New Jersey Low Emission Gasoline Program Rule

Control and Prohibition of Air Pollution by Vehicles Fuels

N.J.A.C. 7:27 - 25.8, 25.9, and 25.10

Clean Air Act Section 211 (c)(4)(C)

Waiver Request

November 16, 1998

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I. Background:

Under Clean Air Act (CAA) §211(c) (4), states are generally preempted from prescribing or attempting enforcement of regulations applicable to fuels or fuel properties that are more stringent than federal regulations. However, CAA §211(c)(4)(C) does authorize the Administrator to approve such regulations by individual states, i.e., grant a "§211(c)(4)(C) waiver", upon a finding that the control measure(s) contained in the state's implementation plan is necessary to achieve the primary or secondary National Ambient Air Quality Standards (NAAQS). Specifically, the Administrator may make this finding "only if he finds that the State control or prohibition is necessary to achieve the national primary or secondary ambient air quality standard which the plan implements. The Administrator may find that a State control or prohibition is necessary to achieve that standard if no other measures that would bring about timely attainment exist, or if other measures exist and are technically possible to implement, but are unreasonable or impracticable. The Administrator may make a finding of necessity under this subparagraph even if the plan for the area does not contain an approved demonstration of timely attainment."

New Jersey has counties in two Air Quality Control Regions (AQCR's) designated as "severe" ozone non-attainment areas under the Clean Air Act. As such it is required to reach attainment in these areas by 2005 (Philadelphia-Wilmington-Trenton area) and 2007 (New York-Northern New Jersey-Long Island). To assure timely attainment by such dates the Congress has also required[1] that steady progress be made toward attainment, through average emission reductions of about 3% per year. The first demonstration of such progress was due in 1993 and termed the 15% Volatile Organic Compound (VOC) Plan since it covered progress from 1991-1996 (5 years), and was limited to VOC emissions. New Jersey's demonstration of such progress was submitted to the United States Environmental Protection Agency (USEPA) as part of its Phase I Ozone State Implementation Plan (SIP) on December 31, 1996.

By letter dated December 12, 1997, from William J. Muszynski, P.E., Deputy Regional Administrator, Region II, USEPA, to Commissioners Robert C. Shinn, Jr., and John J. Haley, Jr., NJDOT, USEPA disapproved the 15% VOC Rate of Progress Plan portion of New Jersey's previously-approved Phase I SIP. The disapproval was triggered by the forgone conclusion that benefits included in the plan from the enhanced Inspection and Maintenance (I/M) program would not be forthcoming within the necessary time frame previously assumed in USEPA's approval of the 15% Rate of Progress Plan. Accordingly, expeditious State adoption, the USEPA approval, and implementation of substitute control measures would be necessary to cure the State's shortfall in meeting the 1996 VOC milestone towards attainment of the NAAQS for ozone. In the State's plan, this shortfall is about 45 tons per day of VOC emissions considering both the AQCRs described above.

[1] 42 U.S.A. §. 7511a (or CAA § 182)

As required by the Clean Air Act, New Jersey recently made a demonstration to the USEPA that its SIP will result in the attainment of the one-hour NAAQS for ozone within the time frame required by the Clean Air Act.[2] New Jersey is required to make such a demonstration for eighteen of its twenty-one counties. These counties are associated with two multi-state non-attainment areas; the Philadelphia-Wilmington-Trenton non-attainment area and the New York-Northern New Jersey-Long Island non-attainment area.

For the Philadelphia, Southern and Central New Jersey region, an area which includes the Philadelphia-Wilmington-Trenton non-attainment area, the results indicate that with further and full implementation of the measures mandated by the Clean Air Act and with a broad Regional nitrogen oxide (NO_x) Emission Reduction cap similar to or more stringent than the one recently proposed by the USEPA[3], attainment with the one-hour standard by 2005 is a reasonable expectation. For New Jersey, the meeting of these requirements, i.e., the mandated Clean Air Act measures and NO_x Budget Cap, was projected[4] to require a 33% of VOC emission reduction, and a 49% NO_x emission reduction, both relative to 1990 emission levels. With respect to the New York, Northern New Jersey, Southern Connecticut region, an area which includes the New York-Northern New Jersey-Long Island non-attainment area, the results indicate that substantial reductions in ozone concentrations will be achieved through further implementation of Clean Air Act measures and a Regional NO_x Cap Program similar to what the USEPA had proposed in its Finding of Significant Contribution and Proposed Rule on November 7, 1997. Using 1998 air quality data as the starting point, projections of future ozone air quality levels indicate this non-attainment area also will reach attainment from the implementation of the Clean Air Act measures and the Regional NO_x cap. However, variations in recent air quality measurements at the sites with the higher design values and other modeling results predicting ozone concentrations directly introduce uncertainty in the above projection. An analysis of that uncertainty indicates that additional VOC or NO_x emission reductions in the affected states, up to 11 % VOC or to 12 % NO_x, or an intermediate combination of VOC and NO_x may be needed for attainment. Based on this uncertainty, the State committed, in its Phase II Ozone SIP, to evaluate control strategies and measures to achieve this level of emission reduction. One such control strategy is a NO_x emission performance or sulfur reduction standard for gasoline sold in New Jersey, that is more stringent than that currently provided by Federal gasoline formulation requirements[5]. In addition, the analysis in the Phase II Ozone SIP indicates that further emission reductions, beyond the Clean Air Act-mandated measures and the USEPA NO_x cap will be needed to attain the new eight-hour ozone standard.

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[2] New Jersey Phase II Ozone State Implementation Plan, August 31, 1998.

[3] On the September 24, 1998 the USEPA adopted a rule requiring such NO_x emission caps, FR 57356.

[4] New Jersey Phase II Ozone SIP, Tables 15 and 16.

[5] Environmental Protection Agency, 40CFR Part 80, Regulation of Fuels and Fuel Additives; Standards for Reformulated and Conventional Gasoline; Final Rule, February 16, 1994, FR 7716.

Consequently, it is clear that New Jersey will need to provide for substantial VOC reductions (~33-44%) and NO_x reductions (~49-61%) before 2007 to achieve the ozone NAAQS. The Clean Air Act prudently recognizes that such reductions should be pursued on a steady continuing bases[6]. For VOC reductions, this would imply that by 1999, the State should be about half way towards its 2007 objective or about a 20% or 60 ton per day reduction. The disapproval of the State's 15% ROP Plan places an even greater burden on the State to restore and continue that progress in the near term, i.e. by 1999. For NO_x reductions, most of the requisite reductions will come as the Department implements the OTC MOU and the USEPA Regional NO_x Budget Cap, however there are likely additional NO_x reductions needed, as discussed above.

II. The New Jersey Fuel Proposal:

The New Jersey Department of Environmental Protection (the Department) is proposing to establish additional requirements for gasoline sold in New Jersey which would result in lower emissions of the ozone precursors known as volatile organic compounds (VOCs) and oxides of nitrogen (NO_x) as part of a new, two-phase low emission gasoline program. The Department is proposing this program in furtherance of the State's efforts to attain and maintain the National Ambient Air Quality Standard (NAAQS) for ozone. Specifically, Phase I of this program will accelerate the VOC emission reduction benefits that are anticipated from Phase II of the Federal reformulated gasoline program, and thus will provide near term (by 1999) progress toward meeting the emission reductions needed to attain the NAAQS, as discussed above. It will also serve as a transition to Phase II of this program. Phase II of the program will provide for additional NO_x reductions, beyond those emissioned in Phase II of the Federal reformulated gasoline program. Therefore Phase II will partially address the projected uncertainty in New Jersey's Phase II Ozone SIP, as to the extent to which the State may fail to achieve the one-hour NAAQS for ozone in the northern portion of the state by the year 2007, and the anticipated further emission reductions needed for attainment of the recently adopted eight-hour standard for ozone.

Therefore, the VOC emission standards proposed herein for Phase I of New Jersey's new low emission fuel program are intended to assure steady, continuing emission reductions and ozone concentration reduction progress, toward attaining the ozone NAAQS. Regarding NO_x, the Phase I proposal serves as a transition to Phase II of New Jersey's new low emission gasoline program, which in turn will address other air quality needs of the State. The additional NO_x emission reductions presented below from the proposed Phase II low emission gasoline program relative to the federal program are intended to partially address ozone NAAQS attainment uncertainties raised by the Department's Phase II Ozone SIP, and the anticipated further emission reductions needed for attainment of the recently adopted eight-hour standard for ozone. Given the supportive nature of Phase I effort to the Phase II NO_x benefits, NO_x emission reduction alternatives are considered under the Phase II discussion (Section VI-VIII).

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[6] 42 U.S.C. § 182

The Department has estimated the emission reduction benefits from the Phase I and II Proposal. These estimates are provided below and are incremental to the Federal reformulated gas program in effect at the starting years of the Phase I (1999) and Phase II (2003) programs.

Table 1
Emission Reduction Benefits from
New Jersey Vehicle Fuel Proposal

	VOC (tons/day)	NO_x (tons/day)
Phase I: 1999 - 2002	18-23	0
Phase II: 2003	0	12-13

III. <u>Criteria for Alternate Measure Evaluation for Phase I of the Proposal:</u>

In proposing this fuel measure, the Department has, as required by §211(c) (4) (C), considered alternatives measures to determine whether other measures exist and are possible to implement, and if such measures exist, whether they are "unreasonable or impracticable".[7] To structure and provide consistency in making these determinations, the Department developed criteria to compare possible alternative measures against. Those criteria as regards the Phase I proposal are discussed below.

Considering the air quality improvements and requisite near term VOC reduction objective sought by the Department through this proposal, the Department has used the criteria below to determine whether alternative measures exist that are practicable and reasonable to implement. To qualify as a reasonable and practicable alternative to the preempted gasoline control, the measure must meet the following criteria:

1. be able to provide substantial and actual VOC emission reductions comparable to the Phase I gasoline proposal, i.e., about 20 tons per day or greater,

2. be implementable by 1999, i.e., emission reductions are actually achieved by the 1999 "ozone season",

[7] 42 U.S.C. §7545 (c) (4) (C)

3. not require excessive costs to industry, consumers, or the State, and

4. not result in any other significant adverse societal health or welfare impact.

Regarding the first criterion, it could be argued that it is too restrictive, and that emission reductions comparable to 20 tons per day could be drawn from number of lesser emission source categories, each one yielding only a few tons per day reduction. The Department does not intend to discard consideration of any potential cost-effective emission reductions in the longer term. However, it would be impracticable for the State Air Program from a resource standpoint to analyze and deploy a multitude of measures on different emission source categories by the summer of 1999 (criterion #2). Therefore only measures applied to a single source emission category that yield emission reductions comparable to 20 tons per day are considered practicable for the near term objective.

IV. Evaluation of Potential Alternatives to the Phase I Proposal

Listings of potential emission source categories are provided in Table 2 (mobile) and Table 3 (point and area). These tables are followed by a discussion of each source category, comparing it against the criteria derived above.

Table 2
Potential Mobile Emission Source Categories

1. Enhanced Inspection and Maintenance (I/M)

2. Basic I/M

3. Federal Reformulated Gasoline/Phase I

4. Federal Reformulated Gasoline/Phase II

5. California Low Emission Vehicles

6. Clean Fuel Fleets

7. Non-Road Engines/Vehicles

8. Employee Commute Options

9. Transportation Control Measures

10. Accelerated Vehicle Retirement

A. Discussion of Potential Mobile Source Control Measures:

1. Enhanced Inspection and Maintenance (I/M)

The State of New Jersey currently operates a basic inspection and maintenance (I/M) program and is working toward the implementation of an enhanced I/M program. On December 12, 1997, the United States Environmental Protection Agency (USEPA) found that the State had failed to implement the enhanced I/M program on the schedule in the SIP, and that such delays would result in the State not realizing the emission credit it claimed in its 15% volatile organic compound (VOC) Rate of Progress (ROP) plans for its enhanced I/M program (45 tons per day). As such, the USEPA disapproved the State's 15% ROP plans, initiating sanction and Federal Implementation clocks.

The State of New Jersey is working as quickly as possible to implement its enhanced I/M program, thereby avoiding Federal sanctions. As part of its Request for Proposal (RFP) for an enhanced I/M contractor, the State included an incentive of $3 million dollars to the successful contractor for earlier implementation. In order to expedite the transition to the enhanced I/M program, the State altered the test frequency of its basic I/M program from annual inspections to biennial inspections upon award of the I/M contract. Simultaneous with this test frequency modification, the State of New Jersey requires fuel cap inspections to identify faulty fuel caps as part of its basic I/M program. Implementation of fuel cap inspection is needed to address the shortfall in VOC emission benefits from the basic I/M test frequency modification.

The State is doing all it can to expedite the implementation of its enhanced I/M program. Inspection lanes will be retrofitted beginning in late 1998, and in 1999. However the USEPA has indicated that the State cannot take SIP credit for the program until it is fully operational. Startup prior to November, 1999 would begin to yield emission benefits, however given construction uncertainties and the past difficulties of the program it is unlikely that any significant benefits will accrue by the summer of 1999, thereby not meeting criteria 1 and 2. Thus this measure is not a practical alternative to the preempted Phase I state gasoline controls.

2. Basic I/M

During the transition to an enhanced I/M program, the State will continue to require compliance with its basic I/M program. It is possible that the State could modify its basic I/M program in the interim to gain additional emission benefit. However, as agreed to by the USEPA in its approval of the State's biennial SIP revision, implementation of any of these modifications to the State's basic I/M program are not practicable because they would disrupt the transition to the greater emission-reducing enhanced I/M program. In addition, these modifications would generate relatively small emission reductions, well below the 20 ton per day requirement of Criterion #1. Therefore this measure is not a practicable alternative to the preempted Phase I State gasoline controls.

3. Federal Reformulated Gasoline/Phase I

42 U.S.C. §7545(k)(1) requires that reformulated gasoline be used in gasoline-fueled vehicles in specified non-attainment areas. These specified non-attainment areas are in the nine major metropolitan districts of the country, including Philadelphia-Wilmington-Trenton and New York-Northern New Jersey-Long Island, which registered the highest ozone levels during the period between 1987 and 1989. As a result of this requirement, and the discretion provided for in 42 U.S.C. § 7545(k)(6), New Jersey is currently subject to the Phase I reformulated gasoline requirements. This measure is already included in the State's ROP and attainment demonstration plans, making it unavailable to be used again as a practical alternative to the Phase I gasoline proposal.

4. Federal Reformulated Gasoline/Phase II

The requirements which establish the performance standard for reformulated gasoline state that effective in calendar year 2000 and thereafter, the volatile organic compounds (VOCs) from vehicles when using reformulated gasoline shall be 25 % below the aggregate VOC emissions when using conventional gasoline. This is considered Phase II reformulated gasoline. Until the year 2000, reformulated gasoline is only required to reduce VOC emissions 15 %.

Although the additional VOC reductions anticipated from the implementation of Phase II reformulated gasoline are significant, this program will not occur until after the 1999 summer ozone season, violating Criterion #2. Therefore this measure is not a practicable alternative to the preempted Phase I State gasoline controls.

5. California Low Emission Vehicles/ National Low Emission Vehicles

The Ozone Transport Commission (OTC), of which New Jersey is a member, previously petitioned the USEPA to require Low Emission Vehicles (LEVs) throughout the Northeastern Ozone Transport Region (OTR). After a lengthy negotiation process, the USEPA proposed and subsequently promulgated a rule creating a National Low Emission Vehicle program (NLEV). This national program was found by the USEPA to be equivalent to the California Low Emission Vehicle program. New Jersey has opted to participate in the NLEV program. On March 2, 1998, the USEPA found the NLEV program in effect.

Since the State of New Jersey is already participating in the NLEV program, it is no longer an available program to generate additional emission reductions. Also, the NLEV program calls for manufacturers to produce cleaner motor vehicles model year for model year 1999 and later model year certification. As such, this program's benefits will begin to be realized in 1998. However, given historical rates of new car sales, it is unlikely that significant emission reductions will be realized by the summer of 1999 (criterion #1). Therefore this measure is not a practicable alternative to the preempted Phase I State gasoline controls.

6. Clean Fuel Fleets

42 U.S.C. §7586(a) requires all serious and higher classified ozone non-attainment areas to develop and implement Clean Fuel Fleet programs. On March 6, 1997, New Jersey submitted to the USEPA a supplement to its February 15, 1996 Clean Fuel Fleet SIP which contained an incentive-based plan known as the New Jersey Clean Fleets (NJCF) program. On November 20, 1997, the USEPA proposed approval of New Jersey's plan. Final approval is expected shortly.

While it may be possible to include additional items, in the NJCF SIP, such an undertaking would require extensive work with the member participants, and any additional emission reductions would likely take time to develop. Since Criterion #2 requires that any practical alternative be in place by the 1999 summer ozone season, this type of action would be infeasible as an alternative to the low RVP rule proposal. In addition, the emissions anticipated from any further modifications to the NJCF SIP in the near term would be relatively small, well below the 20 ton per day required by Criterion #1. Therefore this measure is not a practicable alternative to the preempted Phase I State gasoline controls.

7. Non-Road Engines or Vehicles

Non-road engines/vehicles can contribute significantly to summertime VOC emissions.[8] Standards for such engines/vehicles are under federal preemption.

On May 16, 1994, USEPA published a notice of proposed rule-making for non-road engines.[9] The Federal Register notice, Control of Air Pollution; Emission Standards for New Non-road Spark-Ignition Engines at or Below 19 Kilowatts, proposed the emission standards which are expected to result in a 32% reduction in hydrocarbon (HC) emissions and a 14% reduction in carbon monoxide emissions nationally by the year 2020 when complete fleet turnover is projected.

A July 3, 1995 Federal Register notice contained the final rule on the emission standards for the new non-road gasoline engines at or below 19 kilowatts. This rule became effective with 1997 model year. The Regulatory Impact Analysis and Regulatory Support Document (RIA/RSD) for this final rule[10] contains national emission impacts expected from this rule. Annual emissions reductions increase greatly in the first few years of the program and level off as fleet turnover is achieved. According to the RIA/RSD and the final non-road rule-making, USEPA has determined that the new non-road standards will cause a reduction of VOC emissions by 13.1 % in 1997, 19.5% in 1998 and 23.9% in 1999 nationally.

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[8] USEPA Non-road Engine and Vehicle Emission Study - Report, November 1991

[9] 59FR-25399

[10] Regulatory Impact Analyses and Regulatory Support Document Control of Air Pollution; Emission Standards for New Non-Road Spark Ignition Engines Peak 19 Kilowatts; May, 1995

In its 15% SIP, the state did not claim any emission reductions from the new small non-road engine standards. Based upon population growth, New Jersey projected VOC emissions from the non-road sources increase from the 1990 base year inventory. "Table 34: Projected Off-Highway Mobile Source VOC Emission Inventory by Category" in the New Jersey Phase I SIP lists the 1990 baseline VOC emissions and the 1996 and 1999 emission projections for non-road engines in the state. Appendix VII - Attachment F, "Projected Off-Highway Mobile Source Emission Inventory by Source Category, County and AQCR" was used to extract the engine categories affected by the non-road final rule in the New York City and Philadelphia AQCRs. Non-road engine categories such as generator sets, pumps and welders contain a number of diesel powered engines. The 1990 base year emission inventory prepared by USEPA as part of the non-road study was used to subtract the VOC emissions attributable to the diesel engines, leaving only the VOC emissions from the small gasoline non-road engines.

The total 1990 estimated VOC emissions attributable to small non-road gasoline engines uncontrolled are 67.6 tons per day for the New York City ACR and 23.8 tons per day for the Philadelphia ACR. Therefore, the total 1999 non-road VOC emissions uncontrolled for the two AQCR is 91 tons per day.

Based on the above, the projected emission reduction is about 22 tons per day by the 1999 ozone season.

This measure meets criterion #1. However, the benefit from this measure and the benefit from the Phase I fuel rule (about 20 tons per day) would both be needed to approach the 20% objective cited in Section I. Therefore this measure is not an alternative to the Phase I Proposal, but rather a complementary, essential action. Additionally, as will be discussed in Section VII, this measure is not an alternative to Phase II of the State's low emission gasoline proposal because it was included in the controls that were modeled in the State's ozone attainment demonstration, and will likely be included in future ROP plans. Therefore it cannot serve to meet the additional emission needs to reduce the uncertainty toward attaining the 1-hour standard that resulted from that modeling (Section I).

8. Employee Commute Options

42 U.S.C. §7511a(d)(1)(B) required severe and extreme ozone non-attainment areas to develop and implement an employer trip reduction (ETR) program, also known as the employee commute option (ECO) program. On December 6, 1994, the USEPA proposed approval of New Jersey's ETR program. On December 23, 1995, President Clinton signed Public Law 104-70, which allowed states to withdraw their mandatory ETR program in accordance with state law as long as the state achieved equivalent emission reductions (42 U.S.C. §7511a(d)(1)(B)). On November 1, 1996, New Jersey repealed the mandatory ETR sections of the New Jersey Traffic Congestion and Air Pollution Control Act (P.L. 1996, c.121).

The New Jersey Department of Transportation (NJDOT) is in the process of developing an Employer Trip Reduction Replacement Package which consists of three components. The three components are: 1) a voluntary employer trip reduction program; 2) transportation control measures (TCM's); and 3) transportation technology measures. The State intends to use these three

components to meet the required emission reductions that would have been experienced from mandatory implementation of the State's ETR program. Thus the State cannot also use these measures as an alternative control measure to the Phase I gasoline proposal.

The State predicted in its 15% ROP plans that the mandatory ETR program would result in about a 3 ton per day (TPD) VOC reduction statewide. The ETR Replacement Package, therefore, must result in a 3 TPD VOC reduction statewide. Even if the State could use this replacement package as a practicable control measure, it would not provide for the necessary emission reductions of 20 TPD, which violates Criterion #1. Additionally there have been public concerns with such measures, e.g., high occupancy vehicle lanes, thus potentially violating criterion #4. Therefore this measure is not a practicable alternative to the preempted Phase I State gasoline controls.

9. Transportation Control Measures

As mentioned in the discussion of Employee Commute Options above, any TCMs under consideration by the State will be used to assist the state in replacing the 3 ton per day VOC reductions lost from the repeal of New Jersey's mandatory ETR program. As such, use of these measures is not a practicable option in regard to the Phase I gasoline proposal (violates Criterion #1). As with the Employee Commute Options, and recognizing the public acceptance difficulties for measures such as high-occupancy vehicle lanes, any reductions from implemented TCMs would be minimal and would not be realized by the 1999 summer ozone season (violation of Criterion # 2). Therefore this measure is not a practicable alternative to the preempted Phase I State gasoline controls.

10. Accelerated Vehicle Retirement

P.L. 1993, c. 69, required the then New Jersey Department of Environmental Protection and Energy (NJDEPE), now the NJDEP, to develop a plan for the implementation of an accelerated vehicle retirement program, also known as a vehicle scrappage program. This comprehensive plan was to be submitted to the New Jersey State Legislature on March 10, 1994. The NJDEPE complied with this requirement, and, submitted its comprehensive accelerated vehicle retirement program to the State legislature. The State legislature has taken no further action on this plan.

The State conducted workshop**s** on the practicality of implementing an accelerated vehicle retirement program in New Jersey. The response from the public has been extremely negative. In addition, a State-run accelerated vehicle retirement program would be expensive (violating criterion #3) to implement. This type of program could not be implemented in time to see emission reductions by the 1999 summer ozone season (violating criterion #2) and its predicted VOC emission reduction potential, although difficult to quantify due to the inevitable replacement of a retired vehicle by another vehicle, is not expected to be near the 20 ton per day range (violation of Criterion #1). Therefore this measure is not a practicable alternative to the preempted Phase I State gasoline controls.

B. Discussion of Point and Area Source Control Measures:

A list of possible VOC source categories from which additional VOC emission reductions might be secured is provided in Table 3. This list was derived largely from a 1993 report by the State and Territorial Air Pollution Program Administrators (STAPPA) and the Association of Local Air Pollution Control Officials (ALAPCO)[11]. Each measure is identified by its number in Table 4 and is discussed below.

Emission Level Criteria:

Based on reported emissions for 1996 of facilities with emissions greater than 10 tons per year, through the NJDEP emission statement program (Table 4), the VOC daily emission rate for the source categories numbered 3, 4, 8,11, 15, 19, 20, 27, 28, 30, 32, 34, 35 and 38 in Table 3 is less than 3 tons per day. Even of the emissions from these sources could be eliminated, which is unlikely, none of them could provide the reductions comparable to the 20 ton per day criteria. Therefore, these sources do not meet criterion #1 and were eliminated from further consideration.

Based on the emission estimates in Table 4 and Figure 1, the VOC daily emission rates for source categories numbered 7, 8, 17, 23, 26, 33, 40, 41, 42, 43, 44 and 45 in Table 3 are less than 10 tons per day. Therefore emission control or further emission control on any of these sources categories individually (if it were practical) could not yield emission reduction benefits comparable to 20 tons per day, i.e., criterion #1. Additionally, creating standards in a number of these categories together is impracticable in the short term, i.e., by the summer 1999. (criterion #2). In addition categories 7, 8, 17, 23, 33, 40, 42 and 43 are already regulated by the state and it is unlikely that even is combination, further regulation of these source categories would result in emission reduction benefits comparable to criterion #1. Therefore none of these source categories i.e. numbers 7, 8, 17, 23, 26, 33, 40, 41, 42, 43, 44, and 45 of Table 3 are considered practical options with regard to the Phase I gasoline proposal.

Emerging Federal Measures :

It is generally recognized [12] that the regulation of VOC emissions from architectural and industrial maintenance (AIMS) coatings (stationary/area source category #5), autobody refinishing (#6), and consumer and commercial products (#13) are best performed, at least initially, at a national level. The USEPA was directed by the Congress in the Clean Air Act Amendments[13] of 1990 to pursue the control of emissions from such source categories and has developed implementing rules. These measures are discussed below.

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[11] STAPPA/ALAPCO Report; Meeting the 15% Rate of Progress Requirements Under the Clean Air Act, A Menu of Options, September, 1993

[12] OTAG 1997; Executive Report

[13] 42 U.S.C. § 183

Table 3
Listing of Potential Point and Area Emission Sources for Securing Emission Reduction

1. Adhesives
2. Aerosol Paints
3. Aerospace Manufacturing and Rework
4. Aluminum Rolling Mills
5. Architectural and Industrial Maintenance Coatings
6. Automobile Refinishing
7. Automobile Assembly
8. Bakeries
9. Batch Processes
10. Coke By-Product Recovery Plan
11. Coke Oven Batteries
12. Commercial Ethylene Oxide Sterilization
13. Consumer and Commercial Products
14. Degreasing
15. Glass Forming
16. Graphic Arts - Rotogravure and Flexographic Printing
17. Highway Paints
18. Industrial Wastewater Treatment
19. Iron and Steel Foundries
20. Iron and Steel Industry/Sinter Plants
21. Landfill Gases
22. Marina Gasoline Refueling
23. Marine Vessel Loading
24. Offset Lithographic Printing
25. Pesticide Application
26. Pharmaceuticals
27. Publicly Owned Treatment Works
28. Pulp and Paper
29. Rule Effectiveness Improvement
30. Shipbuilding and Ship Repair
31. Stage II Vapor Recovery
32. Surface Coating of Plastic Parts
33. Synthetic Organic Chemical Manufacturing Industry Reactor and Distillation Process
34. Textile Finishing
35. Treatment, Storage and Disposal Facilities
36. Underground Storage Tank Vents
37. Volatile Organic Liquids Storage
38. Whiskey Distilleries
39. Wood and Furniture Coating
40. Alcoholic Beverage Production
41. Aircraft
42. Roofing Asphalt
43. Dry Cleaning
44. Farm Equipment
45. Locomotives
46. MACT Standards
47. Metal Coil and Can Coatings
48. Cutback /Emulsified Asphalt
49. Multiple Sources

Table 4
Current Reported VOC Emissions for Certain Source Categories

Source Category Number and Name from Table 3		Emission (tons per day)
3	Aerospace Manufacturing	<1.0
4	Aluminum Rolling Mills	<1.0
7	Automobile Assembly	5.6
8	Bakeries	<1.0
11	Coke Oven Batteries	<1.0
12	Commercial Ethylene Oxide	8.6
15	Glass Forming	<1.0
16 & 24	Printing	7.7
19	Iron and Steel Foundries	3.2
20	Iron and Steel Sinter Plants	<1.0
23	Marine Vessel Loading	4.5
26	Pharmaceuticals	3.5
27	Publicly Owned Treatment Works	<1.0
28	Pulp and Paper	<1.0
30	Shipbuilding and Ship Repair	1.5
32	Surface Coatings of Plastics	2.8
33	Synthetic Organic Chemicals	8.8
34	Textile Finishing	<1.0
35	Treatment, Storage, and Disposal Facilities	<1.0
38	Whiskey Distilleries	<1.0

5. Architectural and Industrial Maintenance (AIMS) Coatings

Regarding AIMS, a recent USEPA rule is anticipated to provide substantial benefits by 1999 relative to uncontrolled situations, i.e., on the order of 20% of an uncontrolled AIMS emission inventory. Numerically that figure for New Jersey based on current estimates would be about 8 tons per day. However, New Jersey already regulates AIM coatings to a substantial degree, and internal NJDEP estimates predict that the federal rule will provide actual additional emissions reductions of only about 10 % of the existing benefit of 7 tons per day, or about 1 ton per day. Thus the use of this measure will not provide for actual emission reductions comparable to the Phase I proposal (criterion #1).

Regarding possible additional AIM controls it has been suggested[14] that extension of controls to additional subcategories of coatings and further controls on current subcategories[15] beyond those addressed in the forthcoming USEPA rule may yield significant additional VOC emission reductions. However, an examination of further controls must logically await a review of the final USEPA rule which was adopted in late 1998. This does not leave sufficient time to assess and adopt measures and have new products and practices operable by the summer of 1999, thereby failing the criterion #2 test. Additionally, as will be discussed in Section VII, this measure is not an alternative to Phase II of the proposal because it was included in the controls that were modeled in the State's ozone attainment demonstration, and will likely be included in future ROP plans. Therefore it cannot serve to meet the additional emission needs to reduce the uncertainty toward attaining the 1-hour standard that resulted from that modeling (Section I).

6. Autobody Refinishing

From Figure 1, the projected 1999 uncontrolled VOC emissions for the autobody refinishing source category are about 47 tons per day. The USEPA has projected[16] that their emerging rule will yield about a 37% control efficiency benefit, or for New Jersey, about 17 tons per day (See also Table 2).

New Jersey currently regulates[17] the VOC content of automobile refinishing coatings with certain exemptions. However, the majority of New Jersey's automobile refinishing facilities are small and not covered by Subchapter 16 emission limitations. Therefore much of the benefit from the USEPA rule may result in actual emission reductions relative to current levels. In addition, a 17 ton per day emission reduction is comparable to the reduction anticipated from the Phase I fuel proposal (criterion #1).

However, the VOC benefits from all three measures; gasoline rule (~20 tons per day), non-road engine standards (~22 tons per day) and autobody refinishing (~17 tons per day) are all needed (total of 59 tons per day) to approach the 20% VOC reduction (60 tons per day) objective cited in Section I. Therefore, this measure does not serve as an alternative to the Phase I fuel proposal, but rather is an essential complementary measure to achieve program objectives. Additionally, as will be discussed in Section VII, this measure is not an alternative to Phase II of the proposal because it was included in the baseline controls that were modeled in the State's ozone attainment demonstration, and will likely be included in future ROP plans. Therefore it cannot serve to meet the additional emission needs to reduce the uncertainty toward attaining the 1-hour standard (Section I).

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[14] USEPA Region I; Draft Staff Paper on Possible Additional Control Measures to Help the New England States Reach Attainment of the Ozone Standard, USEPA Region I, 1997.

[15] E. H. Pechan and Associates; Additional Control Measure Evaluation for the Integrated Implementation of the Ozone and Particulate Matter NAAQS, July 17, 1997.

[16] USEPA Memorandum from John Seitz, Director, Office of Air Quality Planning and Standards, September 10, 1993

[17] N.J.A.C. 7:27-16.7, Table 7A

13. Consumer and Commercial Products

Consumer and Commercial products are a major source of VOC emissions. From Figure 1, the estimated emissions in 1999 are about 62 tons per year**.**

New Jersey adopted standards[18] for certain consumer products in 1995 providing for a 7.8 ton per day benefit[19] or about a 12 percent reduction in emissions from this source category.

On September 11, 1998 the USEPA adopted a rule covering 24 categories of household consumer products. The proposed USEPA rule estimated an emission reduction of 20 percent.[20] The rule covers those categories of products that the USEPA considered most amenable to regulations, i.e. without causing significant impact on product quality or price. Additionally, the California Air Resources Board (CARB) is developing additional measures and expanding the coverage of products regulated. These new measures are anticipated to provide an additional 33 percent reduction[21] beyond the current federal rule "baseline".

Consequently there may be opportunity for further significant emission reductions in this source category thereby passing criterion #1. However, there is a need to evaluate a wide variety of products and issues relating to product quality, cost, and potential supply difficulties that may posed by differing state regulations on products that are sold in many states. As a practical matter such studies could not be completed, new rules adopted, and products reformulated and marketed by the summer of 1999. Therefore, although a candidate for longer term reductions, this measure does not meet criterion #2. Therefore this measure is not a practicable alternative to the preempted Phase I State gasoline controls.

Potential State Measures:

1. Adhesives

National VOC emissions have been estimated at 3,680 tons per year from consumer products adhesives and 605,800 tons per year from industrial adhesives.[22] New Jersey currently regulates only consumer products adhesives.[23] There may be opportunity for securing additional emission reductions

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[18] N.J.A.C. 7:27-23

[19] New Jersey Phase I Ozone SIP; Appendix V: Table 20

[20] USEPA Consumer Products Rule; 63FR 148792, 1998

[21] E. H. Pechan and Associates, Additional Control Measure Evaluation for the Integrated Implementation of the Ozone and PM NAAQS, July 17, 1997

[22] STAPPA/ALAPCO; 1993

[23] N.J.A.C. 7:27-24.3

particularly in the industrial category through reformulation (lower VOC content) and the use of add-on control equipment, potentially up to 70%.[24] More specifically Pechan and Associates[25] has estimated the emission reduction potential from industrial adhesive reformulation and dispensing and packaging improvement at about 23 tons per day for the "Philadelphia non-attainment area (which includes South Central New Jersey), and 74 tons per day for the New York non-attainment area (which includes Northern New Jersey).

Consequently, this measure may meet criterion #1. However the impact of application of lower VOC content limits and other proposal on adhesive formulation needs to be fully evaluated for its impact on product quality, costs, and other factors. Given the variety of adhesives and uses, this will require consultation with a number of interested parties. This consultative process cannot practicably be completed and rules written or other measures put in place to secure benefits for the 1999 "ozone season" (criterion #2). Therefore this option is not a practicable alternative as regards the Phase I gasoline proposal, but should be considered for the longer term.

2. Aerosol Paints

From Figure 1 it can be seen that consumer products constitute a significant VOC emission source, i.e., about 62 tons per day. Aerosols, including paints, are expected to contribute a fraction of that number, about 9 tons per day.[26]

The three primary components of aerosol paints are pigments/resins, the solvent, and the propellant. Aerosol paint VOC emissions originate from the use of solvents as a coating component and as a propellant for the application process.

Control options for regulating VOC emissions from aerosol paints include product modification (reformulation and changes to propellant systems) and add-on control equipment. Aerosol paint reformulation requires increasing the solids content, or altering the composition or percentage of one or more of the three primary aerosol paint components. Product modification is generally considered to be more practical than the use of add-on control equipment for aerosol paints.

In March 1995, the California Air Resources Board (CAB) adopted a statewide rule to regulate VOC emissions from aerosol coatings by establishing VOC limits for a variety of aerosol coating types. Manufacturers are expected to comply through product reformulation, replacement of the propellant

[24] E. H. Pechan and Associates; Additional Control Measures Evaluation for the Integrated Implementation of the Ozone and Particulate Matter NAAQS, July 17, 1997

[25] E. H. Pechan and Associates; Control Measure Analysis of Ozone and PM Alternatives July 17, 1997

[26] Internal NJDEP estimate

mechanism, and product packaging improvements.[27] The rule establishes two tiers of contents limits, with the first taking effect in 1995 and a second tier of more stringent limits to go into effect in 1999. By 2001, the South Coast Air Quality Management District (SCAQMD) expects the State Tier II regulation to reduce VOC emissions from coatings by 60 percent.

Based on the SCAQMD analyses, E. H. Pechan and Associates estimated the potential VOC emission reduction benefit from all aerosols for the Philadelphia non-attainment area at about 6 tons per day and the New York non-attainment area at 17.4 tons per day.[28]

However, considering that paints are only one component of aerosol emissions, and that New Jersey already regulates certain aerosol coverings, it is not clear whether the level of emission reduction from these measures will meet criterion #1. Additionally aerosol point controls are included in the 's architectural and industrial maintenance coatings rule (September 1998) and it would be appropriate to review those final standards before considering additional measures. Finally, the imposition of additional state controls beyond federal standards calls for an assessment of costs and potential economic difficulties to manufacturers. It is very unlikely that these actions can be carried out and new products available by the 1999 ozone season (criterion #2). Therefore this measure is not a practicable alternative to the preempted Phase I State gasoline controls.

9. Batch Process

VOC emissions from batch or intermittent processes occur in a number of process operations. These are included and addressed under the particular emission sources categories described in this document.

10. & 11. Coke-By product Recovery Plants and Coke Oven Batteries

Significant VOC emissions are not anticipated from these two sources categories (criterion #1). Therefore this measure is not a practicable alternative to the preempted Phase I State fuel controls.

12. Ethylene Oxide Sterilization

Ethylene oxide, used in the sterilization of medical and other product contributes (Table 5) about 9 tons per day of VOC emissions. However, processes using ethylene oxide are regulated through the New Jersey's Permit Programs, where state-of-the-art controls are applied. Thus while some limited emission reduction may be possible, this source category cannot meet criterion #1. In addition a study would be required of the impact of any controls on product and process integrity. As a practical matter,

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[27] SCAQMD, 1994: 1994 Air Quality Management Plan, Appendix IV-A; September 1994

[28] E. H. Pechan and Associates; Control Measure Analysis of Ozone and PM Alternatives, July 17, 1997

these studies can not be done in time to implement measures by the summer of 1999. Therefore this measure is not a practicable alternative to the preempted Phase I State gasoline controls.

14. Degreasing

From Figure 1, emission levels from degreasing operations are about 20 tons per day, which may offer the potential for further emission reductions. Degreasing operations in New Jersey are already regulated[29], but further reductions of this source may be possible[30] through limits on the VOC content of degreasing solutions. Pechan and Associates have estimated[31] potential emission reductions from this source category for the Philadelphia non-attainment area at about 13 tons per day and the New York non-attainment area at 37 tons per day. For New Jersey the reduction could approach 65% of the emissions remaining after MACT standards (13.8 tons per day) or about 9 tons per day[32], based on estimates of incremental benefits above federal MACT standards. However, given New Jersey's existing rules, it is not clear that, that extent of reduction will occur in the State. However, the time to do an assessment of the option on emission reduction potential and operational effectiveness, and the time needed to reformulate degreasing solutions, precludes emission reductions by the 1999 ozone season. Thus criterion #2 is not met. Therefore this measure is not a practicable alternative to the preempted Phase I State gasoline controls.

16 & 24. Graphic Arts - Rotogravure and Flexographic Printing, and Offset Lithographic Printing

From Figure 1 VOC emissions in the graphic arts category are about 15 tons per day. However all the printing categories above, as well as screen printing are already substantially regulated in New Jersey[33] and it is improbable that further significant emission reductions can be accomplished to the point of approaching the emission reductions achieved by the Phase I proposal. Thus, these source categories do not meet criterion #1. Therefore this measure is not a practicable alternative to the preempted Phase I State gasoline controls.

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[29] N.J.A.C. 17:27-16.6

[30] USEPA Region I Staff Paper, 1997

[31] E. H. Pechan and Associates; Control Measure Analyses of Ozone and PM Alternatives, July 17, 1997

[32] E. H. Pechan and Associates; Additional Control Measure Evaluation Ozone and PM NAAQS, July 17, 1997.

[33] N.J.A.C. 7:27-16.7

18. Industrial Wastewater Treatment (IWT)

From Figure 1, the combined estimated emissions for 1999 for the IWT and the Publicly Owned Treatment Works (POTW) categories are about 18 tons per day. From Table 5 it can be seen that POTW's contribute a small amount, therefore most of the 18 tons per day is from industrial treatment. It has been suggested[34] that technologies historically applied to larger IWT/POTW facilities could be cost-effectively applied to smaller facilities, i.e. greater than 11 tons per year and less than the major source threshold. However New Jersey already regulates[35] wastewater treatment facilities producing above 10 tons per year of VOC emissions. Therefore this option will not realize the substantial reductions of criterion #1. Therefore this measure is not a practicable alternative to the preempted Phase I State gasoline controls.

21. Landfill Gases

From Figure 1 the prior estimate for VOC emissions from landfills is about 16 tons per day. However, revised estimates indicate only about 3 tons per day of VOC emissions. It has been suggested that the application of USEPA Emission Guidelines controls to existing landfills could yield additional emission reduction benefits. These emission guidelines require that landfills with capacities greater than 2.5 million megagrams or non-methane VOC emissions of 50 megagrams or greater, install a gas collector and control system. However, many landfills in New Jersey have already installed or are planning to install gas collection treatment and control systems that reduce emissions.

Consequently this measure does not meet criterion #1. Therefore this measure is not a practicable alternative to the preempted Phase I State gasoline controls.

22. Marina Gasoline Refueling

Marina gasoline refueling in New Jersey is already subject to Stage I Vapor recovery rules[36] which apply to storage tanks above 2000 gallons capacity. Residual emissions are not expected to offer the emission reduction potential comparable to criterion #1. Therefore this measure is not a practicable alternative to the preempted Phase I State gasoline controls.

25. Pesticide Application

From Figure 1, current VOC emissions in New Jersey from pesticide applications are about 13 tons per day. New Jersey already regulates[37] pesticide application for worker health and safety purposes and additional reductions from further control measures are not expected to be major. For example, E.

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[34] USEPA Region I Staff Paper, 1997

[35] N.J.A.C. 7:27-16.7

[36] N.J.A.C. 7:27-16.3

[37] N.J.A.C. 7:30 - 1-12.

H. Pechan and Associates has estimated[38] VOC reductions of less than 0.5 tons per day in both the Philadelphia and New York non-attainment areas from further controls. Therefore this measure does not meet criterion #1. Therefore this measure is not a practicable alternative to the preempted Phase I State gasoline controls.

29. Rule Effectiveness Improvement

New Jersey has made improvements in rule effectiveness, but this measure offers potential for future reductions. However it requires a thorough assessment of enforcement procedures for the particular emission source category. As a practical matter such analysis cannot be completed in time to make changes by the summer of 1999 (criterion #2). Therefore this measure is not a practicable alternative to the preempted Phase I State gasoline controls.

30. Shipbuilding and Ship Repair

The USEPA's final Control Technology Document (CTG) was applicable at the major source threshold (i.e. 50 tons per year in a serious non-attainment area). The CTG however did not apply to the building and repair of pleasure craft. Given New Jersey's pleasure boating facilities there may be opportunity to reduce emissions from this source.

However that potential from pleasure crafts needs to be further quantified, as well as the applicability of the CTG controls to pleasure craft and the impact on New Jersey industry. Such an assessment and any subsequent regulatory development cannot practicably be done in time to see emission reductions by the 1999 ozone season (criterion #2). Therefore this measure is not a practicable alternative to the preempted Phase I State gasoline controls.

31. Stage II Vapor Recovery

The purpose of a Stage II Vapor Recovery System is to prevent any evaporative emissions from gasoline from escaping into the atmosphere during the refueling process. Instead the gasoline vapors are captured and forced back into the gasoline storage tank where the liquid gasoline is stored. Since late 1987 New Jersey has had rules which required the installation of State II Vapor Recovery Systems through the State. These rules required the installation of Stage II Vapor Recovery Systems at all gasoline refueling facilities dispensing more than 10,000 gallons of gasoline per month; specifically, facilities having an average monthly throughput of 40,000 gallons of gasoline or more had to comply by December 30, 1988, while facilities having an average of monthly throughput of less than 40,000 gallons of gasoline had until December 29, 1989 to comply.

At the time of the adoption of New Jersey's regulation, the NJDEP claimed an overall 86 % efficiency for the Stage II Vapor Recovery program, based on annual inspections conducted and figures

[38] E. H. Pechan and Associates; Control Measure Analysis of Ozone and PM Alternatives; July 17, 1997

reported in the USEPA's Gasoline Marketing Strategies. Each system was originally certified as being 95 percent efficient or greater by the California Air Resources Board (CARB). Although it might be feasible to increase the efficiency of the Stage II Vapor Recovery systems, this would require audits of each of the systems to determine what, if any, efficiency loss there has been over time. This auditing analysis would take time and resources, and could not practicably be done in time to see emission reductions by the 1999 ozone season (criterion #2). Therefore this measure is not a practicable alternative to the preempted Phase I State gasoline controls.

36. Underground Storage Tank Vents

Under storage tanks at gasoline service stations are required by fire code to be vented. Stage I vapor recovery devices limit emissions from these vents by channeling displacement vapors into the delivery truck during loading events. Even with Stage I controls, emissions can still occur from the vents. Emissions can occur due to diurnal temperature and barometric changes, and when pressure equalization occurs between delivery trucks and the underground tanks. Pressure-vacuum (P-V) vents can be installed on underground storage tank vent lines to maintain pressure within the tank. Such P-V vents have been in use for many years and are available from several manufacturers. New Hampshire's Stage I rule Env-A 1205 contains a P-V valve requirement, as does the Bay Area's Regulation 8-Rule 7 and the South Coast's Rule 461. Staff at the NH-DES indicate that this requirement has been successfully implemented, and that they include an evaluation of P-V valve performance in their review of gasoline service station compliance. Installation of P-V vents can achieve a 100% control efficiency and is cost-effective. However the New England states have estimated that 8.4 tons per day of VOC emissions are attributed to this source in all the New England States.[39] Therefore it is unlikely that this measure could reduce more than several tons of VOC per day in New Jersey. Consequently it would not meet criterion #1. Therefore this measure is not a practicable alternative to the preempted Phase I State gasoline controls.

37. Volatile Organic Liquids Storage

VOC emissions from volatile organic liquid (VOL) storage have been typically covered under States' non-CTG and gasoline storage regulations. The draft CTG for VOL storage in Floating and Fixed Roof Tanks[40] indicates that cost-effective VOC controls have been demonstrated for 40,000 gallon and greater VOL tanks for liquids with vapor pressures greater than or equal to 0.75 pounds per square inch absolute (psi). The draft CTG defines reasonable available control technology (RACT) for these types of tanks as liquid mounted primary seals or shoe seals on internal floating roof tanks, a deck of welded construction, instead of bolted or seemed panels, for fixed roof tanks, or 95% vapor recovery or emission control. Additionally, the South Coast's AQMD's rule 463 requires similar controls at any above-ground stationary tank with a capacity of 75,000 liters (19,8155 gallons) or greater used for storage of organic liquids. New Jersey currently regulates the storage of VOL,[41] but there may be opportunity for further emission reduction. However chemical storage emissions as a whole in New Jersey are about 25 tons per day with VOL storage comprising only part of that.

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[39] USEPA Region I Staff Paper, 1997.

[40] USEPA 1993 Report No. USEPA 453/D-93-057

[41] N.J.A.C. 7:27-16.2

A detailed analysis of current emission levels control effectiveness, costs, safety and other factors would be necessary before further regulations could be proposed. It is improbable this could be accomplished and any new technology installed prior to the 1999 "ozone season" (criterion # 2). Therefore this measure is not a practicable alternative to the preempted Phase I State gasoline controls.

39. Wood and Metal Furniture/Appliances/Parts Coatings

VOC emissions from both wood and metal coating operations may be significant. Regarding metal coating operations, additional reductions of up to 30% VOC emissions beyond anticipated Maximum Available Control Technology (MACT) levels may be practicable[42] from low-VOC coatings and add-on control equipment. E. H. Pechan & Associates have estimated[43] about 3 tons per day for the Philadelphia non-attainment area and 10 tons per day for the New York non-attainment area from applying new controls to metal furniture/appliances/parts coatings.

New Jersey needs to assess its current emissions from these sources; however based on the above, emission reductions are not likely to be comparable to that for criterion #1. Additionally, it would be prudent from a planning perspective to await the USEPA's MACT standards, due by November 2000, on metal coating operations before adopting new state standards. Consequently, although a candidate source category for future emission reductions, it does not appear to be a practicable measure for achieving reductions by the summer of 1999 (criterion #2).

46. MACT Standards

Pursuant to Section 112 of Title I of the 1990 amended Clean Air Act, the USEPA is required to set standards for hazardous air pollutants. This involves the establishment of maximum available control technology (MACT) standards[44] for a range of source categories, including synthetic organic chemical manufacturing industry (SOCMI) reactor and distillation processes, refineries metal coating operations and others. Since certain hazardous air pollutants are also VOC's, these standards may have the added benefit of reducing VOC emissions.

New Jersey already regulates many of the operations falling under the MACT source categories, and it is difficult to determine at this time the extent of additional VOC reductions that may accrue from the MACT standards. However, the USEPA is working under specified schedules for promulgating these rules: for example the MACT standards for two categories of interest, metal can and coil coating, and

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[42] E. H. Pechan & Associates Inc.: Additional Control Measure Evaluation for the Integrated Implementation of the Ozone and PM NAAQS, July 17, 1997.

[43] E. H. Pechan & Associates Inc.: Control Measure Analyses of Ozone and PM Alternatives, July 17, 1997

[44] 42 U.S.C. § 112.

metal coating for appliances, furniture and machinery are not due till November 2000. Therefore, it is impracticable to assume any sizeable emission reductions by the summer of 1999 (criterion #2). Therefore this measure is not a practicable alternative to the preempted Phase I State gasoline controls.

47. Metal Coil and Can Coatings

Add-on controls to metal can and coating operations, such as incineration, may offer additional (up to 90%) VOC emission reductions in the longer term (2010) beyond those anticipated under future MACT "baseline" standards[45]. E. H. Pechan & Associates has estimated a potential VOC emission reduction of 7 tons per day in the Philadelphia non-attainment area and 14 tons per day in the New York non-attainment area from such add-on measures. For New Jersey, current VOC emissions from metal container operations are estimated at 26 tons per day. After federal MACT standards, emissions are estimated at 16.6 tons per day. Consequently, these add-on controls may offer the future opportunity for emission reductions of about 0.9, 16.6 or 15 tons per day, which is approaching the 20 tons per day benefit of criterion #1. However New Jersey would need to assess the degree to which current coatings operations are regulated relative to the anticipated MACT standard. Such an assessment should logically await promulgation of the MACT standard for this source category, which is not due until 2000. Therefore criterion #2 cannot be met for this emissions category. Therefore this measure is not a practicable alternative to the preempted Phase I State gasoline controls.

48. Cutback/Emulsified Asphalt

From Figure 1 it can be seen that the use of cutback/emulsified asphalt in New Jersey accounts for about 13 tons of VOC emission per day; about 7 tons per day from cutback and 6 tons per day from emulsified. New Jersey prohibits[46] the use of such asphalts containing VOC's during the ozone season, with certain exemptions.

Removing or revising these exemptions in the New Jersey asphalt regulations may be technologically feasible, and could help to lower ozone season emissions. Encouraging manufacturers to seek out "true" emulsified asphalt products would help to reduce VOC emissions from this source category even further.

For example, the cutback asphalt regulation adopted by California's SCAQMD (rule 1108) states that cutback asphalt can contain no more than 0.5 percent by volume organic compounds which evaporates at 500 ^{o}F or lower as determined by ASTM method D-402. The comparable provision in New Jersey's cutback asphalt regulations allow 16 times that amount of solvent to be used. Additionally, SCAQMD has adopted an emulsified asphalt regulation (rule 1108.1) that limits the amount of solvent that can be used in an emulsified asphalt products to no more than 3% by volume.

However proceeding with new product rules must be preceded by an analysis of the current level of compliance with existing rules. This would require consultation with New Jersey counties and as a

[45] E. H. Pechan, Additional Control Measure Evaluation for Integrated Implementation of the Ozone and PM NAAQS, and Regional Haze Program, July 17, 1997.

[46] N.J.A.C. 7:27-16.19

practical matter could not be concluded soon enough to yield emission reduction benefits by the 1999 ozone season, criterion #2. Therefore this measure is not a practicable alternative to the preempted Phase I State gasoline controls.

49. Multiple Point and Area Source Categories

It is clear from the above discussion that VOC emissions arise from a large number of source categories and vary considerably in degree. The Department, as part of its Strategic Planning exercise, is seeking to develop innovative multi-program strategies that would address multiple source categories simultaneously, in contrast with category by category regulations/controls.

One such strategy was recently suggested by a Blue Ribbon Panel charged to review and make recommendations on the States' Open Market Emission Trading Rule to make the program more environmentally beneficial. Specifically, the Panel suggested that a declining emission cap on VOC emissions of 1-3 percent per year be placed on all major and minor point sources.[47] Coupled with a robust and administratively simple emission trading system encompassing small business and even individuals, and extended to NO_x emissions as well, such an approach may offer the opportunity to secure additional VOC and NO_x emissions that will be needed to meet the new 8-hour ozone standard and assure attainment with the 1-hour standard.

However, such an approach could have significant economic impact on certain industries and must be preceded by careful examination of the overall additional emission reductions needed, the emission benefits to be sought from mobile source improvements, the impacts to industry and a host of other factors. While perhaps promising in the longer term, such an effort is impracticable in the near term (criterion #2). Similarly, other options may be useful for multiple source categories, such as better control of fugitive emissions. However estimates of such emissions are just emerging from the State's Title V Operating Permit Program, and will not be available for analyses by the 1999 time frame (criterion #2). Therefore this measure is not a practicable alternative to the preempted Phase I State gasoline controls.

V. <u>Conclusions Regarding Alternatives to the Phase I Proposal</u>

Using preset criteria ten mobile source emission categories and forty-nine point/area source emission categories were examined to determine whether there are any practicable emission reduction alternatives to the Phase I proposal. The results of this assessment are summarized in Table 5.

Based on that assessment it was found that many source emission categories are already controlled and did not offer the potential for emission reductions comparable to that afforded by the Phase I proposal. For a number of other source categories with the potential for greater emission reductions it was concluded that implementation by the 1999 ozone season was not practicable.

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[47] Blue Ribbon Panel ; Recommendations for Phase II Revisions to the New Jersey Open Market Emission Trading Rule; February 27, 1998

Only two source categories, automotive refinishing and non-road engines emerged as possible options for achieving near term emission reductions comparable to the Phase I fuel rule. However, it was reasoned in Section I that the VOC reductions from these two measures and the Phase I fuel proposal are all needed to keep New Jersey on a steady path toward attaining the ozone NAAQS. Therefore, these two measures are not practicable alternatives to the Phase I fuel proposal, but rather essential complementary activities.

Therefore the Department proposes that there are no practicable alternatives to the preempted Phase I gasoline proposal.

Table 5
Summary of Emission Reduction Potential

Source # / Category	**Potential for Further Emission Reductions?**	**Emission Reductions Comparable to 20 Tons Per Day**	**Practicable Option for 1999?**	**Practicable Alternative to Phase I Proposal**	**Candidate for Significant Future Reductions?**
Mobile 1. Enhanced I/M	Y	Y	N	N	Y
2. Basic I/M	Y	N	N	N	N
3. Reform Gas/I	N	N	N	N	N
4. Reform Gas /II	Y	Y	N	N	Y
5. Califor. LEV/NLEV	Y	Y	N	N	N
6. Clean Fuel Fleets	Y	N	N	N	Y
7. Non Road Engines/Vehicles	Y	Y	Y	N	N
8. Employee Commute	Y	N	N	N	Y
9. Transp. Cntrl. Measures	Y	N	N	N	Y
10. Accelerated Vehicle Retirement	Y	N	N	N	N
Stationary Area 1. Adhesives					
2. Aerosol Paints	Y	N	N	N	N
3. Aerospace Manufacturing	N	N	N	N	N
4. Aluminum Mills	N	N	N	N	N
5. AIMS Coatings	Y	N	N	N	Y
6. Autobody Refinish	Y	Y	Y	N	N
7. Auto Assembly	Y	N	N	N	N
8. Bakeries	N	N	N	N	N
9. Batch Processes	_	_	_	_	_
10. Coke-by-Product	N	N	N	N	N
11. Coke Oven	N	N	N	N	N
12. Ethylene Oxide	Y	N	N	N	Y

Source # / Category	Potential for Further Emission Reductions?	Emission Reductions Comparable to 20 Tons Per Day	Practicable Option for 1999?	Practicable Alternative to Phase I Proposal	Candidate for Significant Future Reductions?
13. Consumer/comm./ Products	Y	Y	N	N	Y
14. Degreasing	Y	Y	N	N	Y
15. Glass Forming	N	N	N	N	N
16. Graphic Arts	Y	N	N	N	Y
17. Highway Paints	Y	N	N	N	Y
18. Industrial Wastewater	N	N	N	N	N
19. Iron/Steel Foundries	N	N	N	N	N
20. Iron Steel Sinter	N	N	N	N	N
22. Marina Refueling	N	N	N	N	N
23. Marine Vessel Loading	Y	N	N	N	Y
24. Offset Lithographic	Y	N	N	N	Y
25. Pesticide Application	N	N	N	N	N
26. Pharmaceuticals	N	N	N	N	N
27. Potw's	N	N	N	N	N
28. Pulp and Paper	Y	N	N	N	N
29. Rule Effectiveness Improvement	Y	N	N	N	N
30. Shipbuilding/Repair	Y	N	N	N	N
31. Stage II Vapor Recovery	N	N	N	N	N
32. Surface Coatings/Plastic	N	N	N	N	N
33. SOCMI Processes	Y	N	N	N	Y
34. Textile Finishing	N	N	N	N	N
35. TSD'S	N	N	N	N	N
36. UST Vents	Y	N	N	N	N
37. Volatile Orange Liquid Storage	Y	N	N	N	Y
38. Whiskey Distilleries	N	N	N	N	N
39. Wood/Metal Furniture Coating	Y	N	N	N	N
40. Alcoholic Beverage Production	Y	N	N	N	Y
41. Air Craft	Y	N	N	N	Y
42. Roofing Asphalt	Y	N	N	N	Y
43. Drycleaning	Y	N	N	N	Y

Source # / Category	Potential for Further Emission Reductions?	Emission Reductions Comparable to 20 Tons Per Day	Practicable Option for 1999?	Practicable Alternative to Phase I Proposal	Candidate for Significant Future Reductions?
44. Farm Equipment	N	N	N	N	N
45. Locomotives	N	N	N	N	N
46. MACT Standards	N	N	N	N	N
47. Metal Coil/Can Coating	Y	N	N	N	Y
48. Cutback/ Emulsified Asphalt	Y	N	N	N	Y
49. Multiple Sources	Y	N	N	N	Y

(1) Batch processes are addressed under other relevant emission source categories.

VI. Criteria for Evaluation of Potential Alternative Measures to the Phase II Proposal

As mentioned in Section II, the longer term objective of the vehicle fuel proposal is to provide emission reductions to address in part the uncertainties in attaining the 1-hour standard and the anticipated additional emission reductions needed to attain the new 8-hour ozone standard. Addressing the uncertainty in the 1-hour standard attainment requires[48] either an additional 11% VOC or a 12% NO_x reduction, or various intermediate combinations of VOC and NO_x emission reductions such as a 7.5% VOC and 7.5% NO_x reduction, all relative to 1990 baseline emission levels. Attainment of the 8-hour standard is anticipated to require additional emission reductions comparable or greater than those above. For such emission reductions to impact air quality during the 3 year 2005 to 2007[49] time frame, they must be implemented no later than 2004.

As shown in Table 1, the Phase II vehicle fuel proposal provides a 12-13 ton per day NO_x emission reduction by 2003, beyond the requirements of the Federal Phase II reformulated gasoline program, which is 0.8% of the 1990 baseline NO_x inventory[50]. Since a 12% NO_x reduction may be needed, the fuel proposal addresses about 7% of the uncertainty relative to attaining the 1-hour standard, if all NO_x reductions were assumed.

Considering the above, the criteria for alternative measures to the vehicle fuel proposal are provided below. An alternative to the Phase II Vehicle fuel proposal exists only if there are other measures that:

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[48] Phase II Ozone SIP, August 31, 1998.

[49] Attainment with the 1-hour standard in 2007 is determined by the ozone design value for that year, which involves data from 2005, 2006, and 2007.

[50] The statewide 1990 Baseline NO_x inventory is 1568 tons per day (Phase I Ozone SIP, table 22). The 1990 VOC inventory (without biogenics) is 1395 tons per day.

(1) provide a comparable degree of NO_x (or VOC) benefit as the Phase II proposal, on the order of 10 tons per day or greater
(2) are implementable by the 2003-2004 time frame, and
(3) in total, all alternative measures meeting criteria (1) and (2) above must provide greater than 11% VOC or 12% NO_x emission reductions, or an equivalent intermediate combination of VOC and NO_x emission reductions.

VII. Evaluation of Potential Alternatives to the Phase II Proposal

A listing of potential alternative individual measures is provided in Table 6. These measures are taken primarily from Tables 20 and 21 of the State's Phase II Ozone SIP (August 31, 1998) and from the right hand column of Table 5; "Candidates for Significant Future Reductions". It should be noted that a number of measures (see Table A-1) are not included in Table 6 because they were already included in the Clean Air Act and Regional NO_x reduction measures that were modeled in the State's ozone attainment demonstration in its Phase II Ozone SIP. As discussed in Section I, even with these measures, a residual uncertainty and the need for further emission reductions arose, which the Phase II low emission gasoline rule is designed to, in part, address. Therefore those measures cannot be employed again as alternatives to the Phase II proposal. Each measure in Table 6 is evaluated below. To address criterion #3 above, numerical estimates of VOC and NO_x benefits, where available, are summarized and summed in Table 7. Certain other measures, for the reasons discussed below, are designated as not applicable (N/A) in Table 6, and are not considered to be practicable alternatives to the preempted Phase II gasoline controls proposed.

Table 6
List of Potential Alternative Measures to the Phase II Proposal

1. Transportation control measures
2. New Jersey OTC MOU Implementation
3. Ozone related benefits from global warming initiatives
4. Land use initiatives
5. Tier 2 light duty gasoline and heavy duty diesel vehicle standards
6. Diesel fuel reformations
7. Aircraft NO_x emissions
8. Declining VOC / NO_x caps on stationary sources
9. Stricter NO_x standards for glass and cement manufacturing plants.
10. Additional standards for industrial solvents/degreasers.
11. Additional standards for metal product coverings.
12. Additional standards for automotive refinishers
13. Additional standards for industrial adhesives, sealants
14. Additional standards for gasoline dispensing at service stations
15. Additional standards for fugitive emissions.

16. Additional standards on consumer/commercial products, such as solvents, AIMs, and aerosol coatings.
17. Education for ozone action days
18. Ozone episode bans on open waste burning.
19. Public disclosure of vehicle emission systems performance.
20. Alternate technology vehicle (ATV) programs
21. Economic incentives/disincentives
22. Enhanced I/M
23. Reformulated gasoline (beyond federal requirements)
24. Clean fuel fleets
25. Ethylene oxide controls
26. Graphic arts
27. Highway paints
28. Marine vessel loading
29. Offset lithographic printing
30. SOCMI processes
31. Volatile organic liquid storage
32. Alcoholic beverage production
33. Roofing asphalt
34. Drycleaning
35. Metal coil/can coating
36. Cutback emulsified asphalt
37. Industrial, Commercial, and Institutional boilers using residual oil
38. Commercial and institutional water/space heaters

1. Transportation Control Measures

Current estimates from the NJDOT do not project near term benefits approaching the 10 ton per day criterion #1.

2. NJ Ozone Transport Commission (OTC) Memorandum of Understanding (MOU) Implementation

As discussed in the State's Phase II Ozone SIP, the NJDEP is implementing a NO_x Budget Rule that goes beyond the requirements of the Ozone Transport Commission's (OTC) Memorandum of Understanding (MOU). Per Table A-1 certain NO_x controls were assumed in the State's attainment demonstration. A comparison of the NO_x budgets of that rule with those required by the recently adopted NO_x Budget Rule is underway. At the current time it is not known whether all the NO_x reductions under the NJDEP rule will be used to meet the NO_x budget requirements. Since the EPA NO_x budget estimates were used to perform the air quality modeling projections that led to the need for the additional emission reductions (below the NO_x budgets) embodied in criterion #3, it would be premature at this time to count any part of the NJDEP rule towards criterion #3. Therefore this item is listed as not applicable (N/A) in Table 7.

3. Ozone Related Benefits from Global Warming Initiatives.

The New Jersey Climate Change Action Plan calls for a 3.5% reduction in greenhouse gases below 1990 levels by 2005. Considering the anticipated growth in greenhouse gas emissions from 1990 to 2005 this requires achieving about a 14% reduction from uncontrolled 2005 levels. A number of measures have been proposed to achieve this ambitious goal. However at the current time, implementing actions have not been clearly defined. Therefore, at this time it is assumed that by 2004 only a third of the goal of 3.5% reduction from 1990 levels or 1.2% will be met. Since combustion related CO_2 amounts to about 82% of the greenhouse gas inventory, and assuming that percentage NO_x reductions parallel combustion related CO_2 reductions, a NO_x benefit of 0.82 x 1.2%
or about 1% is projected, from 1990 levels. This is recorded in Table 7, to assess criterion #3.

4. Land Use Initiatives

The set aside of open lands and emphasis toward "hamlet" developments may offer significant reductions in Vehicle Miles Traveled (VMT) growth over time, if transportation planning complements the new structure. Such a land use measure was recently endorsed by New Jersey voters. However these land use changes will take a long time to implement; it is not anticipated that major emission reductions will materialize by the 2003-2004 time frame (criterion #2). Therefore this measure is not a practicable alternative to the preempted Phase II gasoline controls.

5. New Light and Heavy Duty Vehicle Standards

The is considering a "Tier 2" gasoline vehicle emission standard for light duty vehicles (cars and trucks) that may offer significant benefit in the long term. However, such standards, if promulgated, are expected to begin no earlier than the 2004 model or late 2003 calendar year. Therefore any significant fleet turnover and associated emission reductions are not expected by the 2004 time frame (criterion #2). Therefore this measure is not a practicable alternative to the preempted Phase II gasoline controls.

Similarly the USEPA is also considering a 2.0 gram/brake horse power-hour NO_x standard for heavy-duty diesel vehicles. However, by federal law such new engines cannot be introduced before 2004 (criterion #2). Therefore this measure is not a practicable alternative to the preempted Phase II gasoline controls.

6. Diesel Fuel Reformulations

The USEPA is considering the benefit of cetane adjustments and possible reformulations of diesel fuels to reduce emissions. These efforts however are at the conceptual stage only. Given the USEPA's near term focus on removal of sulfur from gasoline, new standards on diesel fuels are not expected by the 2003-2004 time frame (criterion #2). Therefore this measure is not a practicable alternative to the preempted Phase II gasoline controls.

7. Aircraft NO_x Emissions

Airports can be significant sources of NO_x emissions, primarily from aircraft landing and takeoff, although ground support equipment and traffic also contribute. NO_x emissions in New Jersey in 1993 from commercial (the primary source) operations were estimated at about 8 tons per "summer day". This can be expected to grow with the growth of airline activity; however, it may not offer the potential for emission reductions exceeding 10 tons per day (criterion #1). Additionally, the federal government (Federal Aviation Administration) has jurisdiction over emission standards for commercial aircraft engines and new standards would involve a lengthy, multi-state and federal agency consultative process. Therefore it is unlikely that significant benefits would be realized by the 2003-2004 time frame (criterion #2). Therefore this measure is not a practicable alternative to the preempted Phase II gasoline controls.

8. Declining Caps on Stationary Point Sources

As discussed in Section IV, item 49, declining caps on stationary sources on the order of 1-3% per year have been suggested as a measure to secure needed reductions.

Regarding VOC emissions, projected 1999 emissions from major and minor point sources are about 500 tons per day[51]. Assuming most of the sources comprising this number were covered by a declining cap of 1% per year, commencing in 2002[52], this initiative would yield an additional emission reduction of 10 tons per day by 2004. This equivalent to 0.7% of the 1990 baseline VOC inventory without biogenics[53].

Regarding NO_x emissions, emission reductions from large (greater than 25 Megawatts capacity, 1 ton per day NO_x emissions) NO_x emitting sources will be driven over the next 5 years by the NO_x Budget Rule[54] and the NJDEP NO_x Budget Rule[55]. However a declining cap of, for example, 1% per year might be applied to medium and small combustion sources, i.e. less than 250 MMBTU/hr heat input rate.

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[51] NJ Phase I Ozone SIP, Table 15 and Figure 34.

[52] Allowing 3 years for program development, including revisions to the NJDEP Market Trading Rule.

[53] Phase I Ozone SIP, Table 23.

[54] EPA: Final Rule Regarding Finding of No Significant Contribution and Rulemaking for Certain States in the OTAG Region for Purposes of Reducing Regional Transport of Ozone, September 24, 1998.

[55] N.J.A.C. 7:27-31.

Based on the NJDEP emission statement reporting program, the emissions from such medium and small sized combustion sources are estimated at 109 tons per day. Following the calculation for VOC's, a declining cap program encompassing most of these sources would yield a reduction of 2.2 tons per day by 2004, well below the 10 tons per day of criterion #1. Therefore this measure is not a practicable alternative to the preempted Phase II gasoline controls.

9. Additional Standards for Glass and Cement Manufacturing Plants

Current NO_x emission estimates from these source categories are estimated at 10.3 tons per day. Additional controls may be expensive but assuming a 50%[56] emission reduction from controls would not yield benefits comparable to criterion #1. Therefore this measure is not a practicable alternative to the preempted Phase II gasoline controls.

10. Solvents/Degreasers

As discussed in Section IV, item 14, VOC benefits from low VOC solutions of about 40 tons per day have been projected by 2010 for the New York non-attainment area, which includes Northern New Jersey. A substantial part of this benefit may be achievable by the 2004 time frame. This represents about a 2% benefit relative to area-wide 2010 VOC emission[57] baselines or about 1.2% relative to 1990 baselines[58]. This is recorded in Table 7, to assess against criterion #3.

11. Metal Product/Parts Coverings

As discussed in Section IV, item 39, potential VOC benefits are 10 tons per day in the New York non-attainment area, or 0.5% of 2010 VOC emissions. This is equivalent to 0.3% of 1990 VOC emission levels. This is recorded in Table 7, to assess against criterion #3.

12. Automotive Refinishing

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[56] E. H. Pechan and Associates, Additional Control Measure Evaluation for the Integrated Implementations of the Ozone and PM NAAQS, and Regional Haze Program, July 17, 1997.

[57] E. H. Pechan and Associates, Control Measure Analyses of Ozone and PM Alternatives, July 17, 1997; Table VII - 18.

[58] Area-wide VOC emissions in 2010 are estimated at 60% of 1990 levels (See Phase II Ozone SIP).

The EPA has recently published new standards[59] that result in significant benefit for New Jersey (see Section IV). Those standards were already included in the State's attainment demonstration analyses (See Table A-1). It is unclear whether additional standards are needed, but it is unlikely that additional standards would provide a 10 ton per day benefit by 2004 (criterion #1). Pechan and Associates have projected[60] a less than 4 ton per day benefit in the New York non-attainment area from stricter CARB limits, less than the 10 ton per day criterion #1. Therefore this measure is not a practicable alternative to the preempted Phase II gasoline controls.

13. Industrial Adhesives and sealants

As discussed in Section IV, item 1, there may be significant potential for reducing VOC emissions from industrial adhesive/sealant use, potentially up to about 80 tons per day in the New York non-attainment area. That amounts to about 4% of the 2010 VOC area inventory, or 2.4% of the 1990 VOC area inventory. This is recorded in Table 7, to assess against criterion #3.

14. Gasoline Dispensing

The extent of additional benefit needs to be assessed; no credit toward criterion #3 can be given at this time. Therefore this measure is not a practicable alternative to the preempted Phase II gasoline controls.

15. Fugitive Emissions

The extent of additional benefit needs to be assessed; no credit toward criterion #3 can be given at this time. Therefore this measure is not a practicable alternative to the preempted Phase II gasoline controls.

16. Consumer Products (Solvents, AIMs, Aerosols).

The attainment demonstration modeling assumed two phases of mandated Clean Air Act consumer product standards (Table A-1). E. H. Pechan and Associates[61] have projected a significant potential for further VOC emission reductions from consumer products based on an estimated additional 33% VOC reduction. For solvents, the estimate for the New York non-attainment area benefit is 119 tons per day. This amounts to 5.9% of the 2010 VOC non-attainment area inventory, or 3.6% of the 1990 VOC inventory. The measures contemplated are patterned after the California Air Resources Board more stringent component of its near term limits and its mid-term limits, which are potentially achievable

[59] National VOC Emission Standards for Automobile Refinish Coatings, FR 48806, September 11, 1998.

[60] Control Measure Analysis of Ozone and PM Alternatives, July 17, 1997.

[61] E. H. Pechan, Additional Control Measure Evaluation, July 17, 1997.

by 2005. However, there is some overlap between the Pechan estimate and the second phase of consumer products reductions that were already included in the attainment demonstration analyses. This overlap amounts to about 8%/33% or 24%. Therefore the above estimate of 3.6% is reduced by 24% to 2.7%. In addition, there will be need to be a substantial effort to secure manufacturer cooperation and public acceptance of different products in this effort. Finally, a regional approach may be more desirable, requiring interstate coordination. In light of these difficulties a more realistic estimate of potential benefit by the 2004 time frame might be about 2% of 1990 baseline VOC inventories.

Potential benefits from additional AIMs and aerosol paint standards in the New York non-attainment are estimated at[62] 22 tons per day and 27 tons per day respectively. Taken together these add another 49 tons per day or 2.3% gain relative to the projected 2010 VOC area inventory, or 1.4% relative to 1990 levels. Therefore the sum of all three categories represents a potential benefit of about 3.4% of the 1990 VOC inventory. This is recorded in Table 7, to assess against criterion #3.

17. Education for Ozone Action Days

The Department is pursuing programs to educate the public to take certain action on high-ozone days. Many of the actions are designed to avoid exposure, not reduce emissions. Other, such as refueling in the evening help reduce ozone formation but do not affect the overall daily emission rate. Finally, because of its voluntary nature, the response of other emission reducing actions to these efforts is difficult to quantity. Therefore, no emission reduction credit is assigned to this measure in this analysis. Therefore this measure is not a practicable alternative to the preempted Phase II gasoline controls.

18. Ozone Episode Bans on Open Waste Burning

Bans on open waste burning are projected[63] to reduce VOC and NO_x emissions in the New York non-attainment area by about 31 and 7 tons per day respectively. This corresponds to about 1% of the area's 1990 VOC inventory and 0.4% of the area's 1990 NO_x inventory. This is recorded in Table 7 to assess criterion #3.

19. Public Disclosure of Vehicle Emission System Performance

Under this initiative it is anticipated that emissions control system data gathered under the State's enhanced I/M program would be sorted by car make and model and used to provide additional information for new car buyers. However, it will take some time after the enhanced I/M program is fully operational to collect and analyze sufficient data to do comparisons among car makes and models. Additionally there will be time needed for the new car buyer to utilize the new information, and further time for the effect of that information to influence the fleet make-up. Because of these factors, it is

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[62] E. H. Pechan and Associates, Additional Control Measure Evaluation, July 17, 1997.

[63] E. H. Pechan and Associates, Control Measure Analysis of Ozone and PM Alternatives, July 17, 1997, Table VII - 18.

unlikely that this measure will result in emission reductions comparable to the Phase II Vehicle fuel proposal by the year 2004 (criterion #2). Therefore this measure is not a practicable alternative to the preempted Phase II gasoline controls.

20. Alternate Technology Vehicle (ATV)

On July 29, 1998 when Governor Whitman signed on to the NLEV Program, she directed the NJDEP to develop an Alternate Technology Vehicle Encouragement (ATV) program. The ATV program, while still under development, would provide incentives to accelerate the introduction of alternative technology and fueled vehicles into New Jersey. For the purpose of this program, alternately-fueled advanced technology vehicles are considered to be those vehicles with tailpipe emissions significantly lower than those produced by LEVs.

LEVs will be widely available for sale as the manufacturers meet the fleet average mix requirements of the NLEV program. The goal of this program is to encourage the production and sale of even lower polluting, Ultra Low Emission Vehicles (ULEVs) as they become available.

Manufacturers developing non-conventional vehicle technologies, in part as a response to the desire for vehicles with lower emissions than those vehicle currently available or expected in the next few model years. Many of these technologies could be utilized in the next generation of vehicles sold nationwide.

One manufacturer announced it has developed a gasoline-powered vehicle that utilizes advanced engine designs and catalysts to reduce emissions levels to significantly below ULEV standards. Some manufacturers are choosing to produce ULEVs using engines that burn compressed natural gas. These engines give manufacturers additional flexibility in designing and producing vehicles that meet the tighter ULEV standards. In general, these engines are similar to gasoline-powered engines, but have modified fuel delivery and storage systems. Compressed natural gas (CNG) powered vehicles also have lower evaporative emissions than gasoline-powered vehicles.

Manufacturers are also actively developing other non-conventional vehicle propulsion systems which could emit pollutants at lower rates, possibly even significantly lower, than current Tier 1 vehicles. While none of these systems is currently available in the United States, they could be technologically feasible early in the next century. One system utilizes a hybrid propulsion system, which combines a gasoline or diesel-powered engine with an electric motor and is optimized to operate at maximum efficiency over changing driving conditions. These designs can result in very high fuel efficiency and also very low emission levels (a manufacturer estimates up to one tenth the current levels of HC, CO, and NO_x).[64]

[64] One manufacturer has introduced in Japan a hybrid vehicle which incorporates a gasoline engine and an electric motor. Emissions are reduced in part by operating the engine under a constant load and thus minimizing air-fuel ratio changes.

This type of propulsion is also being developed as part of a joint venture between the federal government and the domestic auto manufacturers. The Partnership for a New Generation Vehicle (PNGV) has a design goal of producing production prototypes by 2004 that would achieve up to 80 miles per gallon with very low emissions. Design work is focusing on hybrid electric drives, powered by direct-injection drives or fuel cells, advanced batteries, advanced combustion engines using renewable fuels and petroleum fuels, and increased use of lightweight materials in vehicle construction. Technologies developed from this process, in addition to being integrated into a PNGV vehicle, could be used to reduce emissions from vehicles meeting more stringent standards.

Fuel cells are a promising propulsion system that is being developed for possible introduction to consumers early in the next century. A fuel cell is an electrochemical device that generates electricity from a chemical reaction between hydrogen and oxygen. The necessary hydrogen can either be carried as a compressed gas or extracted from a fuel carried on the vehicle, such as gasoline or methanol. The electricity produced from a fuel cell drives a traction motor that in turn drives the wheels. Fuel cell use gives a vehicle long-range, good performance, rapid refueling and low or even zero emission levels.

While offering significant long term promise, it is unlikely that these technologies will be developed and penetrate the market significantly by the 2003-2004 time frame (criterion #2). Therefore this measure is not a practicable alternative to the preempted Phase II gasoline controls.

21. Incentives for New Lower Emitting Heavy Duty Vehicle Usage in New Jersey

This category of vehicles includes larger trucks designed for on-highway operation, inter-city and urban buses, and larger school buses. Beginning with the 1995 model year, the heavy-duty vehicle category includes only those vehicles with gross vehicle weight ratings greater than 14,000 pounds.

In spite of the emission control standards that have been adopted by the EPA, growth in vehicle population and VMT is projected to largely offset the per-vehicle NO_x emission reductions achieved.

Current emission standards apply to the engine rather than the vehicle. Beginning in 1998, new engines were to meet a 4.0 gram per brake horsepower-hour (g/bhp-hr) standard. From 1991 to 1997 the standard for new Heavy Duty Diesel (HDD) engines was 5.0 g/bhp-hr. Between 1985 and 1990 it was 6.0 g/bhp-hr. Prior to 1985 emissions were about 8.5 g/bhp-hr.

New federal standards are envisioned in 2004. Regarding potential levels, heavy-duty bus engines that use alternative fuels can achieve an emission level of 2.0 g/bhp-hr NO_x now. In the near future, additional alternatively-fueled truck engines that emit at 2.0 g/bhp-hr NO_x or less are expected to be put in service although, practically, they may be limited to urban fleets. Diesel engine control technology is expected to be able to meet a 2.0 g/bhp-hr NO_x emission standard by 2002 by using improved engine design (especially in fuel/air management and delivery), exhaust gas recirculation, and exhaust gas after treatment. This emission level is a 50% reduction from the current federal standard applicable to 1998 and later model year engines. Use of this technology will also reduce VOC emissions by 50% compared

to 1994 model engines. Other technologies (electric, hybrid-electric, fuel cells) are projected to be able to achieve NO_x emissions of less than 1.0 g/bhp-hr in a future time frame that is less certain[65].

Heavy-duty vehicles that are registered in other states and participate in interstate commerce are substantial contributors to the total emissions from heavy-duty diesel vehicles. Federal regulations are preferable to secure emission reductions from these trucks. If state requirements become substantially different and more stringent than the USEPA requirements, New Jersey purchasers of new trucks would have an incentive to buy their vehicles in the other states in which they operate. For these reasons, improvement of air quality in New Jersey is dependent on the USEPA adopting a more stringent heavy duty engine NO_x emission standard, applicable nationwide. Under current law such a standard cannot be adopted before 2004.

This initiative builds on the federal standards by introducing financial incentives to attract the newer engine vehicles to use in New Jersey. Between now and 2004, new heavy duty diesel engines will be introduced at a 4.0 g/bhp-hr NO_x emission level. Based on the above history of emission standards and assuming a 25 year truck lifetime, by 2004, the HDD vehicles in New Jersey should be comprised of about 72% of the trucks averaging 6.5 g/bhp-hr[66] and 28% (7/25) of the 4.0 g/bhp-hr emitters. The average emission rate for the overall HDD vehicle population would be 5.8 g/bhp-hr. Assuming that the financial incentives/disincentives established by this initiative result in a 10% shift, i.e., to 38% of the 4.0 g/bhp-hr and 62% of the averaged 6.5 g/bhp-hr emitters, the overall average emission rate would be reduced to 0.38 x 4.0 + 0.62 x 6.5 = 5.55 g/bhp-hr. This represents a 0.25/5.8 or 4.3% reduction in NO_x emissions from HDD vehicles. Since emissions from HDD vehicles comprise about 7% of the 1990 Baseline NO_x Inventory[67] this is equivalent to a 0.3% of reduction of the full 1990 NO_x inventory.

In fact, the benefit from this program could be substantially greater. A number of diesel engine manufacturers installed devices, for fuel economy purposes, that increased NO_x emissions in engines manufactured before 1998, reportedly at 2-3 times the emission standard. Therefore the emission rate for those pre-1998 engines could be substantially higher than the average 6.5 g/bhp-hr calculated above based on standards. Consequently, the air quality benefit of attracting more post-1998 engines to the State should be even greater. For example if the 6.5 g/bhp-hr pre-1998 average used above was 50% higher, the resulting % NO_x benefit from this initiative would increase to 0.78%. Nevertheless, pending additional data on the extent of engine emission control alterations, the 0.3% NO_x benefit derived above is used in Table 7 to assess against criterion #3. Additionally, it should be noted that the benefit from this initiative will increase after 2004 when the emission standard disparity between "new" and "old" trucks is expected to increase.

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[65] South Coast Air Quality Management District, 1997.
Air Quality Management Plan, Appendix IV-A, November 1996.

[66] (7 x 5.0 g/bhp-hr + 6 x 6.0 g/bhp-hr + 5 x 8.5 g/bhp-hr) / 18 years = 6.5 g/bhp-hr.

[67] NJ Phase I Ozone SIP,

22. Enhanced I/M

The enhanced I/M program was included in the emission reductions that were used to project future ozone reductions in the Department's Phase II Ozone SIP, dated August 31, 1998. Those projections illuminated the uncertainties involved in attaining the 1-hour ozone standard, which in turn led to the need for the additional emission reductions that are embodied in criterion #3 above. Therefore emission reductions from this program cannot be credited again, i.e. towards criterion #3. Thus this initiative is given a "not applicable" in Table 7. Therefore this measure is not a practicable alternative to the preempted Phase II gasoline controls.

23. Reformulated Gasoline

Reformulated gasoline beyond federal Phase II RFG requirements is the nature of the Phase II proposal; therefore it is not an alternative.

24. Clean Fuel Fleets

As discussed in Section IV A, item 6, emission reductions from this initiative are not likely to meet criterion #1. Therefore this measure is not a practicable alternative to the preempted Phase II gasoline controls.

25. Ethylene Oxide Controls

Current estimates of VOC emissions from this source category are less than 10 tons per day (see Table 2). Therefore further controls cannot achieve reductions of 10 tons per day or higher (criterion #1). Therefore this measure is not a practicable alternative to the preempted Phase II gasoline controls.

26. Graphic Arts

From Figure 1, VOC emissions from graphic arts operations are about 15 tons per day. However the industry is already regulated in New Jersey[68] and any further cost-effective controls are not expected to yield an additional 10 ton per day benefit (criterion #1). Therefore this measure is not a practicable alternative to the preempted Phase II gasoline controls.

27. Highway Paints

From Figure 1, VOC emissions from traffic paints are predicted at less than 10 tons per day. Recent adjustments to inventories have reduced this estimate. Therefore any further emission reductions cannot meet criterion #1. Therefore this measure is not a practicable alternative to the preempted Phase II gasoline controls.

[68] N.J.A.C. 7:27 - 16.7.

28. Marine Vessel Loading

From Figure 1, VOC emissions from loading operations are less than 10 tons per day. Therefore any further cost effective reductions cannot meet criterion #1. Therefore this measure is not a practicable alternative to the preempted Phase II gasoline controls.

29. Offset Lithographic Printing

The emission from this source category are included in the graphic arts category (see item 26). Since the full category cannot meet criterion #1, this subcategory cannot either. Therefore this measure is not a practicable alternative to the preempted Phase II gasoline controls.

30. SOCMI Processes

From Figure 1 and Table 4 emissions from this source category are projected at less than 10 tons per day. Therefore any further controls cannot meet criterion #1. Therefore this measure is not a practicable alternative to the preempted Phase II gasoline controls.

31. Volatile Organic Liquid Storage

Current VOC emissions from organic liquid storage through the NJDEP emission reporting program are about 12 tons per day. As discussed in Section IV. B, item 37, additional controls may be feasible, but it is unlikely that the benefits will approach 10 tons per day (criterion #1). Therefore this measure is not a practicable alternative to the preempted Phase II gasoline controls.

32. Alcoholic Beverage Production

From Figure 1, current VOC emissions from this category are less than 10 tons per day. Additionally, this source category is already regulated by the State, and consequently any further emission reduction standards cannot meet criterion #1. Therefore this measure is not a practicable alternative to the preempted Phase II gasoline controls.

33. Roofing Asphalt

From Figure 1, current VOC emissions from this category are less than 10 tons per day. Additionally, this source category is already regulated by the State, and consequently any further emission reduction standards cannot meet criterion #1. Therefore this measure is not a practicable alternative to the preempted Phase II gasoline controls.

34. Drycleaning

From Figure 1, current VOC emissions from this category are less than 10 tons per day. Additionally, this source category is already regulated by the State, and consequently any further emission reduction standards cannot meet criterion #1. Therefore this measure is not a practicable alternative to the preempted Phase II gasoline controls.

35. Metal Coatings

The 1990 VOC emissions from can coatings are estimated at 25.6 tons per day. Projected benefits from MACT standards in 2000 are estimated to be 36% or 9 tons per day, and benefits in 2010 from California - type standards are projected at an additional 8 tons per day[69]. Therefore benefits in the 2003-2004 time frame are projected in the 9 tons per day range, or about 0.6%[70] of the 1990 VOC baseline inventory; and are predominantly from the MACT standards. However these MACT benefits were already incorporated into, the Clean Air Act baselines that were, with Regional NO_x controls, used to model future air quality in the States Phase II Ozone SIP, and which led to the need for the additional emission reductions embodied in criterion #3. Therefore they cannot be used again to contribute to meeting criterion #3, and are designated as not applicable (N/A) in Table 7. Therefore this measure is not a practicable alternative to the preempted Phase II gasoline controls.

36. Cutback/Emulsified Asphalt

Based on the discussion in Section IV.B, item 48, the VOC emissions from these source categories are about 13 tons per day. Further, additional reductions appear feasible, but it is not clear that benefits approaching the 10 tons per day of criterion #1 can be reached. Therefore this measure is not a practicable alternative to the preempted Phase II gasoline controls.

37. Industrial, Commercial, and Institutional (ICI) Boilers Using Residual Oil

NO_x emission benefits from this source category of 9 tons per day from the use of selective catalytic reduction have been projected[71] for the New York non-attainment area. This is equivalent to about 0.4% of the 1990 NO_x inventory. This is recorded in Table 7, to assess against criterion #3.

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[69] E. H. Pechan, Additional Control Measure Evaluation for the Integrated Implementation of the Ozone and PM NAAQS, and the Regional Haze Program, July 17, 1997.

[70] The New Jersey 1990 VOC inventory (without biogenics) Is 1395 tons per day (Phase I Ozone SIP; Table 22).

[71] E. H. Pechan and Associates, Inc., Control Measure Analysis of Ozone and PM Alternatives, July 17, 1997, Table VII - 18.

38. Commercial and Institutional Water/Space Heaters/Natural Gas

Potential NO_x benefits of 9.8 tons per day have been projected[72] in the New York non-attainment area from the application of low NO_x burners. This amounts to 0.9% of the projected 2010 NO_x inventory or 0.5% of the 1990 NO_x inventory. This is recorded in Table 7, to assess against criterion #3.

VIII. Conclusions Regarding Potential Alternatives to the Phase II Vehicle Fuel Proposal

The results of the above evaluations are summarized in Table 7. These measures failing criteria #1 or 2 or designated as not applicable (N/A) to criterion #3. To evaluate against criterion #3, the remaining measures are assigned an estimate of their NO_x and/or VOC benefits by the 2003-2004 time frame. The sum of the VOC and NO_x benefits from all such measures is provided at the bottom of Table 7.

The sum of the estimated VOC benefit is 9% of the 1990 VOC baseline; the NO_x benefit is 2.6% of the 1990 NO_x baseline. The ratio of the total VOC to NO_x benefits is about 3.3 to 1. At that ratio, based on the local air quality modeling done for the Phase II Ozone SIP, the % VOC and NO_x reductions required to address the uncertainty in attaining the one-hour standard are 10.8% VOC and 3.2% NO_x emission reduction (see Figure 2[73]). As discussed in Section V, the vehicle fuel rule in Phase II provides a 0% VOC and a 0.8% NO_x emission benefit. Therefore the required NO_x reduction of 3.2% is not met without the vehicle fuel rule, and the sum of the VOC benefits from the vehicle fuel rule and the other measures (9%) is less than that needed (10.8%). Therefore it is clear that none of the measures evaluated are practicable alternatives to the Phase II fuel proposal, but rather that all the measures (and/or others to be found) are essential complementary actions that are needed to assure meeting the ozone national ambient air quality standards.

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[72] E. H. Pechan and Associates, Inc., Control Measure Analysis of Ozone and PM Alternatives, July 17, 1997, Table VII - 18.

[73] Each point on the curve in Figure 2 represents a VOC/NO_x emission reduction combination that is projected to substantially remove the uncertainty in attaining the 1-hour ozone standard.

Table 7
Potential for
Additional Emission Reductions

Control Measure	Anticipated Benefits by 2004 (% of 1990 Baseline)
1. Transportation Control Measures	criterion #1
2. NJ NO_x Budget	N/A
3. Global Warming Initiatives	~1% NO_x
4. Land Use Initiatives	criterion #2
5. New Light and Heavy Duty Vehicle Standards	criterion #2
6. Diesel Fuel Reformulation	criterion #2
7. Aircraft NOx Emissions	criterion #2
8. Declining Caps on Stationary Sources	0.7 % VOC
9. Glass and Cement Manufacturing	criterion #1
10. Solvents/Degreasers	~1.2% VOC
11. Metal Products Coverings	~0.3% VOC
12. Automotive Refinishing	criterion #1
13. Industrial Adhesives	~2.4% VOC
14. Gasoline Dispensing	N/A
15. Fugitive Emissions	N/A
16. Consumer Products	~3.4% VOC
17. Education for ozone Action Days	N/A
18. Waste Burning Bans	~1% VOC, 0.4% NO_x
19. Disclosure of Vehicle Emission System Performance	criterion #2
20. Alternate Technology Vehicle Program	criterion #2
21. Incentives/Heavy Duty Vehicles	0.3 % NO_x
22. Enhanced I/M	N/A
23. Reformulated Gasoline	N/A
24. Clean Fuel Fleets	criterion #1
25. Ethylene Oxide Controls	criterion #1
26. Graphic Arts	criterion #1
27. Highway Paints	criterion #1
28. Marine Vessel Loading	criterion #1
29. Offset Lithographic Painting	criterion #1
30. SOCMI Processes	criterion #1
31. Volatile Organic Liquid Storage	criterion #1
32. Alcoholic Beverage Production	criterion #1
33. Roofing Asphalt	criterion #1
34. Drycleaning	criterion #1
35. Metal Can Coatings	N/A
36. Cutback/Emulsified Asphalt	criterion #1
37. ICI boilers; residual oil	~0.4% NO_x
38. C&I Water/Space Heaters	~0.5% NO_x
Sum of Potential Reduction	~9% VOC, 2.6% NO_x

Figure 1:
Effect of Rate-of-Progress Plans
on Projected Inventories

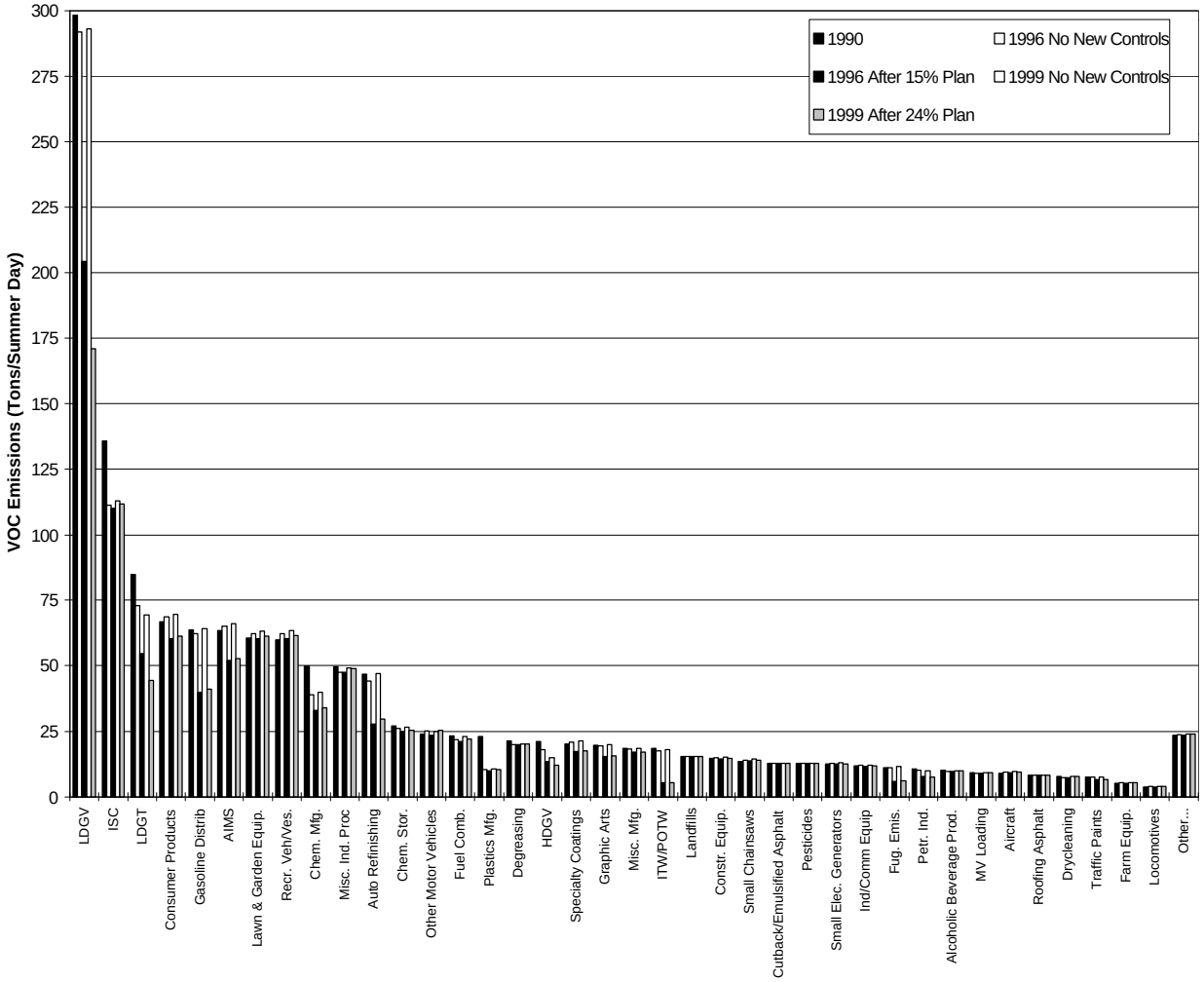

Figure 2:
Percentage Emission Reductions To Assure Attainment
with the 1- Hour Ozone Standard (relative to 1990 emission levels)

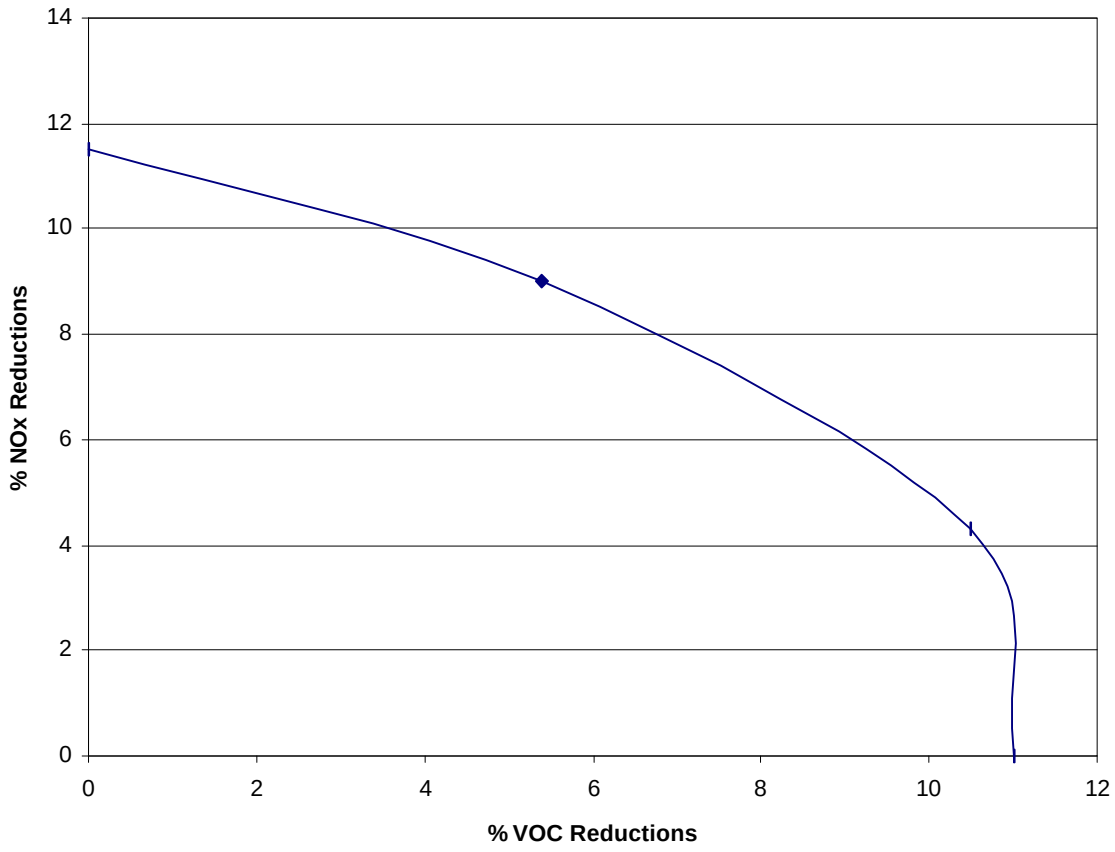

Table A-1

Control Strategies Contained in Model Run 5 of Round 2 of Ozone Transport Assessment Group Modeling Effort

UTILITY

Mandated CAA controls

* Acid Rain Controls (Phase 1 & 2 for all boiler types)
* RACT & NSR in non-attainment areas (NAAs) without waivers

Additional controls

* OTC NO_x MOU (Phase II)
* 85 percent reduction from 1990 rate or rate-base of 0.15 lb/mmbtu for all units, whichever is less stringent

NON-UTILITY POINT SOURCES

Mandated CAA controls

* RACT at major sources in NAAs without waivers
* 250 Ton PSD and NSPS (not modeled)
* NSR in NAAs without waivers (not modeled)
* CTG & Non-CTG RACT at major sources in NAAs & throughout OTC
* New Source LAER & Offsets for NAAs (not modeled)
* "9 percent by 99" ROP Measures (VOC or NO_x) for serious and above areas

Additional controls

* NO_x Controls based on cost per ton of reduction (<$1,000 per ton) - primarily LNB technology

NON-ROAD MOBILE

Mandated CAA controls

* Federal Phase II Small Engine Standards
* Federal Marine Engine Standards
* Federal HDV (>=50 hp) Standards-Phase 1
* Federal RFG II (statutory and opt-in areas)
* 9.0 RVP maximum elsewhere in OTAG

* “9 percent by 99" ROP Measures (VOC or NO_x) for serious and above areas

Additional Controls

* Federal Locomotive Standards (including rebuilds)
* HD Engine 4gm Standard

HIGHWAY MOBILE

Mandated CAA controls

* Tier 1 light-duty and heavy-duty Standards
* Federal reformulated gas (RFG II) (statutory and opt-in areas)
* High Enhanced I/M (serious and above areas)
* Low Enhanced I/M for rest of OTR
* Basic I/M (mandated areas)
* Clean Fuel Fleets (mandated areas)
* 9.0 RVP maximum elsewhere in OTAG
* On board vapor recovery

Additional Controls

* National LEV
* Heavy Duty Vehicle 2 gm Standard
* Federal Test Procedure (FTP) revisions
* “9 percent by 99" ROP Measures (if substitute for VOC) in serious and above areas

OTHER AREA SOURCE CONTROLS

Mandated CAA controls

* Two Phases of Consumer & Commercial Products & One Phase of Architectural Coatings
* Stage 1 & 2 Petroleum Distribution Controls-NAAs
* Autobody, Degreasing & Dry Cleaning Controls in NAAs
* “9 percent by 99" ROP Measures (VOC or NO_x) (serious and above areas)