitution gives Congress the power "[t]o regulate commerce ... among the several States." U.S. Const., Art. I, section 8, cl3. Under the Commerce Clause, Congress may "regulate those activities having a substantial relationship to interstate commerce, i.e., those activities that substantially affect interstate commerce." U.S. v. Lopez, 115 S. Ct. 1624, 1629-30 (1995) (citation omitted). The courts have held that Congress acted within its powers under the Commerce Clause when it enacted the Act. See Hodel v. Virginia Surface Mining & Reclamation Ass'n., 452 U.S. 264, 289 (1981). Regulation of air pollution and of emission sources that contribute to air pollution is a legitimate exercise of authority by Congress in enacting section 183(e) of the Act, and of EPA when acting in accordance with the Act. To the extent that the commenters intended to assert that there is an equal protection clause problem with the regulation of consumer and commercial products, EPA likewise disagrees. The intent of the Agency is not to discriminate against any group or protected class, but rather to promulgate regulations that accomplish the directives of Congress to reduce VOC emissions. Because these regulations are rationally related to accomplishment of a legitimate objective, EPA disagrees that there can be any equal protection violation.

The EPA also disagrees with the commenter's conclusion that consumer and commercial product regulations will constitute unreasonable restraints of trade because of the burdens imposed upon companies that do not already comply relative to those that already do. In any regulation, those who already comply will have an advantage over those who do not. The EPA does not believe that the Agency can simply refuse to issue regulations on

the grounds that some regulated entity will suffer a greater impact than others, especially when the supposed benefit to the other entities is a result of their already producing products that are more protective of the environment. Section 183(e) of the Act directs EPA to regulate consumer and commercial products for the purposes of reducing VOC emissions; to do so, some products and some regulated entities must necessarily be affected in a way that they may consider disadvantageous. Certainly, EPA's intent in setting standards is to achieve certain environmental results, not to discriminate against or otherwise disadvantage a certain segment of an industry. In addition, the Agency has striven to tailor the rules to make appropriate adjustments for small entities in accordance with statutory directives under other applicable statutes.

The EPA notes that the specific concern of the commenter was that companies which produce predominantly solvent-based coatings cannot compete favorably with other companies which produce predominantly water-based coatings with less VOC content. The EPA has already taken a number of steps to include provisions the Agency deems appropriate to provide flexibility in the final rule for architectural coatings.

2.4.3.2 Violations of Due Process

Comment: One commenter (AIM-IV-D-212, AIM-IV-D-12p6/ CP-IV-D-35t) has alleged that EPA's rulemakings under section 183(e) of the Act included violations of the Due Process Clause of the Fifth Amendment to the U.S. Constitution. The commenter did not specify consistently whether it perceived violations of substantive due process, procedural due process, or both in each instance. The commenter did, however, note various actions that it contended were violative of due process: (1) the manner in which EPA conducted the regulatory negotiation; (2) EPA's method of ranking products for regulation; and (3) EPA's treatment of relative reactivity of VOCs.

Response: The EPA disagrees with the commenter's assertions that the Agency's actions violate due process, whether substantive or procedural. The Fifth Amendment Due Process

Clause states that “[n]o person shall ... be deprived of life, liberty, or property, without due process of law.” In the case of substantive due process for economic regulation, like that at issue with the consumer and commercial product regulations, “[i]t is enough that there is an evil at hand for correction, and that it might be thought that the particular legislative measure was a rational way to correct it.” Williamson v. Lee Optical of Oklahoma, Inc., 348 U.S. 483, 488 (1955). As described more fully elsewhere in this 183-BID, EPA has legal authority to issue the regulations under section 183(e) of the Act. The EPA’s duty to protect public safety and health under the Act is explicit. Because the regulations issued by EPA pursuant to section 183(e) of the Act, are designed to reduce tropospheric ozone, a pollutant with adverse effects upon human health and the public welfare, the regulations are rationally related to Congress' objective. The Agency thus believes that the commenter has no basis for complaint that the regulations are inconsistent with the requirements of substantive due process.

With regard to procedural due process, EPA likewise disagrees with the commenter’s assertions. As described more fully elsewhere in this 183-BID, EPA followed the requisite procedures in connection with the three items the commenter enumerated: (1) the regulatory negotiation process, (2) the ranking of products, and (3) the consideration of VOC reactivity. In particular, EPA notes that the public, including the commenter, have had the opportunity to participate throughout the development of the regulations from the lengthy regulatory negotiation process through the close of the comment period for each rule. To the extent that the commenter or others have had significant comments regarding the decisions reached by the Agency in connection with the section 183(e) study and report to Congress, the listing of products, the scheduling of products for regulation, and the product regulations themselves, EPA will take such comments into account in the final rules for the appropriate consumer and commercial product category.

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16. ABSTRACT

A study and report to Congress were completed on March 23, 1995 pursuant to section 183(e) of the Clean Air Act. This document contains summaries of public comments on the study and report, along with EPA's responses to those comments.

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