AIR QUALITY IMPACT OF ALTERNATIVE EMISSION STANDARDS FOR LIGHT DUTY VEHICLES

Environmental Protection Agency
Office of Air and Waste Management

March 4, 1975

Revised March 12, 1975

EXECUTIVE SUMMARY

A computer simulation model was used to predict the impact on future air quality of changes to exhaust emission standards for light duty vehicles (LDV). The model allowed for city-specific growth estimates and for control assumptions for both motor vehicle and stationary sources. Air quality predictions were made for oxidants (30 cities), carbon monoxide (26 cities) and nitrogen dioxide (10 cities) at five year intervals through the year 1985. Five LDV exhaust control options were examined for carbon monoxide (CO) and hydrocarbons (HC); eight control options were examined for NOx.

Results show that the future Ox problem is serious and pervasive under all of the different LDV control options examined. Carbon monoxide levels decrease rapidly under nearly all of the LDV standards considered. Future NO_2 levels will exceed the air quality standard in most of the ten cities analyzed under all options considered principally due to the growth of stationary sources which will constitute the major contribution of NOx emissions.

INTRODUCTION

On January 30, 1975, President Ford transmitted to Congress a proposed omnibus energy bill, the Energy Independence Act of 1975, which included under Title V a number of proposed amendments to the Clean Air Act. One of the proposed amendments involving section 202(b) of the Act would establish emission standards for light duty vehicles (LDV) that are less stringent than presently required by the Act for 1977 vehicles, yet are more stringent than the standards presently in effect for 1975 model vehicles. The principal purpose of this amendment is to permit the automotive industry to undertake a commitment to materially improve fuel efficiency and reduce the nation's dependence upon foreign oil imports. It was based on a "best judgment" estimate at that time of the adjustment in auto emission limits needed to ensure the President's goal of a 40% 1980 improvement in fuel economy over 1974 levels.

On January 21, 1975 the EPA Administrator convened a hearing, as required by law to consider applications from the automobile manufacturers to suspend, for one year, the effective date of the 1977 statutory standards for HC and CO. In his statement opening that hearing Mr. Train stated: "this hearing will be conducted in all respects from a clean slate, with no preconceptions concerning the President's proposal or any other."

This paper contains an analysis of the impact on air quality out to the year 1985 of various LDV emission standards for hydrocarbons (HC), carbon monoxide (CO), and nitrogen oxides (NOx). HC emissions were analyzed in terms of their impact on the photochemical oxidant (Ox) air quality standard, which is the principal reason for total HC control. The analysis includes the effect out to the year 1985 of a series of possible emission

standards, ranging from current standards to the statutory levels specified for the 1977 model year, in order to allow the current proposal to be put into perspective with other possible options.

BACKGROUND AND DESCRIPTION OF THE PROPOSED AMENDMENT:

The Clean Air Act of 1970 required that new light duty vehicles beginning with model year 1975 reduce emissions of carbon monoxide (CO) and hydrocarbons (HC) by at least 90% from the allowable emissions under Federal standards for 1970 model year light duty vehicles. The Act also required that new light duty vehicles beginning with model year 1976 reduce emissions of nitrogen oxides (NO_x) by at least 90% from the emissions of 1971 model year light duty vehicles. These standards are as follows:

Hydrocarbons (HC)	0.41 grams/mile (1975)
Carbon Monoxide (CO)	3.40 grams/mile (1975)
Nitrogen Oxides (NO_x)	0.40 grams/mile (1976)

On April 11, 1973, the Administrator granted a one year suspension of the 1975 automobile emission standards for CO and HC. Nationwide interim standards for 1975 were set at 1.5 grams/mile HC and 15.0 grams/mile CO. Separate standards of .9 grams/mile HC and 9.0 grams/mile CO were prescribed for the cars sold in the State of California. On July 30, 1973, the Administrator granted a one year suspension of the 1976 automotive emission standard for NO_x. The 1976 interim standard was set at 2.0 grams/mile. In June 1974 amendments to the Clean Air Act in the Energy Supply and Environmental Coordination Act (ESECA) provided for a continuation of

the 49 State standard (1.5 grams/mile HC and 15 grams/mile CO) through model year 1976 with the statutory standards to be effective in 1977. Under ESECA the Administrator of EPA may grant a one year extension of the statutory standard to 1978. The NO_x standard was prescribed to be 3.1 grams/mile in 1976 and 2.0 grams/mile in 1977 and revert to the statutory 0.4 grams/mile in 1978. California standards in effect for 1976 and 1977 are .9 grams/mile HC, 9.0 grams/mile CO, and 2.0 grams/mile NO_x.

The proposed amendment would establish HC and CO standards at .9 grams/mile HC and 9.0 grams/mile CO (California standards) for model years 1977-1981 with the statutory standards of .41 grams/mile HC and 3.4 grams/mile CO to be effective in 1982. The NO_x standard would be set at 3.1 grams/mile through 1981. In 1982, the NO_x standard would be set at a level that the Administrator of EPA determines appropriate, taking into account air quality, energy, available technology, cost and other pertinent considerations. The existing emission requirements and proposed changes are shown on the following table:

AUTOMOTIVE EMISSION STANDARDS UNDER THE 1974 CLEAN AIR ACT AMENDMENT (ESECA) AND THE 1975 PROPOSED AMENDMENTS

Emission Standard in Grams/Mile

Pollutant	1974 Clean Air Act Amendments (ESECA)			1975 Proposed Amendment		
	1976	1977/81	1982	1976	1977/81	1982
Hydrocarbons (HC)	1.5	0.41	0.41	1.5	.9	0.41
Carbon Monoxide (CO)	15.0	3.4	3.4	15.0	9.0	3.4
Nitrogen Oxides (NO_x)	3.1	2.0*	0.40	3.1	3.1	**

**To be determined by the Administrator of EPA.
*NO_x standards 2.0 grams/mile 1977; 0.40 grams/mile 1978 on.

METHOD OF ANALYSIS

Prediction of future air quality for a major urban area is a complex task with a high possibility of error. It requires an analysis of the growth and distribution of growth for major sources of pollution (both mobile and stationary) and assumptions on the control that will be applied to these sources in the future. Changes in new auto emission standards are especially complex since they result in emission factors for the pool of existing vehicles which changes annually as old vehicles are replaced and control systems deteriorate. EPA has developed and used in this analysis a computer simulation model to predict the future air quality impact of various growth and control situations.

This model has been described fully in several publications.[1] A fundamental assumption in the model is that air quality will vary proportionately with emissions; observed air quality and an emission inventory for a recent year provide the baseline for future predictions. The model recognizes six major source categories: light, medium, and heavy duty vehicles, power plants, industrial sources, and area sources. It allows growth rates, replacement, and degree of control to be varied annually for each source category. It is the most sophisticated model now available for general use with automotive pollutants for analyzing the future impact of alternative regulatory schemes.

Changes in the absolute levels of future air quality using the model are totally determined by the assumptions made relative to growth and

[1] N. deNevers and R. Morris, "Rollback Modelling - Basic and Modified," presented at the annual meeting of the Air Pollution Control Association, June 24-28, 1973, Chicago, Illinois, paper no. 73-139.

future control actions. Assumptions cannot be made with much confidence beyond five years and are only guesses beyond ten years. Differing assumptions will result in measurable changes in air quality. For example, assumptions using low mobile source growth rates combined with higher stationary source growth rates will, after a sufficiently lengthy period of time, result in air quality levels significantly different than assumptions using a higher mobile source growth rate. Consequently, two sets of tables with differing mobile source growth rates are presented for comparison purposes.

ASSUMPTIONS USED IN THE ANALYSIS

Generally, the assumptions used in these calculations are fairly conservative and reflect only those control actions which are already planned and which have a high likelihood of being implemented. For example, no credit was assumed for air quality maintenance plans, since these plans have not yet been formulated. However, the required maintenance analysis for most major urban areas will force a detailed evaluation of future pollution emissions and air quality in relation to the standard. Where necessary to maintain the standards, states must tighten existing regulations, control new sources, and modify existing growth patterns. This, of course, could cause future air quality to be better

than the estimates presented in the analysis. Because the assumptions are so important, it is necessary to define them in some detail in order to allow an interpretation of the results.

General Assumptions for All Pollutants

Air quality data from the State Implementation Plans (SIP's) for 1970 and 1971, which generally form the basis for the SIP control strategies and transportation control plans (TCP's), were used for projecting future air quality for CO and HC. Air quality data for 1972 were used initially for NO_2. However, 1973 air quality data for all three pollutants, which are more comprehensive than earlier data, were examined to ensure that earlier data accurately represented a "worst case" situation. Wherever the 1973 air quality data indicated a more adverse air quality problem then the earlier data, the 1973 data were used instead.

- The air quality data used generally represent the second highest values for the year for photochemical oxidants and the maximum eight hour values for carbon monoxide. Since the Ox and CO standards are values not to be exceeded more than once per year, the use of second highest is more correct and the analyses for CO are somewhat conservative in this respect. The observed annual values for NO_2 were used, since the ambient NO_2 standard is stated in terms of an annual average.
- Stationary source emission data representative of 1970 and 1971 were taken from the State Implementation Plan (SIP) for each urban area. For many areas this represents the last year for which comprehensive data are available. Mobile source emission data for 1971 were obtained from EPA's

National Emissions Data System since it provides a consistent data base for all areas analyzed. Table B-1 in Addendum B lists the annual growth rates for mobile source emissions used in the calculations.

- Area-specific stationary source growth rates were based on economic projections (projections of earnings by various industrial categories made by the Bureau of Economic Analysis in each Air Quality Control Region [AQCR]), in "Economic Projections for Air Quality Control Regions."
- For the analysis contained in the body of the report, area-specific mobile source growth rates for all pollutants were estimated primarily through historic growth rates for the central business district (CBD). The use of historic CBD figures often do not reflect adequately the growth in vehicle miles of travel (VMT) for the entire metropolitan area and therefore may not be representative of future area-wide emission of HC and NO_x. Therefore, a separate analysis for HC and NO_x was performed using metropolitan VMT growth rates based upon estimates supplied (through DOT) by the appropriate states, (Addendum B). These latter estimates are based upon population and economic growth estimates for the specific metropolitan area and were adjusted to account for any existing or planned TCP's. The results of the analysis using the metropolitan growth rates are contained in an addendum to the report. Generally, the VMT growth rates using historic CBD figures range from 0.5% to 3.0%, while the metropolitan area growth rates range from 2.0 to 6.0%. No separate analysis was performed for CO using the metropolitan growth rates since air quality data used in the analysis is derived from monitoring instruments which are generally located in well

developed sections of the urban complex. Even the use of these lower growth rates (CBD rates) may result in overestimating future air quality for CO, since many CBD's may be close to saturation and VMT would not continue at historic rates. No consideration was given in any of the analyses for possible reductions in future VMT due to projected high gasoline prices.

- No credit was taken for future reductions in growth of vehicle miles of travel (VMT) or in emissions (obtained through retrofit of existing vehicles), even though such provisions are included in some of the SIP's. Other measures in the SIP's were accounted for and are discussed below.

- Emission factors for all motor vehicles are based on the latest available data, and reflect recent surveillance programs for in use vehicles, more sophisticated testing procedures, and recent prototype and certification tests. The new emission factors differ from previously used emission factors in the following areas:

    1) LDV evaporative emissions are higher than previously estimated (1.8 grams/mile rather than 0.2 grams/mile for new cars); additional Federal controls of evaporative emissions were assumed in 1980, as discussed below.

    2) CO emission factors for 1972-1974 LDV's increased by 65%.

    3) Emission factors for both CO and HC from pre-1970 heavy duty vehicles (HDV's) increased substantially (70% and 106% respectively). Emission factors for controlled HDV's (post-1970) increased moderately for CO (45%) and were virtually unchanged for HC.

4) The LDV emission factors used in the analysis incorporate the Agency's estimate (from certification data and future projections) of the emissions from actual in-use vehicles. Thus, vehicles designed to meet a certain standard may have higher or lower emissions than that standard depending upon the age of the vehicles. Consequently, a change in the magnitude of a LDV emission standard may not mean that an equal change in actual emissions can be expected. For example, the interim (15 gm/mi) and California (9 gm/mi) CO LDV standard from 1977 until 1990 will result in average in-use vehicle CO emissions of 12.57 and 7.39 gm/mile, in 1990 respectively; however, under a similar situation for the statutory standard (3.4 gm/mi), average in-use vehicle CO emission in 1990 would be 3.99 gm/mi. (Note: The 1977-1990 timeframe is used in the preceeding example to allow sufficient time so that all in-use vehicles would have been designed under the particular standards used in the comparison).

5) The deterioration of control efficiency for HC appears to be significant, but offsetting this was the assumption that inspection/ maintenance programs would be implemented in areas with serious oxidant problems. Replacement of the catalyst was assumed if HC emissions rose to about twice the standard. For non-catalyst vehicles it was assumed

that the I/M program reduced HC by 10% initially and limited deterioration to 3% a year thereafter. No credit was taken for the impact of I/M on CO control deterioration.

° Heavy duty diesels will remain unchanged from presently-used diesels: CO and HC emission factors from gasoline engine trucks will be reduced significantly, while the emission factors for NOx will increase substantially

° The introduction rate of new cars was assumed to be the same in the future as it was in 1970. The effect of a decline in new car sales was examined and found to have only a small impact. Specifically, the effect of the following new car sales rates was analyzed:

Year	% of 1970 Sales
1975	70
1976-79	80
1980	90
1981-85	100

Using the California emission standards as an example, the above change in new car sales produced a maximum effect in 1980, increasing concentrations of CO by about 10%. The impact on the relative effectiveness of the alternative emission control schemes will be smaller. In 1985 there was virtually no effect of the change in sales on predicted air quality or relative effectiveness.

Specific Assumption for Hydrocarbon/Oxidant Strategies

° It was assumed that reasonably available control technology (RACT) for stationary sources would be implemented in all cities analyzed. This

assumption is based on the Administration's proposed Act amendment, which requires that in order to qualify for an attainment date extension beyond 1977 (due to serious social and economic disruption), a region must adopt and implement all reasonable control measures.

- The application of RACT was assumed to include control of gasoline evaporative emissions at bulk terminals, service station tanks, and automobile fuel tanks.
- As discussed above, recent data indicate that the LDV evaporative emission factor used previously is much too low and the use of current comprehensive emission test data (SHED test) indicate that the evaporative emission factor should be increased from 0.2 grams per mile to 1.8 grams per mile. If the new factor is correct, evaporative emissions become a more significant portion of the vehicle problem and regulatory steps are indicated and will be taken. Therefore, it was assumed that the 1.8 factor was correct and that new evaporative emission standards would be developed requiring 70% control (to 0.5 grams/mile) for 1980 and later vehicles.
- Federal new source performance standards (NSPS) now exist for petroleum storage vessels. Much work is underway on NSPS for other hydrocarbon sources, and future NSPS were assumed for carbon black plants, dry cleaning plants, solvent degreasing and surface coating operations.

Specific Assumption for Carbon Monoxide

- Since the "hot spots" for CO are always located in areas of high traffic density the impact on future air quality of mobile source emissions and their control appear to dominate the CO situation; stationary sources have very little impact. Therefore, it is necessary to apply an adjustment factor to the stationary source categories to realistically estimate future air quality. Factors of 20% for area sources, 10% for industry and 0% for

power plants were used. This means that a pound of CO from a new industrial source was assumed to have only 1/10 the air quality impact on the roadside CO "hot spot" as a pound of CO emitted on the street in front of the sampler. These adjustment factors were selected after considering the results from dispersion models for power plants and industry and a review of the relationship between traffic density and CO levels in several situations.

- It is recognized that there may be situations where carbon monoxide levels at downtown intersections or surburban highway intersections are composed of nearly 100% light duty vehicles. In those situations, the relative difference in the impact between various LDV CO standards would be greater than that shown in the enclosed tables.

- In problem cities, it was assumed that reasonably available control technology would be applied to large industrial sources, although such regulations may not now be adopted in all cities analyzed. Since stationary sources are not significant for CO, this assumption has only a minor effect.

Specific Assumptions for Oxides of Nitrogen

- Control of existing sources was not assumed unless SIP regulations are presently in effect. Since there is very little technology available at this time for control of NO_X from stationary sources, little retrofit is possible and stationary sources growth dominates the future NO_X situation. Technology is being developed, however, and its availability coupled with Air Quality Maintenance Plans should influence significantly future NO_2 air quality.

Since NO_2 appears to be a widespread future problem rather than one that requires rollback from current air quality levels, a fairly aggressive program for control of new stationary sources was assumed and is being implemented. In addition to present new source performance standards (NSPS) for power plants, nitric acid plants, and gas turbines (to be proposed shortly), NSPS were assumed for lignite steam generators, stationary internal combustion engines, and intermediate coal, oil, and gas-fired boilers. Further tightening of NSPS for power plants was assumed in 1980.

DISCUSSION

The results of these analyses are presented in several forms; predicted air quality, percent change in air quality, number of Regions above the ambient standard and annual frequency of violations of the air quality standard. These are presented for many alternative exhaust control schemes for CO, Ox (HC), and NO_2 to the year 1985. Not all Regions with a current pollution problem were included in the analysis, but the worst regions are probably all included. New air quality data suggest that air pollution problems from CO and Ox may be more widespread than previously determined. As more widespread monitoring is carried out and reported, additional problems inevitably are uncovered.

Thirty cities have been analyzed for O_x, 26 for CO, and 10 for NO_2. Data available to EPA's National Aerometric Data Bank indicate that 212 adequate sampling stations for CO are operating nationwide. Of these, approximately 150 have shown violations of the ambient air quality standard. These represent over 50 urban areas. Since CO levels are strongly influenced by high traffic density, it seems likely that violations will be found in additional cities as the number of samplers increases.

Recent O_x data shows that 162 out of 187 urban sampling sites have at least two hours a year above the ambient standard of 0.08 ppm. This represents about 60 urban areas. Recent data at rural locations show widespread violations of the standard throughout the midwest and east coast, often up to twice the standard. It is clear that the estimates of the number of Regions above the standard especially in 1980 and 1985 is significantly below the national total.

The ten cities selected for NO_2 analysis were the worst case situations (considering air quality and growth) from a list of about 30 urban areas for which 1972 data were available. Data for 1973 from over 150 sites of the National Air Sampling Network (NASN) do not suggest that many additional cities have problems similar to the ten selected for analysis. No other validated NASN sites had an annual average above the standard (100 $\mu g/m^3$). Four cities (Atlanta, Detroit, Springfield, Mass., and Louisville, Ky.) recorded levels between 90 and 100 $\mu g/m^3$ Six others had levels between 80 and 90 $\mu g/m^3$ (Cincinnati, Boston, New Orleans, Minneapolis, St. Louis, and Steubenville, Ohio).

Oxides of Nitrogen

Current air quality data show clearly that for most of the country the NO_2 problem is one of maintaining compliance with the ambient standard by controlling growth in NOx emissions, and not one of reducing existing emission levels in order to attain the standard. Los Angeles, Chicago and possibly New York are exceptions. Los Angeles seems to be unique for all of the automotive pollutants and does not approach the ambient standards with any level of exhaust control. Clearly, significant modification must

be made in VMT and transportation patterns if Los Angeles is to meet the primary air quality standards for NO_2 or Ox.

Oxides of nitrogen are emitted from any combustion process and from several industrial operations. Nationwide, about half of the NOx comes from stationary sources and half from motor vehicles; in most urban areas motor vehicles now account for more than half. A key to attainment and maintenance of the standard for NOx is in control of stationary sources; this in turn depends on development of technology for NOx control for both new and existing sources. Only modest credit has been given for control of stationary sources in this analysis; therefore, the standard is projected not to be maintained in 1985 for six of the ten cities (Table 9) analyzed even with the most restrictive exhaust standards. Using the higher VMT growth rates Addendum B, nine of the ten cities analyzed fail to maintain the NOx standard in 1985. The vigorous technology development program now underway, the Air Quality Maintenance Plan requirements, and an intensified new source performance standard program all should accelerate control of stationary sources and reduce the predicted air quality levels. Also control of medium duty and heavy duty vehicles must be improved to offset growth.

Nonetheless, tighter control of LDV exhaust does make an important difference in NO_2 levels in every city analyzed. Predicted air quality through 1985 is shown for each city for eight different exhaust control scenarios in Tables 1 through 8 and is summarized in Table 9. Under the most stringent set of standards (0.4 g/m in 1978 and continuing through 1985) NO_2 in the air <u>increases</u> by an average of 6% in 1980 and

the most lenient set of standard (3.1 from now until 1985) allows average increases of 16% in 1980 with seven cities exceeding the standard and 32% in 1985 with all ten cities exceeding.

Air quality impact alone does not provide a conclusive basis for softening or selected LDV emission standard for NOx. The selection of the optimum emission standards also depend on other factors such as available technology, fuel savings, and cost. Even ignoring maintenance of the air quality standards the analysis of future air quality does not provide obvious plateaus nor breakpoints to aid in the selection. The NO_2 problem always gets worse, although the rate of worsening is slowed as emission standards are tightened and implemented sooner.

Carbon Monoxide

Twenty-six urban areas were analyzed for CO. Five exhaust control options were considered; statutory (3.4 g/m), California (9.0) and interim or current (15 g/m) from 1977 through 1985, California from 1977-81 dropping to the statutory from 1982 and 1985 and finally the interim to 1981 dropping to the statutory from 1982 to 1985. The results for each of the 26 cities are presented as projected air quality and frequency of violations out to 1985 in Tables 10 through 14. The results are summarized in Table 20 showing Regions above the air quality standard, average percent decrease in CO concentrations and total number of violations of the air quality standard (eight hour periods) for the 26 cities.

Unlike the NOx and HC, carbon monoxide is almost uniquely associated with motor vehicles. The growth of stationary sources over the next 10 years will have very little effect on CO air quality. Therefore, air quality improves rapidly and continues to improve out to 1985 under all of the exhaust control options considered. The most lenient control (interim standards through 1985) will lower CO levels an average of 65% in the 26 cities by 1985. However, eight of these 26 will still exceed the standard a total of 108 times a year. The highest city will be Phoenix at 16 ppm. Application of the 3.4 g/m statutory standard in 1977 will lower CO levels by 74% in 1985.

Relative Impact on Carbon Monoxide of Control Options on Cold Start Emissions

Emissions of CO from LDV are much more pronounced during the first few minutes of cold operation than during the period after the vehicle has warmed up. Consequently, the testing cycle used in the Federal Test Procedures (FTP) for determining if a vehicle meets a given emission standard requires that a substantial portion of the test be conducted immediately after initial start up (after a long cool-down period) when CO emissions are much higher than in other phases of the test. This portion of the test is frequently referred to as the "cold-start" phase.

It has been suggested that in order to meet the lower alternative emission standards, future control systems would have to focus a disproportionate amount of control on the high emissions during "cold-start" operations. That is, lower emission standards would be met by a much larger reduction in "cold-start" emissions than for emissions during the so-called stabilized (warm vehicle operation) phase. If this is true, lower emission standards (i.e., the statutory levels) will provide considerable extra benefits in air quality around indirect sources, where many vehicles that operate in the "cold-start" mode (e.g. stadiums, parking lots), and in other areas where there are many simultaneous cold starts at certain times (e.g. suburbs in the morning and downtown areas at the afternoon "rush hour").

An analysis was made of the relative impact on cold engine emissions of the statutory and the interim exhaust standards. Although the Agency cannot be sure how the industry would choose to meet various emission standards for CO, it is our current judgement that catalyst systems probably will be necessary to meet 3.4 grams/mile and that a variety of engine modifications, without catalysts, could be used if the standard is 9 or above and if HC controls are not lower than .9. Using both emission data from prototype catalyst systems and extrapolation techniques it is our best estimate that future standards will be met by proportionately reducing emissions during all phases of the driving cycle, not by concentrating on the "cold-start period. The analysis was extended to examine very low temperature ambient start up conditions (25° F) with similar results. Therefore,

the low statutory emission standards will not provide disproportionate benefits in areas dominated by "cold start" operations.

Hydrocarbon/Oxidant

Thirty urban areas were analyzed for projected hydrocarbon emissions under the same five sets of control options used for CO. Resulting oxidant levels and annual frequency of violations of the ambient air quality standard (0.08 ppm for one hour) for each of the 30 cities are presented in Tables 15 through 19 and in Addendum B, Tables B-15 through B-19. These are summarized for all 30 cities and presented along with the average percent decrease in O_x levels (or HC emissions) in Table 20, and Table B-16.

The most striking feature of the HC analysis in the pervasiveness of the O_x problem. Even assuming the lower mobile source growth rates (Table 20), t majority of cities analyzed will not meet the ambient standard by 1985 under the assumed regulatory programs. Using the higher mobile source growth rates of Addendum B, an even greater number of cities will not meet the ambient standard by 1985 under the assumed regulatory programs. Future population and vehicle miles traveled growth rates after 1985 will futher exacerbate the problem.

LDV's exhaust currently accounts for about 25% of the hydrocarbon emissions; this decreases to about 10% as more control is applied to automobile exhaust and the number of stationary HC sources increases. This is true even with the application of known control technology to existing and new stationary sources of hydrocarbon. It is clear that both increased control of stationary sources coupled with reduction in projected vehicle miles traveled increase will be necessary to obtain O_x levels below the ambient standards.

Table 1

Projected NO_x Air Quality Concentration, $\mu g/m^3$
3.1 gm/mi 1977-90

Region	Ambient conc. 1972-73	1980	1985
015 Phoenix	78	97	111
024 Los Angeles	148	173	194
030 San Francisco	82	93	102
036 Denver	100	119	135
043 NY-NJ-Conn.	113	124	144
045 Philadelphia	89	107	121
047 National Capitol	88	104	116
067 Chicago	117	133	152
115 Baltimore	96	99	116
220 Wasatch Front	100	121	137

Table 2

Projected NO_x Air Quality Concentration, $\mu g/m^3$
3.1 gm/mi 1977-81
2.0 gm/mi 1982-90

Region	Ambient conc. 1972-73	1980	1985
015 Phoenix	78	97	105
024 Los Angeles	148	173	183
030 San Francisco	82	93	96
036 Denver	100	119	129
043 NY-NJ-Conn.	113	130	139
045 Philadelphia	89	107	119
047 National Capitol	88	104	111
067 Chicago	117	133	148
115 Baltimore	96	99	112
220 Wasatch Front	100	121	131

Table 3

Projected NO_x Air Quality Concentration, $\mu g/m^3$
3.1 gm/mi 1977-81
1.0 gm/mi 1982-90

Region	Ambient conc. 1972-73	1980	1985
015 Phoenix	78	97	100
024 Los Angeles	148	173	174
030 San Francisco	82	93	92
036 Denver	100	119	125
043 NY-NJ-Conn.	113	130	136
045 Philadelphia	89	107	117
047 National Capitol	88	104	107
067 Chicago	117	133	145
115 Baltimore	96	99	109
220 Wasatch Front	100	121	124

Table 4

Projected NO_x Air Quality Concentration, $\mu g/m^3$
3.1 gm/mi 1977-81
0.4 gm/mi 1982-90

Region	Ambient conc. 1972-73	1980	1985
015 Phoenix	78	97	98
024 Los Angeles	148	173	167
030 San Francisco	82	93	89
036 Denver	100	119	123
043 NY-NJ-Conn.	113	130	132
045 Philadelphia	89	107	115
047 National Capitol	88	104	105
067 Chicago	117	133	143
115 Baltimore	96	99	107
220 Wasatch Front	100	121	121

Table 5
Projected NO_x Air Quality Concentration, $\mu g/m^3$
2.0 gm/mi 1977-90

Region	Ambient conc. 1972-73	1980	1985
015 Phoenix	78	92	100
024 Los Angeles	148	163	173
030 San Francisco	82	88	92
036 Denver	100	115	125
043 NY-NJ-Conn.	113	125	136
045 Philadelphia	89	104	117
047 National Capitol	88	100	107
067 Chicago	117	129	145
115 Baltimore	96	96	109
220 Wasatch Front	100	116	124

Table 6

Projected NO_x Air Quality Concentration, $\mu g/m^3$

2.0 gm/mi 1977-81

1.0 gm/mi 1982-90

Region	Ambient conc. 1972-73	1980	1985
015 Phoenix	78	92	96
024 Los Angeles	148	163	163
030 San Francisco	82	88	86
036 Denver	100	115	120
043 NY-NJ-Conn.	113	125	131
045 Philadelphia	89	104	114
047 National Capitol	88	100	103
067 Chicago	117	129	141
115 Baltimore	96	96	105
220 Wasatch Front	100	116	119

Table 7

Projected NO_x Air Quality Concentration, $\mu g/m^3$

2.0 gm/mi 1977-81

0.4 gm/mi 1982-90

Region	Ambient conc. 1972-73	1980	1985
015 Phoenix	78	92	93
024 Los Angeles	148	163	157
030 San Francisco	82	88	83
036 Denver	100	115	117
043 NY-NJ-Conn.	113	125	129
045 Philadelphia	89	104	113
047 National Capitol	88	100	101
067 Chicago	117	129	139
115 Baltimore	96	96	103
220 Wasatch Front	100	116	115

Table 8

Projected NO_x Air Quality Concentration, $\mu g/m^3$

0.4 gm/mi 1978-90

Region	Ambient conc. 1972-73	1980	1985
015 Phoenix	78	86	87
024 Los Angeles	148	151	145
030 San Francisco	82	82	77
036 Denver	100	109	112
043 NY-NJ-Conn.	113	121	124
045 Philadelphia	89	102	109
047 National Capitol	88	95	96
067 Chicago	117	125	134
115 Baltimore	96	92	99
220 Wasatch Front	100	110	108

TABLE 9

COMPARISON OF THE EFFECT OF VARIOUS ALTERNATIVE LDV STANDARDS ON NO_x AIR QUALITY CONCENTRATIONS

LDV Standard (g/mi)	1977-81	3.1	3.1	3.1	3.1	2.0	2.0	2.0	0.4(1978-81
	1982-85	3.1	2.0	1.0	0.4	2.0	1.0	0.4	0.4
Number of AQCR's exceeding NAAQS (10 cities analyzed	1980	7	7	7	7	7	7	7	6
	1985	10	9	9	8	9	8	8	6
Average percent increase in air quality concentration	1980	16	16	16	16	12	12	12	6
	1985	32	26	22	19	22	17	14	8

Table 10

Projected Impact of Statutory CO LDV Emission Standard, 1977 1990

No.	Region	Predicted Ambient Conc.[1] and No. of Occasions Standard is Exceeded (#)[2]				
		1971/73[3]	1980		1985	
		conc.	conc.	#	conc.	#
004	Birmingham	18	6	-	4	-
009	North Alaska	35	15	26	11	4
013	Clark-Mohave	15	9	-	5	
015	Phoenix-Tucson	42	20	127	12	6
024	Los Angeles	41	17	55	10	2
028	Sacremento Valley	22	9	-	5	-
029	San Diego	15	7	-	4	-
030	San Francisco	18	9	-	6	
031	San Joaquin	13	6	-	3	-
036	Denver	33	15	26	8	-
042	Hartford-N. Haven	27	11	4	7	-
043	NY-NJ-Conn.	51	21	153	11	4
045	Philadelphia	32	13	10	8	-
047	National Capitol	20	9	-	6	-
062	E. Wash.-N. Idaho	18	10	2	6	-
067	Chicago	23	8	-	5	-
080	Indianapolis	15	6	-	4	-
094	Kansas City	15	7	-	4	-
115	Baltimore	18	11	4	6	-
119	Boston	18	7	-	4	-
131	Minn.-St. Paul	22	11	4	7	-
158	Central New York	15	6	-	4	-
193	Portland	26	12	6	7	-
197	S.W. Pennsylvania	22	9	-	5	-
220	Wasatch Front	41	19	101	11	4
229	Puget Sound	24	12	6	7	-
Total # of Regions Exceeding Standards		26	13		5	
Total # of Occasions Standard is Exceeded				524		20
Average % Air Quality Reduction from 1970			57		74	

1. Maximum 8-hour concentration in ppm.

2. Estimated number of non-overlapping 8-hour intervals exceeding 9 ppm.

3. Second highest recorded concentrations from 1971 through 1973.

Table 11

Projected Impact of California CO LDV Standard,
1977-1981, Statutory LDV Standard,
1982 - 1990

No.	Region	Predicted Ambient Conc.[1] and No. of Occasions Standard is Exceeded (#)[2]				
		1971/73[3]	1980		1985	
		conc.	conc.	#	conc.	#
004	Birmingham	13	8	-	5	-
009	North Alaska	35	15	26	11	4
013	Clark-Mohave	15	9	-	5	-
015	Phoenix-Tucson	42	21	157	13	10
024	Los Angeles	41	18	77	11	4
028	Sacremento Valley	22	9	-	6	-
029	San Diego	15	7	-	5	-
030	San Francisco	18	10	2	6	-
031	San Joaquin	13	6	-	3	-
036	Denver	33	15	26	9	-
042	Hartford-N. Haven	27	11	4	7	-
043	NY-NJ-Conn.	51	21	157	13	10
045	Philadelphia	32	13	10	8	-
047	National Capitol	20	9	-	6	-
062	E. Wash.-N. Idaho	18	10	2	6	-
067	Chicago	23	9	-	5	-
080	Indianapolis	15	6	-	4	-
094	Kansas City	15	7	-	5	-
115	Baltimore	18	11	4	7	-
119	Boston	18	8	-	5	-
131	Minn.-St. Paul	22	11	4	7	-
158	Central New York	15	7	-	4	-
193	Portland	26	12	6	8	-
197	S.W. Pennsylvania	22	9	-	6	-
220	Wasatch Front	41	19	101	13	10
229	Puget Sound	24	12	6	8	-
	Total # of Regions Exceeding Standards	26	14		5	
	Total # of Occasions Standard is Exceeded			582		38
	Average % Air Quality Reduction from 1970		56		71	

1. Maximum 8-hour concentration in ppm.
2. Estimated number of non-overlapping 8-hour intervals exceeding 9 ppm.
3. Second highest recorded concentrations from 1971 through 1973.

Table 12

Projected Impact of Interim CO LDV Standard 1977-1981, Statutory LDV Standard 1982-1990

No.	Region	Predicted Ambient Conc.[1] and No. of Occasions Standard is Exceeded (#)[2] 1971/73[3] conc.	1980 conc.	1980 #	1985 conc.	1985 #
004	Birmingham	18	8	-	5	-
009	North Alaska	35	16	38	11	4
013	Clark-Mohave	15	9	-	6	-
015	Phoenix-Tucson	42	22	184	14	16
024	Los Angeles	41	19	101	12	6
028	Sacremento Valley	22	9	-	6	-
029	San Diego	15	9	-	5	-
030	San Francisco	18	10	2	6	-
031	San Joaquin	13	7	-	3	-
036	Denver	33	16	38	11	4
042	Hartford-N. Haven	27	14	16	9	-
043	NY-NJ-Conn.	31	22	184	13	10
045	Philadelphia	32	13	10	8	-
047	National Capitol	20	10	2	6	-
062	E. Wash.-N. Idaho	18	10	2	7	-
067	Chicago	23	9	-	6	-
080	Indianapolis	15	7	-	4	-
094	Kansas City	15	7	-	5	-
115	Baltimore	18	11	4	7	-
119	Boston	18	8	-	5	-
131	Minn.-St. Paul	22	12	6	8	-
158	Central New York	15	7	-	4	-
193	Portland	25	13	10	8	-
197	S.W. Pennsylvania	22	9	-	6	-
220	Wasatch Front	41	21	157	13	10
229	Puget Sound	24	13	10	8	-
	Total # of Regions Exceeding Standards	26	15		6	
	Total # of Occasions Standard is Exceeded			764		50
	Average % Air Quality Reduction from 1970		53		70	

1. Maximum 8-hour concentration in ppm.
2. Estimated number of non-overlapping 8-hour intervals exceeding 9 ppm.
3. Second highest recorded concentrations from 1971 through 1973.

Table 13

Projected Impact of California CO LDV Standard 1977-1990

No.	Region	Predicted Ambient Conc.[1] and No. of Occasions Standard is Exceeded (#)[2]				
		1971/73[3]	1980		1985	
		conc.	conc.	#	conc.	#
004	Birmingham	18	8	-	5	-
009	North Alaska	35	15			
013	Clark-Mohave	15	9	26 -	11 6	4 -
015	Phoenix-Tucson	42	21	157	14	16
024	Los Angeles	41	18	77	11	4
028	Sacremento Valley	22	9	-	6	-
029	San Diego	15	7	-	5	-
030	San Francisco	18	10	2	6	-
031	San Joaquin	13	6	-	3	-
036	Denver	33	15	26	9	-
042	Hartford-N. Haven	27	11	4	9	-
043	NY-NJ-Conn.	51	21	157	13	10
045	Philadelphia	32	13	10	8	-
047	National Capitol	20	9	-	6	-
062	E. Wash.-N. Idaho	18	10	2	7	-
067	Chicago	23	9	-	6	-
080	Indianapolis	15	6	-	4	-
094	Kansas City	15	7	-	5	-
115	Baltimore	18	11	4	7	-
119	Boston	18	8	-	5	-
131	Minn.-St. Paul	22	11	4	8	-
158	Central New York	15	7	-	4	-
193	Portland	26	12	6	8	-
197	S.W. Pennsylvania	22	9	-	6	-
220	Wasatch Front	41	19	101	13	10
229	Puget Sound	24	12	6	8	-
	Total # of Regions Exceeding Standards	26	14		5	
	Total # of Occasions Standard is Exceeded			582		44
	Average % Air Quality Reduction from 1970		55		70	

1. Maximum 8-hour concentration in ppm.
2. Estimated number of non-overlapping 8-hour intervals exceeding 9 ppm.
3. Second highest recorded concentrations from 1971 through 1973.

Table 14

Projected Impact of Interim CO LDV Standard 1977-1990

No.	Region	Predicted Ambient Conc.[1] and No. of Occasions Standard is Exceeded (#)[2]				
		1971/73[3]	1980		1985	
		conc.	conc.	#	conc.	#
004	Birmingham	18	8	-	6	-
009	North Alaska	35	16	38	13	10
013	Clark-Mohave	15	9	-	7	-
015	Phoenix-Tucson	42	22	184	16	38
024	Los Angeles	41	19	101	13	10
028	Sacremento Valley	22	9	-	7	-
029	San Diego	16	9	-	6	-
030	San Francisco	23	10	2	8	-
031	San Joaquin	15	7	-	5	-
036	Denver	33	16	38	11	4
042	Hartford-N. Haven	27	14	16	9	-
043	NY-NJ-Conn.	51	22	184	14	16
045	Philadelphia	32	13	10	10	2
047	National Capitol	20	10	2	7	-
062	E. Wash.-N. Idaho	19	10	2	8	-
067	Chicago	23	9	-	7	-
080	Indianapolis	15	7	-	5	-
094	Kansas City	15	7	-	6	-
115	Baltimore	21	11	4	8	-
119	Boston	18	8	-	6	-
131	Minn.-St. Paul	22	12	6	9	-
158	Central New York	15	7	-	5	-
193	Portland	26	13	10	9	-
197	S.W. Pennsylvania	22	9	-	7	-
220	Wasatch Front	41	21	157	15	26
229	Puget Sound	24	13	10	10	2
	Total # of Regions Exceeding Standards	26	15		8	
	Total # of Occasions Standard is Exceeded			764		108
	Average % Air Quality Reduction from 1970		53		65	

1. Maximum 8-hour concentration in ppm.
2. Estimated number of non-overlapping 8-hour intervals exceeding 9 ppm.
3. Second highest recorded concentrations from 1971 through 1973.

Table 15

Projected Impact of Statutory HC LDV Emission Standard, 1977 - 1990

No.	Region	Predicted Ambient Conc. and No. of Occasions Standard is Exceeded (#)				
		1971/73[1]	1980		1985	
		conc. ppm	conc.	#	conc.	#
004	Birmingham	.22	.15	80	.11	14
009	Mobile-Pensacola	.11	.06	-	.04	-
013	Clark-Mohave	.22	.14	58	.12	24
015	Phoenix-Tucson	.19	.16	114	.16	114
024	Los Angeles	.62	.46	4030	.41	3330
028	Sacremento Valley	.24	.20	333	.20	333
029	San Diego	.30	.21	412	.19	263
030	San Francisco	.30	.25	780	.23	578
031	San Joaquin	.26	.22	490	.21	412
033	S.E. Desert	.28	.29	1331	.32	1866
036	Denver	.28	.19	263	.16	114
043	NY-NJ-Conn.	.26	.17	153	.13	39
045	Philadelphia	.20	.13	39	.10	6
047	National Capitol	.38	.28	1165	.25	780
079	Cincinnati	.17	.12	24	.11	14
080	Indianapolis	.14	.09	3	.08	-
106	S. Lou.-S.E. Texas	.32	.24	666	.19	263
119	Boston	.21	.13	39	.10	6
124	Toledo	.14	.10	6	.07	-
153	El Paso-Las Cruces	.13	.07	-	.05	-
160	Genesse-Finger Lakes	.15	.09	3	.07	-
173	Dayton	.18	.14	58	.12	24
193	Portland	.14	.10	6	.08	-
197	S.W. Pennsylvania	.21	.14	58	.11	14
212	Austin-Waco	.16	.09	3	.07	-
214	Corpus-Christi	.19	.17	153	.14	58
215	Dallas-Ft. Worth	.13	.07	-	.04	-
216	Houston-Galveston	.32	.28	1165	.26	902
217	San Antonio	.15	.08	-	.06	-
229	Pudget Sound	.16	.10	6	.08	-
	Total # of Regions Exceeding Standards	30	26		20	
	Total # of Occasions Standard is Exceeded			11438		9154
	Average % Air Quality Reduction from 1970		30		40	

1. Second highest recorded concentrations from 1971 through 1973.

Table 16

Projected Impact of California HC LDV Standard, 1977-1981, Statutory LDV Standard, 1982 - 1990

No	Region	Predicted Ambient Conc. and No. of Occasions Standard is Exceeded (#)				
		1971/73 [1]	1980		1985	
		conc. ppm	conc.	#	conc.	#
[illegible]	Birmingham	.22	.15	80	.11	14
[illegible]	Mobile-Pensacola	.11	.06	-	.04	-
013	Clark-Mohave	.22	.15	80	.12	24
015	Phoenix-Tucson	.19	.17	153	.16	114
024	Los Angeles	.62	.47	4120	.41	3330
028	Sacremento Valley	.24	.21	412	.20	333
029	San Diego	.30	.22	490	.19	263
030	San Francisco	.30	.25	780	.23	578
031	San Joaquin	.26	.22	490	.21	412
033	S.E. Desert	.28	.30	1507	.32	1866
036	Denver	.28	.19	263	.16	114
043	NY-NJ-Conn.	.26	.17	153	.13	39
045	Philadelphia	.20	.13	39	.10	6
047	National Capitol	.38	.28	1165	.25	780
079	Cincinnati	.17	.13	39	.11	14
080	Indianapolis	.14	.10	6	.08	-
106	S. Lou.-S.E. Texas	.32	.24	666	.19	263
119	Boston	.21	.14	58	.10	6
124	Toledo	.14	.10	6	.07	-
153	El Paso-Las Cruces	.13	.07	-	.05	-
160	Genesse-Finger Lakes	.15	.09	3	.08	
173	Dayton	.18	.14	58	.12	24
193	Portland	.14	.10	6	.08	-
197	S.W. Pennsylvania	.21	.14	58	.11	14
212	Austin-Waco	.16	.09	3	.07	-
214	Corpus-Christi	.19	.17	153	.14	58
215	Dallas-Ft. Worth	.13	.07	-	.05	-
216	Houston-Galveston	.32	.29	1331	.27	1034
217	San Antonio	.15	.09	3	.07	-
229	Pudget Sound	.16	.10	6	.08	-
Total # of Regions Exceeding Standards		30	27		20	
Total # of Occasions Standard is Exceeded				12128		9296
Average % Air Quality Reduction from 1970			28		40	

1. Second highest recorded concentration recorded from 1971 through 1973.

Table 17

Projected Impact of Interim HC LDV Standard 1977-1981, Statutory LDV Standard 1982-1990

No.	Region	Predicted Ambient Conc. and No. of Occasions Standard is Exceeded (#)				
		1971/73[1]	1980		1985	
		conc. ppm	conc.	#	conc.	#
004	Birmingham	.22	.15	80	.12	24
009	Mobile-Pensacola	.11	.06	-	.05	-
013	Clark-Mohave	.22	.15	80	.12	24
015	Phoenix-Tucson	.19	.17	153	.16	114
024	Los Angeles	.62	.47	4120	.42	3416
028	Sacremento Valley	.24	.21	412	.20	333
029	San Diego	.30	.22	490	.20	333
030	San Francisco	.30	.25	780	.23	578
031	San Joaquin	.26	.22	490	.21	412
033	S.E. Desert	.28	.30	1507	.32	1866
036	Denver	.28	.20	333	.16	114
043	NY-NJ-Conn.	.26	.17	153	.13	39
045	Philadelphia	.20	.13	39	.10	6
047	National Capitol	.38	.28	1165	.26	902
079	Cincinnati	.17	.13	39	.11	14
080	Indianapolis	.14	.10	6	.08	-
106	S. Lou.-S.E. Texas	.32	.24	666	.20	333
119	Boston	.21	.19	58	.10	6
124	Toledo	.14	.10	6	.07	-
153	El Paso-Las Cruces	.13	.08	-	.06	-
160	Genesse-Finger Lakes	.15	.09	3	.08	-
173	Dayton	.18	.14	58	.12	24
193	Portland	.14	.10	6	.08	-
197	S.W. Pennsylvania	.21	.15	80	.12	24
212	Austin-Waco	.16	.09	3	.07	-
214	Corpus-Christi	.19	.17	153	.14	58
215	Dallas-Ft. Worth	.13	.07	-	.05	-
216	Houston-Galveston	.32	.29	1331	.27	1034
217	San Antonio	.15	.09	3	.07	-
229	Pudget Sound	.16	.11	14	.08	-
	Total # of Regions Exceeding Standards		30	27	20	
	Total # of Occasions Standard is Exceeded			12228		9654
	Average % Air Quality Increase relative to Statutory Reduction from 1970.			27	38	

1. Second nighest recorded concentrations from 1971 through 1973.

Table 18

Projected Impact of California HC LDV Standard 1977-1990

No.	Region	Predicted Ambient Conc. and No. of Occasions Standard is Exceeded (#)				
		1971/73[1]	1980		1985	
		conc. ppm	conc.	#	conc.	#
011	Birmingham	.22	.15	80	.12	24
012	Mobile-Pensacola	.11	.06	-	.05	-
013	Clark-Mohave	.22	.15	80	.12	24
015	Phoenix-Tucson	.19	.17	153	.16	114
024	Los Angeles	.62	.47	4120	.42	3416
028	Sacremento Valley	.29	.21	412	.20	333
029	San Diego	.30	.22	490	.20	333
030	San Francisco	.30	.25	780	.23	578
031	San Joaquin	.26	.22	490	.22	490
033	S.E. Desert	.28	.30	1507	.32	1866
036	Denver	.28	.19	263	.16	114
043	NY-NJ-Conn.	.26	.17	153	.14	58
045	Philadelphia	.20	.13	39	.10	6
047	National Capitol	.38	.28	1165	.26	902
079	Cincinnati	.17	.13	39	.12	24
080	Indianapolis	.14	.10	6	.08	-
106	S. Lou.-S.E. Texas	.32	.24	666	.20	333
119	Boston	.21	.14	58	.11	14
124	Toledo	.14	.10	6	.07	-
153	El Paso-Las Cruces	.13	.07	-	.06	-
160	Genesse-Finger Lakes	.15	.09	3	.08	-
173	Dayton	.18	.14	58	.13	39
193	Portland	.14	.10	6	.08	-
197	S.W. Pennsylvania	.21	.14	58	.12	24
212	Austin-Waco	.16	.09	3	.07	-
214	Corpus-Christi	.19	.17	153	.14	58
215	Dallas-Ft. Worth	.13	.07	-	.05	-
216	Houston-Galveston	.32	.29	1331	.27	1034
217	San Antonio	.15	.09	3	.07	-
229	Pudget Sound	.16	.10	6	.08	-
Total # of Regions Exceeding Standards		30	27		20	
Total # of Occasions Standard is Exceeded				12128		9784
Average % Air Quality Reduction from 1970			28		38	

1. Second highest recorded concentrations from 1971 through 1973.

Table 19

Projected Impact of Interim HC LDV Standard 1977-1990

No.	Region	Predicted Ambient Conc. and No. of Occasions Standard is Exceeded (#)				
		1971/73[1]	1980		1985	
		conc. ppm	conc.	#	conc.	#
004	Birmingham	.22	.15	80	.12	24
009	Mobile-Pensacola	.11	.06	-	.05	-
013	Clark-Mohave	.22	.15	80	.13	39
015	Phoenix-Tucson	.19	.17	153	.17	153
024	Los Angeles	.62	.47	4120	.43	3630
028	Sacremento Valley	.24	.21	412	.21	412
029	San Diego	.30	.22	490	.20	333
030	San Francisco	.30	.25	780	.23	578
031	San Joaquin	.26	.22	490	.22	490
033	S.E. Desert	.28	.30	1507	.33	2040
036	Denver	.28	.20	333	.17	153
043	NY-NJ-Conn.	.26	.17	153	.14	58
045	Philadelphia	.20	.13	39	.11	14
047	National Capitol	.38	.28	1165	.27	1034
079	Cincinnati	.17	.13	39	.12	24
080	Indianapolis	.14	.10	6	.08	-
106	S. Lou.-S.E. Texas	.32	.24	666	.20	333
119	Boston	.21	.14	58	.11	14
124	Toledo	.14	.10	6	.07	-
153	El Paso-Las Cruces	.13	.08	-	.06	-
160	Genesse-Finger Lakes	.15	.09	3	.08	-
173	Dayton	.18	.14	58	.13	39
193	Portland	.14	.10	6	.09	3
197	S.W. Pennsylvania	.21	.15	80	.12	24
212	Austin-Waco	.16	.09	3	.08	-
214	Corpus-Christi	.19	.17	153	.14	58
215	Dallas-Ft. Worth	.13	.07	-	.05	-
216	Houston-Galveston	.32	.29	1331	.27	1034
217	San Antonio	.15	.09	3	.07	-
229	Pudget Sound	.16	.14	14	.09	3
	Total # of Regions Exceeding Standards	30	27		21	
	Total # of Occasions Standard is Exceeded			12228		10487
	Average % Air Quality Reduction from 1970		27		36	

1. Second highest recorded concentrations from 1971 through 1973.

TABLE 20

COMPARISON OF ALTERNATIVE EMISSION STANDARDS ON PROJECTED AIR QUALITY CONCENTRATIONS

			Statutory Standard 1977-1985	Calif. Std. 1977-81 Stat. Std. 1982-85	Interim Std. 1977-81 Stat. Std. 1982-85	Calif. Std. 1977-85	Interim Std. 1977-85
Number[1] of AQCR's above NAAQS; Average % Decrease in A. Q. Conc.( ); and Number[2] of Occasions NAAQS are exceeded [ ]	OX	1980	26 (30) [11400]	27 (28) [12100]	27 (27) [12200]	27 (28) [12100]	27 (20) [12300]
		1985	20 (40) [9150]	20 (40) [9300]	20 (38) [9650]	20 (38) [9800]	21 (36) [10500]
	CO	1980	13 (57) [524]	14 (56) [582]	15 (53) [764]	14 (56) [582]	15 (53) [764]
		1985	5 (74) [20]	5 (71) [38]	6 (70) [50]	5 (70) [40]	8 (65) [108]

1. 26 AQCR's analyzed for CO; 30 AQCR's analyzed for oxidant.

2. For CO, violations of NAAQS are based on non-overlapping 8-hour intervals which exceed 9 ppm.

TABLE 20

COMPARISON OF ALTERNATIVE EMISSION STANDARDS ON PROJECTED AIR QUALITY CONCENTRATIONS

			Statutory Standard 1977-1985	Calif. Std. 1977-81 Stat. Std. 1982-85	Interim Std. 1977-81 Stat. Std. 1982-85	Calif. Std. 1977-85	Interim Std. 1977-85
Number[1] of AQCR's above NAAQS; Average % Decrease in A. Q. Conc.( ); and Number[2] of Occasions NAAQS are exceeded [ ]	OX	1980	26 (30) [11400]	27 (28) [12100]	27 (27) [12200]	27 (28) [12100]	27 (20) [12300]
		1985	20 (40) [9150]	20 (40) [9300]	20 (38) [9650]	20 (38) [9800]	21 (36) [10500]
	CO	1980	13 (57) [524]	14 (56) [582]	15 (53) [764]	14 (56) [582]	15 (53) [764]
		1985	5 (74) [20]	5 (71) [38]	6 (70) [50]	5 (70) [40]	8 (65) [108]

1. 26 AQCR's analyzed for CO; 30 AQCR's analyzed for oxidant.

2. For CO, violations of NAAQS are based on non-overlapping 8-hour intervals which exceed 9 ppm.

ADDENDUM A

OXIDANT EXPOSURE LEVELS UNDER DIFFERING AUTOMOBILE EMISSION STANDARDS

Oxidant Exposure Levels Under Differing Auto Emission Standards

One way of looking at oxidant exposure levels is to consider the number of people who are exposed to oxidants exceeding the primary levels, and the number of hours that these people are exposed. The result is cumulative figures which represent total exposure levels during a specified period of time.

A calculation was done on the cities listed in Tables 15, 16, 17 to show the differing effects of various auto emission standards on the number of hours of oxidant exposure over the primary level for the year 1980 and 1985. The method of calculation was to take the number of people for a given year living in each of the listed cities, multiply that number by the total number of annual hours of oxidant levels exceeding the primary standard, and sum up the total.

The assumption in the calculations is that all people in a given city are exposed when oxidant levels exceed the primary standard. While this may tend to overestimate the impact somewhat, any overestimation is clearly offset by the fact that less than 30 areas were examined. Clearly, there are metropolitan and rural areas where standards are being exceeded that are not included in the table.

The results show the aggregate number of person - hours of exposure, and the difference in the hours of exposure when different auto emission

standards are factored in. The following is a summary of the data:

ANNUAL PEOPLE HOURS OF OXIDANT EXPOSURE OVER PRIMARY LEVELS UNDER DIFFERENT EMISSION STANDARDS

/ Table 15 / Statutory HC LDV; 1977 -1985

1980: 45 billion, 714 million

1985: 37 billion, 367 million

/ Table 16 / Calif. HC LDV; 1977-81; Statutory LDV 1982 - 1985

1980: 47 billion, 234 million

1985: 37 billion, 713 million

/ Table 17 / Interim HC LDV 1977 - 1981; Statutory LDV 1982 - 1985

1980: 47 billion, 409 million

1985: 39 billion, 058 million

Increased People Hours of Exposure Due to Departure From Statutory Standard
(billions of hours)

	1980	1985
California & Statutory (Table 16)	1.520	.346
Interim & Statutory (Table 17)	1.695	1.691

The figures show that the largest difference between the statutory and interim standards occur in 1980 and that the largest differences between the

California and interim standards occurs in 1985. 3.6% more people hours of exposure occur in 1985 if interim standards are adopted (Table 17) than if California standards are adopted (Table 16).

For the period 1980 - 1985, the total cumulative person hours of exposure under the statutory standard is approximately 249 billion. This compares with 255 and 258 billion person hours of exposure under the California and Federal interim standards, respectively. These figures will, of course, be higher using the larger mobile source growth assumptions of Addendum B.

ADDENDUM B

IMPACT ON AIR QUALITY OF METROPOLITAN-WIDE VMT GROWTH RATES

The analysis discussed in the report used growth rates for VMT for light duty vehicles (LDV) that were appropriate generally for the central business district (CBD) or other already well developed portions of the city. Most of these ranged from 0.5% to 3.0% per year compounded annually. For comparison purposes an additional analysis was made for HC and NOx emissions and air quality projections with larger growth factors, generally considered to be more indicative of anticipated VMT growth in the entire metropolitan area. All other assumptions remained the same. The growth factors used ranged generally from 2% to 6% compounded annually. These rates were based on estimates supplied by the States, reviewed by the Department of Transportation, then adjusted by EPA for any existing or planned transportation control plans. No consideration was given to possible impacts on future VMT of fuel shortages or price increases

The use of higher LDV growth rates projected higher levels of Ox and NO_2 especially toward the end of the period. They made little difference in the relative impact of the alternative control options examined for Ox (Tables 20 and B-16). The relatively large impact of alternative LDV control options on future NO_2 levels observed using CBD growth rates was emphasized even further in the new analysis (Tables 9 and B-10).

Table B-1

COMPOUNDED GROWTH RATE FACTORS FOR
SPECIFIC METROPOLITAN AREAS

Metropolitan Area	CBD Growth Rate Percent	Area Growth Rate Percent
Birmingham	1.0	6.1
Mobile-Pensacola	1.0	3.2
Clark-Mohave	2.7	6.0
Phoenix-Tucson	2.7	5.4
Los Angeles	1.4	2.5
Sacramento Valley	1.0	3.5
San Diego	1.4	4.3
San Francisco	1.8	3.3
San Joaquin	1.0	4.7
S.E. Desert	1.0	2.4
Denver	1.5	3.6
NY-NJ-Conn.	0.8	2.1
Philadelphia	1.2	3.0
National Capitol	2.0	4.3
Cincinnati	2.2	4.0
Indianapolis	1.0	3.7
S. Lou.-S.E. Texas	1.0	5.6
Boston	1.0	2.4
Toledo	1.0	2.4

Table B-1 Continued

Metropolitan Area	CBD Growth Rate Percent	Area Growth Rate Percent
El Paso-Las Cruces	1.5	5.0
Genesse-Finger Lakes	1.0	4.3
Dayton	3.5	4.0
Portland	2.2	2.5
S.W. Pennsylvania	1.5	2.4
Austin-Waco	1.0	2.9
Corpus Christi	1.0	3.2
Dallas	1.0	5.1
Houston-Galveston	1.0	5.4
San Antonio	1.0	4.6
Puget Sound	2.8	2.3

Table B-2

Projected NO_x Air Quality Concentration, $\mu g/m^3$
3.1 gm/mi 1977-90*

Region	Ambient conc. 1972-73	1980	1935
015 Phoenix	78	110	138
024 Los Angeles	148	182	208
030 San Francisco	82	102	118
036 Denver	100	128	150
043 NY-NJ-Conn.	113	134	150
045 Philadelphia	89	112	130
047 National Capitol	88	111	129
067 Chicago	117	136	157
115 Baltimore	96	108	134
220 Wasatch Front	100	124	143

* Using metropolitan growth rates

Table B-3

Projected NO_x Air Quality Concentration, $\mu g/m^3$
3.1 gm/mi 1977-81
2.0 gm/mi 1982-90 *

Region	Ambient conc. 1972-73	1980	1985
015 Phoenix	78	110	130
024 Los Angeles	148	182	196
030 San Francisco	82	102	111
036 Denver	100	128	143
043 NY-NJ-Conn.	113	134	145
045 Philadelphia	89	112	126
047 National Capitol	88	111	123
067 Chicago	117	136	153
115 Baltimore	96	108	129
220 Wasatch Front	100	124	136

* Using metropolitan growth rates

Table B-4

Projected NO_x Air Quality Concentration, $\mu g/m^3$
3.1 gm/mi 1977-81
1.0 gm/mi 1982-90 *

Region	Ambient conc. 1972-73	1980	1985
015 Phoenix	78	110	122
024 Los Angeles	148	182	184
030 San Francisco	82	102	104
036 Denver	100	128	137
043 NY-NJ-Conn.	113	134	141
045 Philadelphia	89	112	123
047 National Capitol	88	111	118
067 Chicago	117	136	145
115 Baltimore	96	108	124
220 Wasatch Front	100	124	129

* Using metropolitan growth rates

Table B-5

Projected NO_x Air Quality Concentration, $\mu g/m^3$
3.1 gm/mi 1977-81
0.4 gm/mi 1982-90 *

Region	Ambient conc. 1972-73	1980	1985
015 Phoenix	78	110	118
024 Los Angeles	148	182	177
030 San Francisco	82	102	100
036 Denver	100	128	134
043 NY-NJ-Conn.	113	134	138
045 Philadelphia	89	112	121
047 National Capitol	88	111	114
067 Chicago	117	136	147
115 Baltimore	96	108	120
220 Wasatch Front	100	124	125

* Using metropolitan growth rates

Table B-6

Projected NO_x Air Quality Concentration, $\mu g/m^3$ 2.0 gm/mi 1977-90 *

Region	Ambient conc. 1972-73	1980	1935
015 Phoenix	78	104	122
024 Los Angeles	148	171	184
030 San Francisco	82	96	104
036 Denver	100	122	137
043 NY-NJ-Conn.	113	130	141
045 Philadelphia	89	109	123
047 National Capitol	88	106	118
067 Chicago	117	132	149
115 Baltimore	96	104	124
220 Wasatch Front	100	118	129

* Using metropolitan growth rates

Table B-7

Projected NO_x Air Quality Concentration, $\mu g/m^3$

2.0 gm/mi 1977-81

1.0 gm/mi 1982-90 *

Region	Ambient conc. 1972-73	1980	1935
015 Phoenix	78	104	115
024 Los Angeles	148	171	173
030 San Francisco	82	96	98
036 Denver	100	122	131
043 NY-NJ-Conn.	113	130	136
045 Philadelphia	89	109	120
047 National Capitol	88	106	112
067 Chicago	117	132	145
115 Baltimore	96	104	118
220 Wasatch Front	100	118	122

* Using metropolitan growth rates

Table B-8

Projected NO_x Air Quality Concentration, $\mu g/m^3$

2.0 gm/mi 1977-81

0.4 gm/mi 1982-90 *

Region	Ambient conc. 1972-73	1980	1985
015 Phoenix	78	104	110
024 Los Angeles	148	171	165
030 San Francisco	82	96	94
036 Denver	100	122	127
043 NY-NJ-Conn.	113	130	133
045 Philadelphia	89	109	118
047 National Capitol	88	106	109
067 Chicago	117	132	143
115 Baltimore	96	104	115
220 Wasatch Front	100	118	118

* Using metropolitan growth rates

Table B-9

Projected NO_x Air Quality Concentration, $\mu g/m^3$ 0.4 gm/mi 1978-90 *

Region	Ambient conc. 1972-73	1980	1985
015 Phoenix	78	97	101
024 Los Angeles	148	158	152
030 San Francisco	82	89	86
036 Denver	100	116	120
043 NY-NJ-Conn.	113	124	128
045 Philadelphia	89	106	114
047 National Capitol	88	101	102
067 Chicago	117	128	138
115 Baltimore	96	100	109
220 Wasatch Front	100	111	110

* Using metropolitan growth rates

TABLE B-10

COMPARISON OF THE EFFECT OF VARIOUS ALTERNATIVE LDV STANDARDS ON NO_x AIR QUALITY CONCENTRATIONS *

LDV Standard (g/mi)	1977-81	3.1	3.1	3.1	3.1	2.0	2.0	2.0	0.4 (1978-81)
	1982-90	3.1	2.0	1.0	0.4	2.0	1.0	0.4	0.4
Number of AQCR's exceeding NAAQS (10 cities analyzed	1980	10	10	10	10	9	9	9	8
	1985	10	10	10	9	10	9	9	9
Average percent increase in air quality concentration	1980	24	24	24	24	18	18	18	12
	1985	46	39	32	29	33	27	23	16

* Using metropolitan growth rates

Table B-11

(Using metropolitan growth rates)

Projected Impact of Statutory HC LDV Emission Standard, 1977-1990

No.	Region	Predicted Ambient Conc. and No. of Occasions Standard is Exceeded (#)				
		1971/73[1]	1980		1985	
		conc. ppm	conc.	#	conc.	#
004	Birmingham	.22	.18	201	.15	80
009	Mobile-Pensacola	.11	.06	-	.04	-
013	Clark-Mohave	.22	.18	201	.15	80
015	Phoenix-Tucson	.19	.18	201	.17	153
024	Los Angeles	.62	.48	4204	.42	3416
028	Sacremento Valley	.24	.22	490	.21	412
029	San Diego	.30	.25	780	.22	490
030	San Francisco	.30	.26	902	.24	666
031	San Joaquin	.26	.24	666	.23	578
033	S.E. Desert	.28	.30	1507	.32	1366
036	Denver	.28	.21	412	.17	153
043	NY-NJ-Conn.	.26	.18	201	.14	58
045	Philadelphia	.20	.14	58	.11	14
047	National Capitol	.38	.31	1621	.28	1165
079	Cincinnati	.17	.15	80	.13	39
080	Indianapolis	.14	.11	14	.09	3
106	S. Lou.-S.E. Texas	.32	.27	1034	.23	578
119	Boston	.21	.14	58	.11	14
124	Toledo	.14	.10	6	.07	
153	El Paso-Las Cruces	.13	.10	6	.08	-
160	Genesse-Finger Lakes	.15	.11	14	.09	3
173	Dayton	.18	.14	58	.13	39
193	Portland	.14	.10	6	.08	
197	S.W. Pennsylvania	.21	.15	80	.12	24
212	Austin-Waco	.16	.10	6	.08	
214	Corpus-Christi	.19	.17	153	.15	80
215	Dallas-Ft. Worth	.13	.09	3	.07	-
216	Houston-Galveston	.32	.31	1621	.29	1331
217	San Antonio	.15	.11	14	.09	3
229	Puget Sound	.16	.10	6	.07	-
	Total # of Regions Exceeding Standards	30	29		23	
	Total # of Occasions Standard is Exceeded			14,603		11,245
	Average % Air Quality Reduction from 1970		21		33	

1 Highest recorded concentration recorded from 1971 through 1973.

Table B-12

(Using metropolitan growth rates)

Projected Impact of California HC LDV Standard, 1977-1981, Statutory LDV Standard, 1982-1990

No.	Region	Predicted Ambient Conc. and No. of Occasions Standard is Exceeded (#)				
		1971/73[1]	1980		1985	
		conc. ppm	conc.	#	conc.	#
004	Birmingham	.22	.19	263	.15	80
009	Mobile-Pensacola	.11	.07	-	.05	-
013	Clark-Mohave	.22	.18	201	.16	114
015	Phoenix-Tucson	.19	.18	201	.18	201
024	Los Angeles	.62	.49	4468	.43	3630
028	Sacremento Valley	.24	.22	490	.21	412
029	San Diego	.30	.25	780	.23	578
030	San Francisco	.30	.26	902	.24	666
031	San Joaquin	.26	.24	666	.23	578
033	S.E. Desert	.28	.30	1507	.33	2040
036	Denver	.28	.21	412	.18	201
043	NY-NJ-Conn.	.26	.18	201	.14	58
045	Philadelphia	.20	.14	58	.11	14
047	National Capitol	.38	.31	1621	.28	1165
079	Cincinnati	.17	.15	80	.13	39
080	Indianapolis	.14	.11	14	.09	3
106	S. Lou.-S.E. Texas	.32	.28	1165	.24	666
119	Boston	.21	.15	80	.11	14
124	Toledo	.14	.10	6	.08	-
153	El Paso-Las Cruces	.13	.10	6	.08	-
160	Genesse-Finger Lakes	.15	.11	14	.09	3
173	Dayton	.18	.15	80	.13	39
193	Portland	.14	.10	6	.08	-
197	S.W. Pennsylvania	.21	.15	80	.12	24
212	Austin-Waco	.16	.10	6	.08	-
214	Corpus-Christi	.19	.17	153	.15	80
215	Dallas-Ft. Worth	.13	.10	6	.07	-
216	Houston-Galveston	.32	.31	1621	.29	1331
217	San Antonio	.15	.11	14	.09	3
229	Puget Sound	.16	.10	6	.07	-
Total # of Regions Exceeding Standards		30	29		23	
Total # of Occasions Standard is Exceeded				15,107		11,939
Average % Air Quality Reduction from 1970			20		31	

1. Highest recorded concentration recorded from 1971 through 1973.

Table B-13

(Using metropolitan growth rates)

Projected Impact of Interim HC LDV Standard 1977-1981,

Statutory LDV Standard 1982-1990

No.	Region	Predicted Ambient Conc. and No. of Occasions Standard is Exceeded (#)				
		1971/73[1]	1980		1985	
		conc. ppm	conc.	#	conc.	#
004	Birmingham	.22	.19	263	.16	114
009	Mobile-Pensacola	.11	.07		.05	-
013	Clark-Mohave	.22	.19	263	.16	114
015	Phoenix-Tucson	.19	.18	201	.18	201
024	Los Angeles	.62	.49	4468	.44	3723
028	Sacremento Valley	.24	.22	490	.22	490
029	San Diego	.30	.25	780	.23	578
030	San Francisco	.30	.26	902	.24	666
031	San Joaquin	.26	.25	780	.24	666
033	S.E. Desert	.28	.30	1507	.33	2040
036	Denver	.28	.22	490	.18	201
043	NY-NJ-Conn.	.26	.18	201	.14	58
045	Philadelphia	.20	.14	58	.11	14
047	National Capitol	.38	.32	1866	.29	1331
079	Cincinnati	.17	.15	80	.14	58
080	Indianapolis	.14	.11	14	.09	3
106	S. Lou.-S.E. Texas	.32	.28	1165	.24	666
119	Boston	.21	.15	80	.11	14
124	Toledo	.14	.10	6	.08	-
153	El Paso-Las Cruces	.13	.10	6	.08	-
160	Genesse-Finger Lakes	.15	.12	24	.10	6
173	Dayton	.18	.15	80	.13	39
193	Portland	.14	.10	6	.08	-
197	S.W. Pennsylvania	.21	.15	80	.12	24
212	Austin-Waco	.16	.11	14	.08	-
214	Corpus-Christi	.19	.17	153	.15	80
215	Dallas-Ft. Worth	.13	.10	6	.08	-
216	Houston-Galveston	.32	.31	1621	.29	1331
217	San Antonio	.15	.11	14	.09	3
229	Puget Sound	.16	.10	6	.08	-
Total # of Regions Exceeding Standards		30	29		23	
Total # of Occasions Standard is Exceeded				15,624		12,420
Average % Air Quality Reduction from 1970			19		30	

1. Highest recorded concentration recorded from 1971 through 1973.

Table B-14

(Using metropolitan growth rates)

Projected Impact of California HC LDV Standard 1977-1990

No.	Region	Predicted Ambient Conc. and No. of Occasions Standard is Exceeded (#)				
		1971/73[1]	1980		1985	
		conc. ppm	conc.	#	conc.	#
004	Birmingham	.22	.19	263	.16	114
009	Mobile-Pensacola	.11	.07	-	.05	-
013	Clark-Mohave	.22	.18	201	.17	153
015	Phoenix-Tucson	.19	.18	201	.18	201
024	Los Angeles	.62	.49	4468	.44	3723
028	Sacremento Valley	.24	.22	490	.22	490
029	San Diego	.30	.25	780	.23	578
030	San Francisco	.30	.26	902	.25	780
031	San Joaquin	.26	.24	666	.24	666
033	S.E. Desert	.28	.30	1507	.33	2040
036	Denver	.28	.21	412	.18	201
043	NY-NJ-Conn.	.26	.18	201	.15	80
045	Philadelphia	.20	.14	58	.12	24
047	National Capitol	.38	.31	1621	.29	1331
079	Cincinnati	.17	.15	80	.14	58
080	Indianapolis	.14	.11	14	.09	3
106	S. Lou.-S.E. Texas	.32	.28	1165	.24	666
119	Boston	.21	.15	80	.11	14
124	Toledo	.14	.10	6	.08	-
153	El Paso-Las Cruces	.13	.10	6	.08	-
160	Genesse-Finger Lakes	.15	.11	14	.10	6
173	Dayton	.18	.15	80	.13	39
193	Portland	.14	.10	6	.08	-
197	S.W. Pennsylvania	.21	.15	80	.12	24
212	Austin-Waco	.16	.10	6	.08	-
214	Corpus-Christi	.19	.17	153	.15	80
215	Dallas-Ft. Worth	.13	.10	6	.08	-
216	Houston-Galveston	.32	.31	1621	.30	1507
217	San Antonio	.15	.11	14	.09	3
229	Puget Sound	.16	.10	6	.08	-
Total # of Regions Exceeding Standards		30	29		23	
Total # of Occasions Standard is Exceeded				15,107		12,781
Average % Air Quality Reduction from 1970			20		28	

1. Highest recorded concentration recorded from 1971 through 1973.

Table B-15
(Using metropolitan growth rates)

Projected Impact of Interim HC LDV Standard 1977-1990

No.	Region	Predicted Ambient Conc. and No. of Occasions Standard is Exceeded (#)				
		1971/73[1]	1980		1985	
		conc. ppm	conc.	#	conc.	#
004	Birmingham	.22	.19	263	.17	153
009	Mobile-Pensacola	.11	.07	-	.05	-
013	Clark-Mohave	.22	.19	263	.18	201
015	Phoenix-Tucson	.19	.18	201	.19	263
024	Los Angeles	.62	.49	4468	.46	3942
028	Sacremento Valley	.24	.22	490	.22	490
029	San Diego	.30	.25	780	.24	666
030	San Francisco	.30	.26	902	.25	780
031	San Joaquin	.26	.25	780	.25	780
033	S.E. Desert	.28	.30	1507	.33	2040
036	Denver	.28	.22	490	.19	263
043	NY-NJ-Conn.	.26	.18	201	.15	80
045	Philadelphia	.20	.14	58	.12	24
047	National Capitol	.38	.32	1366	.30	1507
079	Cincinnati	.17	.15	80	.15	80
080	Indianapolis	.14	.11	14	.10	6
106	S. Lou.-S.E. Texas	.32	.28	1165	.25	780
119	Boston	.21	.15	80	.12	24
124	Toledo	.14	.10	6	.08	-
153	El Paso-Las Cruces	.13	.10	6	.09	3
160	Genesse-Finger Lakes	.15	.12	24	.11	14
173	Dayton	.18	.15	80	.14	58
193	Portland	.14	.10	6	.09	3
197	S.W. Pennsylvania	.21	.15	80	.13	39
212	Austin-Waco	.16	.11	14	.09	3
214	Corpus-Christi	.19	.17	153	.15	80
215	Dallas-Ft. Worth	.13	.10	6	.09	3
216	Houston-Galveston	.32	.31	1621	.30	1507
217	San Antonio	.15	.11	14	.10	6
229	Puget Sound	.16	.10	6	.08	
Total # of Regions Exceeding Standards		30	29		27	
Total # of Occasions Standard is Exceeded				15,624		13,795
Average % Air Quality Reduction from 1970			19		26	

1. Highest recorded concentration recorded from 1971 through 1973.

TABLE B-16

COMPARISON OF ALTERNATIVE EMISSION STANDARDS ON PROJECTED AIR QUALITY CONCENTRATIONS*

			Statutory Standard 1977-1990	Calif. Std. 1977-81 Stat. Std. 1982-90	Interim Std. 1977-81 Stat. Std. 1982-90	Calif. Std. 1977-90	Interim Std. 1977-90
Number[1] of AQCR's above NAAQS; Average % Decrease in A. Q. Conc.( ); and Number[2] of Occasions NAAQS are exceeded [ ]	OX	1980	29(21)[14603]	29(20)[15107]	29(19)[15624]	29(20)[15107]	29(19)15624]
		1985	23(33)[11,245]	23(31)[11939]	23(30)[12420]	23(28)[12781]	27(26)[13795]
	CO	1980	Same as in Table 20.				
		1985					
		1990					

1. 26 AQCR's analyzed for CO; 30 AQCR's analyzed for oxidant.

2. For CO, violations of NAAQS are based on non-overlapping 8-hour intervals which exceed 9 ppm.

* Using metropolitan growth rates

Table B-17

Comparison of Total Number of Occassions Ox Standard is Exceeded Under Different Emission Standards and Mobile Source Growth Rates

	CBD	Metropolitan	% Change
Statutory : 1977-1985			
1980	11,438	14,603	27.6
1985	9,154	12,707	38.8
California: 1977-1981 Statutory 1982-1985			
1980	12,128	15,107	24.6
1985	9,296	11,939	28.4
Interim: 1977-1981 - Statutory 1982-1985			
1980	12,228	15,624	27.8
1985	9,654	12,420	28.7
California: 1977-1985			
1980	12,128	15,107	24.6
1985	9,784	12,781	30.6
Interim: 1977-1985			
1980	12,228	15,624	27.8
1985	10,490	13,795	31.5

ADDENDUM C

TABULATION OF EMISSIONS CONTRIBUTION BY SOURCE CATEGORY

Because the calculated impact on air quality brought about by the different LDV standards investigated is dependent upon the distribution of emissions from the various sources, this addendum provides a tabulation of the percentage contribution of emissions from these sources, grouped into three categories: (1) LDV, (2) Other Mobile, and (3) Stationary. Distributions are given for the years 1970, 1980, and 1985 for all the LDV standards investigated, and data are presented for two VMT growth rates. Tables C-1 through C-18 contain source percentage contributions for NO_x, CO, and HC for a VMT growth rate essentially equal to the historic CBD growth rate. Data corresponding to these tables are discussed in the main text. Tables C-19 through C-31 contain source percentage contributions for NO_x and HC where VMT growth rate is based upon the entire metropolitan area growth rate. Data corresponding to these latter tables is discussed in Addendum B.

Table C-1
Source Contribution (by percent)
Pollutant: NO_x
Standard: 3.1 gpm 1977-85
Growth Rate: CBD

No.	City	1970			1980			1985		
		LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationar
015	Phoenix-Tucson	40	22	38	35	22	43	33	20	47
024	Los Angeles	46	18	36	39	18	43	36	16	48
030	San Francisco	45	20	35	39	20	41	36	18	46
036	Denver	32	15	53	27	15	58	25	13	62
043	NY-NJ-Conn.	26	10	64	22	9	69	20	8	72
045	Philadelphia	21	11	68	16	9	75	14	8	78
047	National Capitol	31	12	57	27	12	61	26	11	63
067	Chicago	21	12	67	18	11	71	16	10	74
115	Baltimore	20	11	69	22	14	64	21	13	66
220	Wasatch Front	37	18	45	34	19	47	33	19	48
	Average:	32	15	53	28	15	57	26	14	60

Table C-2
Source Contribution (by percent)
Pollutant: NO_x
Standard: 3.1 gpm 1977-81, 2.0 gpm 1982-85
Growth Rate: CBD

No.	City	1970			1980			1985		
		LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary
015	Phoenix-Tucson	40	22	38	35	22	43	29	21	50
024	Los Angeles	46	18	36	39	18	43	32	17	51
030	San Francisco	45	20	35	39	20	41	32	19	49
036	Denver	32	15	53	27	15	58	21	14	65
043	NY-NJ-Conn.	26	10	64	22	9	69	17	9	74
045	Philadelphia	21	11	68	16	13	71	12	8	80
047	National Capitol	31	12	57	27	12	61	23	12	65
067	Chicago	21	12	67	18	11	71	14	10	76
115	Baltimore	20	11	69	22	14	64	18	13	69
220	Wasatch Front	37	18	45	34	19	47	29	19	52
	Average:	32	15	53	28	15	57	23	14	63

Table C-3
Source Contribution (by percent)
Pollutant: NO_x
Standard: 3.1 gpm 1977-81, 1.0 gpm 1982-85
Growth Rate: CBD

No.	City	1970			1980			1985		
		LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationar
015	Phoenix-Tucson	40	22	38	35	22	43	26	23	51
024	Los Angeles	46	18	36	39	18	43	28	18	54
030	San Francisco	45	20	35	39	20	41	28	20	52
036	Denver	32	15	53	27	15	58	18	15	67
043	NY-NJ-Conn.	26	10	64	22	9	69	14	9	77
045	Philadelphia	21	11	68	16	13	71	10	9	81
047	National Capitol	31	12	57	27	12	61	19	12	69
067	Chicago	21	12	67	18	11	71	12	10	78
115	Baltimore	20	11	69	22	14	64	16	14	70
220	Wasatch Front	37	18	45	34	19	47	25	21	54
	Average:	32	15	53	28	15	57	20	15	65

Table C-4
Source Contribution (by percent)
Pollutant: NO_x
Standard: 3.1 gpm 1977-81; 0.4 gpm 1982-85
Growth Rate: CBD

No.	City	1970			1980			1985		
		LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary
015	Phoenix-Tucson	40	22	38	35	22	43	23	23	54
024	Los Angeles	46	18	36	39	18	43	25	18	57
030	San Francisco	45	20	35	39	20	41	25	21	54
036	Denver	32	15	53	27	15	57	16	15	69
043	NY-NJ-Conn.	26	10	64	22	9	69	13	9	78
045	Philadelphia	21	11	68	16	13	71	9	9	82
047	National Capitol	31	12	57	27	12	61	17	12	71
067	Chicago	21	12	67	18	11	71	10	11	79
115	Baltimore	20	11	69	22	14	64	14	14	72
220	Wasatch Front	37	18	45	34	19	57	23	21	56
	Average:	32	15	53	28	15	57	18	15	67

Table C-5
Source Contribution (by percent)
Pollutant: NO_x
Standard: 2.0 gpm 1977-85
Growth Rate: CBD

No.	City	1970			1980			1985		
		LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationar
015	Phoenix-Tucson	40	22	38	31	23	46	26	23	51
024	Los Angeles	46	18	36	35	19	46	28	18	54
030	San Francisco	45	20	35	35	21	44	28	20	52
036	Denver	32	15	53	24	16	60	18	15	67
043	NY-NJ-Conn.	26	10	64	19	10	71	14	9	77
045	Philadelphia	21	11	68	14	10	76	10	9	81
047	National Capitol	31	12	57	24	13	63	19	12	69
067	Chicago	21	12	67	16	12	72	12	10	78
115	Baltimore	20	11	69	20	14	66	16	14	70
220	Wasatch Front	37	18	45	30	20	50	25	21	54
	Average:	32	15	53	25	16	59	20	15	65

Table C-6
Source Contribution (by percent)
Pollutant: NO_x
Standard: 2.0 gpm 1977-81; 1.0 gpm 1982-85
Growth Rate: CBD

No.	City	1970			1980			1985		
		LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary
015	Phoenix-Tucson	40	22	38	31	23	46	21	24	55
024	Los Angeles	46	18	36	35	19	46	24	19	57
030	San Francisco	45	20	35	35	21	44	23	21	56
036	Denver	32	15	53	24	16	60	15	15	70
043	NY-NJ-Conn.	26	10	64	19	10	71	12	10	78
045	Philadelphia	21	11	68	14	10	76	8	9	83
047	National Capitol	31	12	57	24	13	63	16	13	71
067	Chicago	21	12	67	16	12	72	9	11	80
115	Baltimore	20	11	69	20	14	66	13	14	73
220	Wasatch Front	37	18	45	30	20	50	21	22	57
	Average:	32	15	53	25	16	59	16	16	68

Table C-7
Source Contribution (by percent)
Pollutant: NO_x
Standard: 2.0 gpm 1977-81; 0.4 gpm 1982-85
Growth Rate: CBD

No.	City	1970			1980			1985		
		LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationar
015	Phoenix-Tucson	40	22	38	31	23	46	18	25	57
024	Los Angeles	46	18	36	35	19	46	20	20	60
030	San Francisco	45	20	35	35	21	44	20	22	58
036	Denver	32	15	53	24	16	60	13	16	71
043	NY-NJ-Conn.	26	10	64	19	10	71	10	9	81
045	Philadelphia	21	11	68	14	10	76	7	9	84
047	National Capitol	31	12	57	24	13	63	14	13	73
067	Chicago	21	12	67	16	12	72	8	11	81
115	Baltimore	20	11	69	20	14	66	11	14	75
220	Wasatch Front	37	18	45	30	20	50	18	22	60
	Average :	32	15	53	25	16	59	14	16	70

Table C-8
Source Contribution (by percent)
Pollutant: NO_x
Standard: 0.4 gpm 1978-85
Growth Rate: CBD

No.	City	1970			1980			1985		
		LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary
015	Phoenix-Tucson	40	22	38	27	25	48	12	27	61
024	Los Angeles	46	18	36	30	20	50	14	21	65
030	San Francisco	45	20	35	30	23	47	13	24	63
036	Denver	32	15	53	20	7	73	8	16	76
043	NY-NJ-Conn.	26	10	64	15	10	75	6	10	84
045	Philadelphia	21	11	68	12	10	78	4	9	87
047	National Capitol	31	12	57	20	13	67	9	14	77
067	Chicago	21	12	67	13	12	75	5	11	84
115	Baltimore	20	11	69	16	15	69	7	15	78
220	Wasatch Front	37	18	45	25	22	53	12	24	64
	Average:	32	15	53	21	16	63	9	17	74

Table C-9
Source Contribution (by percent)*
Pollutant: CO
Standard: Statutory Standard 1977-85
Growth Rate: CBD

No.	City	1970			1980			1985		
		LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary	LDV	Other Mobile	Station.
004	Birmingham	71	23	6	52	33	15	31	41	28
009	North Alaska	69	21	10	44	25	31	24	25	51
013	Clark-Mohave	73	27	0	58	41	1	40	57	3
015	Phoenix-Tucson	73	26	1	57	40	3	37	56	7
024	Los Angeles	74	25	1	59	39	2	40	56	4
028	Sacremento Valley	72	25	3	54	37	9	33	48	19
029	San Diego	74	26	0	59	61	0	40	59	1
030	San Francisco	73	26	1	57	38	5	36	53	11
031	San Joaquin Valley	72	27	1	55	38	7	35	50	15
036	Denver	73	26	1	57	40	3	38	57	5
042	Hartford-N. Haven	74	26	0	59	40	1	40	58	2
043	NY-NJ-Conn.	74	25	1	59	39	2	44	52	4
045	Philadelphia	72	26	2	56	38	6	40	50	10
047	National Capitol	73	26	1	58	37	5	42	50	8
062	E. Wash.-N. Idaho	73	26	1	57	37	6	43	49	8
067	Chicago	70	26	4	51	36	13	35	44	21
080	Indianapolis	72	26	2	54	36	10	38	48	14
094	Kansas City	72	27	1	55	40	5	39	55	6
115	Baltimore	72	26	2	56	39	5	36	54	10
119	Boston	74	26	0	59	39	2	40	56	4
131	Minn.-St. Paul	73	26	1	58	40	2	39	58	3
158	Central New York	74	25	1	59	33	8	39	56	5
193	Portland	71	25	4	52	37	11	31	47	22
197	S. W. Penna.	72	26	2	56	39	5	36	55	9
220	Wasatch Front	72	26	2	56	39	5	37	56	7
229	Puget Sound	73	26	1	58	40	2	38	57	5
	Average:	72	26	2	56	38	6	37	52	11

* Note: Tables reflect an adjustment factor for stationary source categories to account for receptor location (see text).

Table C-10
Source Contribution (by percent)*
Pollutant: CO
Standard: California Standard 1977-81, Statutory Standard 1982-85
Growth Rate: CBD

No.	City	1970			1980			1985		
		LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary
004	Birmingham	71	23	6	54	32	14	35	38	27
009	North Alaska	69	21	10	47	25	28	25	31	44
013	Clark-Mohave	73	27	0	59	38	3	44	54	2
015	Phoenix-Tucson	73	26	1	58	39	3	41	52	7
024	Los Angeles	74	25	1	61	37	2	44	52	4
028	Sacremento Valley	72	25	3	55	35	10	37	45	18
029	San Diego	74	26	0	61	39	0	45	54	1
030	San Francisco	73	26	1	58	37	5	41	49	10
031	San Joaquin Valley	72	27	1	57	36	7	39	47	14
036	Denver	73	26	1	59	38	3	42	54	4
042	Hartford-N. Haven	74	26	0	61	38	1	44	54	2
043	NY-NJ-Conn.	74	25	1	60	38	2	40	56	4
045	Philadelphia	72	26	2	57	37	6	36	53	11
047	National Capitol	73	26	1	59	36	5	38	54	8
062	E. Wash.-N. Idaho	73	26	1	59	35	6	38	53	9
067	Chicago	70	26	4	53	35	12	31	46	23
080	Indianapolis	72	26	2	56	34	10	34	51	15
094	Kansas City	72	27	1	57	39	4	35	4	7
115	Baltimore	72	26	2	57	38	5	40	51	9
119	Boston	74	26	0	61	37	2	44	53	3
131	Minn.-St. Paul	73	26	1	60	38	2	43	54	3
158	Central New York	74	25	1	60	37	3	45	50	5
193	Portland	71	25	4	54	35	11	35	44	21
197	S. W. Penna.	72	26	2	58	37	5	41	51	8
220	Wasatch Front	72	26	2	58	37	5	42	51	7
229	Puget Sound	73	26	1	60	38	2	43	52	5
	Average:	72	26	2	58	36	6	40	50	10

* Note: Tables reflect an adjustment factor for stationary source categories to account for receptor location (see text).

Table C-11
Source Contribution (by percent)*
Pollutant: CO
Standard: Interim Standard 1977-81, Statutory Standard 1982-85
Growth Rate: CBD

No.	City	1970			1980			1985		
		LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary	LDV	Other Mobile	Station.
004	Birmingham	71	23	6	56	30	14	40	35	25
009	North Alaska	69	21	10	51	25	34	32	24	44
013	Clark-Mohave	73	27	0	62	36	2	49	49	2
015	Phoenix-Tucson	73	26	1	61	36	3	47	47	6
024	Los Angeles	74	25	1	63	35	2	50	46	4
028	Sacremento Valley	72	25	3	58	34	8	42	42	16
029	San Diego	74	26	0	63	37	0	50	49	1
030	San Francisco	73	26	1	61	35	4	46	45	9
031	San Joaquin Valley	72	27	1	59	34	7	45	42	13
036	Denver	73	26	1	60	36	3	48	48	4
042	Hartford-N. Haven	74	26	0	63	36	1	50	48	2
043	NY-NJ-Conn.	74	25	1	63	35	2	50	47	3
045	Philadelphia	72	26	2	59	35	6	45	46	9
047	National Capitol	73	26	1	61	35	4	48	45	7
062	E. Wash.-N. Idaho	73	26	1	61	34	6	48	45	7
067	Chicago	70	26	4	55	33	12	40	40	20
080	Indianapolis	72	26	2	58	33	9	43	45	12
094	Kansas City	72	27	1	59	37	4	45	49	6
115	Baltimore	72	26	2	59	36	5	46	46	8
119	Boston	74	26	0	63	35	2	50	47	3
131	Minn.-St. Paul	73	26	1	62	36	2	49	48	3
158	Central New York	74	25	1	63	34	3	49	47	4
193	Portland	71	25	4	56	34	10	41	40	19
197	S. W. Penna.	72	26	2	60	36	4	46	46	8
220	Wasatch Front	72	26	2	60	36	4	47	47	6
229	Puget Sound	73	26	1	62	36	2	48	48	4
	Average:	72	26	2	59	35	6	46	45	9

* Note: Tables reflect an adjustment factor for stationary source categories to account for receptor location (see text).

Table C-12
Source Contribution (by percent)*
Pollutant: CO
Standard: California Standard 1977-85
Growth Rate: CBD

No.	City	1970			1980			1985		
		LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary
004	Birmingham	71	23	6	54	31	15	36	38	26
009	North Alaska	69	21	10	47	25	28	28	26	46
013	Clark-Mohave	73	27	0	60	39	1	46	52	2
015	Phoenix-Tucson	73	26	1	58	39	3	43	51	6
024	Los Angeles	74	25	1	61	37	2	46	50	4
028	Sacremento Valley	72	25	3	55	36	9	39	43	18
029	San Diego	74	26	0	61	39	0	47	52	1
030	San Francisco	73	26	1	58	37	5	43	47	10
031	San Joaquin Valley	72	27	1	57	36	7	41	46	13
036	Denver	73	26	1	59	39	2	44	51	5
042	Hartford-N. Haven	74	26	0	61	38	1	47	51	2
043	NY-NJ-Conn.	74	25	1	61	37	2	46	51	3
045	Philadelphia	72	26	2	57	37	6	42	48	10
047	National Capitol	73	26	1	59	37	4	44	48	8
062	E. Wash.-N. Idaho	73	26	1	59	37	4	44	48	8
067	Chicago	70	26	4	53	35	12	36	43	21
080	Indianapolis	72	26	2	56	37	7	40	48	12
094	Kansas City	72	27	1	57	40	3	41	53	6
115	Baltimore	72	26	2	57	38	5	42	49	9
119	Boston	74	26	0	61	37	2	46	51	3
131	Minn.-St. Paul	73	26	1	60	39	1	45	52	3
158	Central New York	74	25	1	61	37	2	46	49	5
193	Portland	71	25	4	54	35	11	37	43	20
197	S. W. Penna.	72	26	2	58	37	5	43	49	8
220	Wasatch Front	72	26	2	58	38	4	44	50	6
229	Puget Sound	73	26	1	60	38	2	45	50	5
	Average:	72	26	2	58	37	5	42	48	10

* Note: Tables reflect an adjustment factor for stationary source categories to account for receptor location (see text).

Table C-13
Source Contribution (by percent)*
Pollutant: CO
Standard: Interim Standard 1977-85
Growth Rate: CBD

No.	City	1970			1980			1985		
		LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary	LDV	Other Mobile	Station
004	Birmingham	71	23	6	56	30	14	46	31	23
009	North Alaska	69	21	10	49	24	27	36	23	41
013	Clark-Mohave	73	27	0	62	37	1	55	43	2
015	Phoenix-Tucson	73	26	1	61	36	3	53	42	5
024	Los Angeles	74	25	1	63	35	2	55	42	3
028	Sacremento Valley	72	25	3	58	33	9	48	37	15
029	San Diego	74	26	0	63	37	0	56	43	1
030	San Francisco	73	26	1	61	35	4	52	40	8
031	San Joaquin Valley	72	27	1	59	35	6	50	39	11
036	Denver	73	26	1	61	37	2	54	42	4
042	Hartford-N. Haven	74	26	0	63	36	1	56	42	2
043	NY-NJ-Conn.	74	25	1	63	36	1	56	41	3
045	Philadelphia	72	26	2	60	35	5	52	40	8
047	National Capitol	73	26	1	61	35	4	54	40	6
062	E. Wash.-N. Idaho	73	26	1	61	35	4	54	39	7
067	Chicago	70	26	4	55	34	11	46	36	18
080	Indianapolis	72	26	2	58	35	7	49	40	11
094	Kansas City	72	27	1	59	38	3	51	44	5
115	Baltimore	72	26	2	60	35	5	51	42	7
119	Boston	74	26	0	63	36	1	56	41	3
131	Minn.-St. Paul	73	26	1	62	37	1	55	43	2
158	Central New York	74	25	1	63	35	2	55	41	4
193	Portland	71	25	4	56	34	10	46	36	17
197	S. W. Penna.	72	26	2	60	36	4	52	41	7
220	Wasatch Front	72	26	2	60	36	4	53	42	5
229	Puget Sound	73	26	1	62	36	2	54	42	4
	Average:	72	26	2	60	35	5	52	40	8

* Note: Tables reflect an adjustment factor for stationary source categories to account for receptor location (see text).

Table C-14

Source Contribution (by percent)
Pollutant: Hydrocarbons
Standard: Statutory Standard 1978-85
Growth Rate: CBD

No.	City	1970			1980			1985		
		LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary
004	Birmingham	46	21	33	31	17	52	21	18	61
009	Mobile-Pensacola	61	28	11	51	27	22	37	33	30
013	Clark-Mohave	61	31	8	50	32	18	35	38	27
015	Phoenix-Tucson	39	10	51	23	14	63	12	13	75
024	Los Angeles	47	22	31	29	16	55	16	15	69
028	Sacramento Valley	39	18	43	20	11	69	10	9	81
029	San Diego	54	25	21	36	20	44	20	19	61
030	San Francisco	39	18	64	22	12	66	12	11	77
031	San Joaquin	37	17	46	19	10	71	10	9	81
033	S.E. Desert	23	9	68	9	4	87	4	3	93
036	Denver	55	26	19	41	23	36	27	26	47
043	NY-NJ-Conn.	50	23	27	36	20	44	25	23	52
045	Philadelphia	54	25	21	40	22	38	26	25	49
047	National Capitol	55	25	20	38	21	41	22	20	58
079	Cincinnati	48	22	30	32	10	58	18	17	65
080	Indianapolis	44	21	35	28	16	56	17	16	67
106	S. Lou.-S.E. Texas	43	20	37	28	16	56	18	17	65
119	Boston	49	23	28	35	19	46	24	22	54
124	Toledo	36	18	46	22	14	64	15	16	69
153	El Paso-Las Cruces	59	28	13	46	28	26	31	33	36
160	Genesse-Finger Lakes	57	26	17	41	21	38	25	21	54
173	Dayton	47	22	31	33	19	48	20	19	61
193	Portland	42	19	39	29	16	55	19	17	64
197	S.W. Pennsylvania	48	23	29	34	20	46	22	22	56
212	Austin-Waco	61	28	11	48	27	25	32	30	38
214	Corpus-Christi	18	9	73	9	5	86	5	5	90
215	Dallas-Ft. Worth	62	29	9	50	28	22	35	33	32
216	Houston-Galvaston	28	13	59	14	8	78	7	7	86
217	San Antonio	60	29	11	47	27	26	31	30	39
229	Pudget Sound	59	27	14	48	27	25	40	37	23
	Average:	47	22	31	33	18	49	21	20	59

Table C-15

Source Contribution (by percent)
Pollutant: Hydrocarbons
Standard: California Standard 1977-81; Statutory Syandard 1982-85
Growth Rate: CBD

No.	City	1970			1980			1985		
		LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary
004	Birmingham	46	21	33	33	16	51	23	18	59
009	Mobile-Pensacola	61	28	11	52	27	21	39	32	29
013	Clark-Mohave	61	31	8	52	31	17	37	36	27
015	Phoenix-Tucson	39	10	51	24	13	63	14	12	74
024	Los Angeles	47	22	31	30	16	64	18	15	67
028	Sacramento Valley	39	18	43	21	11	68	11	9	80
029	San Diego	54	25	21	37	20	43	22	19	59
030	San Francisco	39	18	64	22	12	66	13	11	76
031	San Joaquin	37	17	46	20	10	70	11	9	80
033	S.E. Desert	23	9	68	9	4	87	4	3	93
036	Denver	55	26	19	42	23	35	29	25	46
043	NY-NJ-Conn.	50	23	27	37	19	44	27	22	51
045	Philadelphia	54	25	21	41	22	37	28	24	48
047	National Capitol	55	25	20	40	20	40	24	20	56
079	Cincinnati	48	22	30	33	17	50	20	9	71
080	Indianapolis	44	21	35	29	16	55	19	16	65
106	S. Lou.-S.E. Texas	43	20	37	29	16	55	19	17	64
119	Boston	49	23	28	36	19	45	26	22	52
124	Toledo	36	18	46	23	14	63	16	16	68
153	El Paso-Las Cruces	59	28	13	47	28	25	33	32	35
160	Genesse-Finger Lakes	57	26	17	43	21	36	27	20	53
173	Dayton	47	22	31	34	18	48	22	19	59
193	Portland	42	19	39	30	16	54	20	17	63
197	S.W. Pennsylvania	48	23	29	35	19	46	24	21	55
212	Austin-Waco	61	28	11	49	26	25	34	29	37
214	Corpus-Christi	18	9	73	9	5	86	6	5	89
215	Dallas-Ft. Worth	62	29	9	51	27	22	37	31	32
216	Houston-Galvaston	28	13	59	14	8	78	8	7	85
217	San Antonio	60	29	11	48	27	25	33	29	38
229	Pudget Sound	59	27	14	50	26	24	37	31	32
	Average:	47	22	31	34	18	48	23	19	58

Table C-16 Source Contribution (by percent)
Pollutant: Hydrocarbons
Standard: Interim Standard 1977-81; Statutory Standard 1982-85
Growth Rate: CBD

No.	City	1970			1980			1985		
		LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary
004	Birmingham	46	21	33	34	16	50	25	17	58
009	Mobile-Pensacola	61	28	11	53	26	21	42	31	27
013	Clark-Mohave	61	31	8	53	30	17	39	35	26
015	Phoenix-Tucson	39	10	51	25	13	62	15	12	73
024	Los Angeles	47	22	31	31	15	54	19	14	67
028	Sacramento Valley	39	18	43	22	11	67	12	9	79
029	San Diego	54	25	21	38	19	43	24	18	58
030	San Francisco	39	18	64	23	12	65	14	11	75
031	San Joaquin	37	17	46	21	10	69	11	9	80
033	S.E. Desert	23	9	68	10	4	86	5	3	92
036	Denver	55	26	19	43	22	35	31	24	45
043	NY-NJ-Conn.	50	23	27	38	19	43	29	22	49
045	Philadelphia	54	25	21	42	13	45	30	24	46
047	National Capitol	55	25	20	41	20	39	26	19	55
079	Cincinnati	48	22	30	34	17	49	22	16	62
080	Indianapolis	44	21	35	30	16	54	20	16	64
106	S. Lou.-S.E. Texas	43	20	37	30	15	55	21	16	63
119	Boston	49	23	28	38	19	43	28	21	51
124	Toledo	36	18	46	24	14	62	18	15	67
153	El Paso-Las Cruces	59	28	13	48	27	25	35	31	34
160	Genesse-Finger Lakes	57	26	17	44	20	36	29	20	51
173	Dayton	47	22	31	35	18	47	24	19	57
193	Portland	42	19	39	31	15	54	22	17	61
197	S.W. Pennsylvania	48	23	29	36	19	45	26	21	53
212	Austin-Waco	61	28	11	50	25	25	36	28	36
214	Corpus-Christi	18	9	73	10	5	85	6	5	89
215	Dallas-Ft. Worth	62	29	9	53	27	20	40	30	30
216	Houston-Galvaston	28	13	59	15	8	77	7	7	86
217	San Antonio	60	29	11	50	26	24	35	28	37
229	Pudget Sound	59	27	14	51	25	24	39	30	31
	Average:	47	22	31	35	18	47	24	19	57

Table C-17

Source Contribution (by percent)
Pollutant: Hydrocarbons
Standard: California Standard 1977-85
Growth Rate: CBD

No.	City	1970			1980			1985		
		LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary
004	Birmingham	46	21	33	33	16	51	26	17	57
009	Mobile-Pensacola	61	28	11	52	27	21	43	30	27
013	Clark-Mohave	61	31	8	52	31	17	41	34	25
015	Phoenix-Tucson	39	10	51	24	13	63	15	12	73
024	Los Angeles	47	22	31	30	16	54	20	14	66
028	Sacramento Valley	39	18	43	21	11	68	12	9	79
029	San Diego	54	25	21	37	20	43	25	18	57
030	San Francisco	39	18	64	22	12	66	14	10	76
031	San Joaquin	37	17	46	20	10	70	12	9	79
033	S.E. Desert	23	9	68	9	4	87	5	3	92
036	Denver	55	26	19	42	23	35	32	24	44
043	NY-NJ-Conn.	50	23	27	37	19	44	30	22	48
045	Philadelphia	54	25	21	41	22	37	38	28	34
047	National Capitol	55	25	20	40	20	40	27	19	54
079	Cincinnati	48	22	30	33	17	50	23	16	61
080	Indianapolis	44	21	35	29	16	55	21	15	64
106	S. Lou.-S.E. Texas	43	20	37	29	16	55	22	16	62
119	Boston	49	23	28	36	19	45	29	21	50
124	Toledo	36	18	46	23	14	63	18	15	67
153	El Paso-Las Cruces	59	28	13	48	28	24	36	30	34
160	Genesse-Finger Lakes	57	26	17	43	21	36	30	20	50
173	Dayton	47	22	31	34	18	48	24	18	58
193	Portland	42	19	39	30	16	54	23	16	61
197	S.W. Pennsylvania	48	23	29	35	19	46	27	20	53
212	Austin-Waco	61	28	11	49	26	25	38	27	35
214	Corpus-Christi	18	9	73	9	5	86	6	5	89
215	Dallas-Ft. Worth	62	29	9	51	27	22	41	30	29
216	Houston-Galvaston	28	13	59	14	8	78	9	7	84
217	San Antonio	60	29	11	48	27	25	36	27	37
229	Pudget Sound	59	27	14	50	26	24	41	29	30
	Average:	47	22	31	34	18	48	25	19	56

Table C-18

Source Contribution (by percent)
Pollutant: Hydrocarbons
Standard: Interim Standard 1977-85
Growth Rate: CBD

No.	City	1970			1980			1985		
		LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary
C04	Birmingham	46	21	33	34	16	50	29	16	55
009	Mobile-Pensacola	61	28	11	53	26	21	47	28	25
013	Clark-Mohave	61	31	8	53	30	17	45	32	23
015	Phoenix-Tucson	39	10	51	25	13	62	18	12	70
024	Los Angeles	47	22	31	31	15	54	23	14	63
028	Sacramento Valley	39	18	43	22	11	67	14	9	77
029	San Diego	54	25	21	38	19	43	28	17	55
030	San Francisco	39	18	64	23	12	65	17	10	73
031	San Joaquin	37	17	46	21	10	69	14	8	78
033	S.E. Desert	23	9	68	10	4	86	6	3	91
036	Denver	55	26	19	43	22	35	36	23	41
043	NY-NJ-Conn.	50	23	27	38	19	43	34	20	46
045	Philadelphia	54	25	21	42	22	36	35	22	43
047	National Capitol	55	25	20	41	20	39	30	18	52
079	Cincinnati	48	22	30	34	17	49	26	16	58
080	Indianapolis	44	21	35	30	16	54	24	15	61
106	S. Lou.-S.E. Texas	43	20	37	30	15	55	25	16	59
119	Boston	49	23	28	38	19	43	33	20	47
124	Toledo	36	18	46	24	14	62	21	15	64
153	El Paso-Las Cruces	59	28	13	48	27	25	40	28	32
160	Genesse-Finger Lakes	57	26	17	44	20	36	33	19	48
173	Dayton	47	22	31	35	18	47	28	18	54
193	Portland	42	19	39	31	15	54	26	16	58
197	S.W. Pennsylvania	48	23	29	36	19	45	30	19	51
212	Austin-Waco	61	28	11	50	25	25	42	26	32
214	Corpus-Christi	18	9	73	10	5	85	8	5	87
215	Dallas-Ft. Worth	62	29	9	53	27	20	45	28	27
216	Houston-Galvaston	28	13	59	15	8	77	11	7	82
217	San Antonio	60	29	11	50	26	24	40	26	34
229	Pudget Sound	59	27	14	51	25	24	45	27	28
	Average:	47	22	31	35	18	47	28	18	54

Source Contribution (by percent)
Pollutant: NO_x
Standard: 3.1 gpm 1977-85
Growth Rate: Metroplitan

No.	City	1970			1980			1985		
		LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationar
015	Phoenix-Tucson	40	22	38	39	24	37	39	24	37
024	Los Angeles	46	18	36	41	18	41	39	17	44
030	San Francisco	45	20	35	41	21	38	40	20	40
036	Denver	32	15	53	29	16	55	29	16	55
043	NY-NJ-Conn.	26	10	64	23	10	67	22	9	69
045	Philadelphia	21	11	68	18	11	71	18	10	72
047	National Capitol	31	12	57	30	14	56	31	13	56
067	Chicago	21	12	67	19	12	69	17	11	72
115	Baltimore	20	11	69	26	16	58	27	16	57
220	Wasatch Front	37	18	45	34	20	46	34	19	57
	Average:	32	15	53	30	16	54	30	15	55

Table C-20
Source Contribution (by percent)
Pollutant: NO_x
Standard: 3.1 gpm 1977-81, 2.0 gpm 1982-85
Growth Rate: Metropolitan

No. City	1970			1980			1985		
	LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationar
015 Phoenix-Tucson	40	22	38	39	24	37	35	26	39
024 Los Angeles	46	18	36	41	18	41	35	18	47
030 San Francisco	45	20	35	41	21	38	36	21	43
036 Denver	32	15	53	29	16	55	25	16	59
043 NY-NJ-Conn.	26	10	64	23	10	67	19	10	71
045 Philadelphia	21	11	68	18	11	71	15	10	75
047 National Capitol	31	12	57	30	14	56	27	14	59
067 Chicago	21	12	67	19	12	69	15	11	74
115 Baltimore	20	11	69	26	16	58	24	17	59
220 Wasatch Front	37	18	45	34	20	46	30	20	50
Average:	32	15	53	30	16	54	26	16	58

Table C-21
Source Contribution (by percent)
Pollutant: NO_x
Standard: 3.1 gpm 1977-81; 1.0 gpm 1982-85
Growth Rate: Metropolitan

No.	City	1970			1980			1985		
		LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationar
015	Phoenix-Tucson	40	22	38	39	24	37	31	27	42
024	Los Angeles	46	18	36	41	18	41	30	19	51
030	San Francisco	45	20	35	41	21	38	32	23	45
036	Denver	32	15	53	29	16	55	22	17	61
043	NY-NJ-Conn.	26	10	64	23	10	67	16	10	74
045	Philadelphia	21	11	68	18	11	71	13	11	76
047	National Capitol	31	12	57	30	14	56	23	15	62
067	Chicago	21	12	67	19	12	69	13	11	76
115	Baltimore	20	11	69	26	16	58	21	18	61
220	Wasatch Front	37	18	45	34	20	46	26	21	52
	Average:	32	15	53	30	16	54	23	17	60

Table C-22
Source Contribution (by percent)
Pollutant: NO_x
Standard: 3.1 gpm 1977-81; 0.4 gpm 1982-85
Growth Rate: Metropolitan

No.	City	1970			1980			1985		
		LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary
015	Phoenix-Tucson	40	22	38	39	24	37	28	28	44
024	Los Angeles	46	18	36	41	18	41	27	20	53
030	San Francisco	45	20	35	41	21	38	29	24	47
036	Denver	32	15	53	29	16	55	19	18	63
043	NY-NJ-Conn.	26	10	64	23	10	67	14	9	77
045	Philadelphia	21	11	68	18	11	71	11	11	78
047	National Capitol	31	12	57	30	14	56	21	15	64
067	Chicago	21	12	67	19	12	69	11	12	77
115	Baltimore	20	11	69	26	16	58	18	18	64
220	Wasatch Front	37	18	45	34	20	46	23	22	55
	Average:	32	15	53	30	16	54	20	18	62

Source Contribution (by percent)
Pollutant: NO_x
Standard: 2.0 gpm 1977-85
Growth Rate: Metropolitan

No.	City	1970			1980			1985		
		LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationar
015	Phoenix-Tucson	40	22	38	35	26	39	31	27	42
024	Los Angeles	46	18	36	37	20	43	30	19	51
030	San Francisco	45	20	35	37	23	40	32	23	45
036	Denver	32	15	53	26	17	57	22	17	61
043	NY-NJ-Conn.	26	10	64	20	11	69	16	10	74
045	Philadelphia	21	11	68	16	11	73	13	11	76
047	National Capitol	31	12	57	27	14	59	23	15	62
067	Chicago	21	12	67	16	12	72	13	11	76
115	Baltimore	20	11	69	23	17	60	21	18	61
220	Wasatch Front	37	18	45	30	21	49	26	21	53
	Average:	32	15	53	27	17	56	23	17	60

Table C-24
Source Contribution (by percent)
Pollutant: NO_x
Standard: 2.0 gpm 1977-81; 1.0 gpm 1982-85
Growth Rate: Metropolitan

No.	City	1970			1980			1985		
		LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary
015	Phoenix-Tucson	40	22	38	35	26	39	26	29	45
024	Los Angeles	46	18	36	37	20	43	25	20	55
030	San Francisco	45	20	35	37	23	40	27	25	48
036	Denver	32	15	53	26	17	57	18	18	64
043	NY-NJ-Conn.	26	10	64	20	11	69	13	10	77
045	Philadelphia	21	11	68	16	11	73	10	11	79
047	National Capitol	31	12	57	27	14	59	19	15	66
067	Chicago	21	12	67	16	12	72	10	12	78
115	Baltimore	20	11	69	23	17	60	17	19	64
220	Wasatch Front	37	18	45	30	21	49	21	22	57
	Average:	32	15	53	27	17	56	19	18	63

Table C-25
Source Contribution (by percent)
Pollutant: NO_x
Standard: 2.0 gpm 1977-81; 0.4 gpm 1982-85
Growth Rate: Metropolitan

No. City	1970			1980			1985		
	LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationar
015 Phoenix-Tucson	40	22	38	35	26	39	22	31	47
024 Los Angeles	46	18	36	37	20	43	22	21	57
030 San Francisco	45	20	35	37	23	40	23	26	51
036 Denver	32	15	53	26	17	57	15	19	66
043 NY-NJ-Conn.	26	10	64	20	11	69	11	11	78
045 Philadelphia	21	11	68	16	11	73	9	11	80
047 National Capitol	31	12	57	27	14	59	17	16	67
067 Chicago	21	12	67	16	12	72	9	12	79
115 Baltimore	20	11	69	23	17	60	14	19	67
220 Wasatch Front	37	18	45	30	21	49	18	22	60
Average:	32	15	53	27	17	56	16	19	65

Table C-26
Source Contribution (by percent)
Pollutant: NO_x
Standard: 0.4 gpm 1978-85
Growth Rate: Metropolitan

No.	City	1970			1980			1985		
		LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary
015	Phoenix-Tucson	40	22	38	30	28	42	15	33	52
024	Los Angeles	46	18	36	31	21	48	15	23	62
030	San Francisco	45	20	35	32	24	44	16	28	56
036	Denver	32	15	53	22	18	60	10	20	70
043	NY-NJ-Conn.	26	10	64	17	11	72	7	11	82
045	Philadelphia	21	11	68	13	11	76	6	11	83
047	National Capitol	31	12	57	23	15	62	11	17	72
067	Chicago	21	12	67	13	13	74	6	13	81
115	Baltimore	20	11	69	19	18	63	9	20	71
220	Wasatch Front	37	18	45	26	22	52	12	25	63
	Average:	32	15	53	23	18	59	11	20	69

Table C-27
Source Contribution (by percent)
Pollutant: Hydrocarbons
Standard: Statutory standard 1977-85
Growth Rate: Metropolitan

No.	City	1970			1980			1985		
		LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary
004	Birmingham	46	21	33	39	21	40	31	27	42
009	Mobile-Pensacola	61	28	11	53	29	18	40	36	24
013	Clark-Mohave	61	31	8	53	33	14	39	42	19
015	Phoenix-Tucson	39	10	51	27	32	41	16	17	67
024	Los Angeles	47	22	31	31	17	52	18	17	65
028	Sacramento Valley	39	18	43	23	13	64	13	12	75
029	San Diego	54	25	21	41	23	36	26	25	49
030	San Francisco	39	18	64	25	14	61	15	14	71
031	San Joaquin	37	17	46	24	13	63	14	13	73
033	S.E. Desert	23	9	68	10	5	85	5	4	91
036	Denver	55	26	19	44	25	31	31	30	39
043	NY-NJ-Conn.	50	23	27	38	21	41	28	25	47
045	Philadelphia	54	25	21	42	24	34	30	28	42
047	National Capitol	55	25	20	42	23	35	27	24	49
079	Cincinnati	48	22	30	37	20	43	24	23	53
080	Indianapolis	44	21	35	32	18	50	22	21	57
106	S. Lou.-S.E. Texas	43	20	37	35	20	45	26	25	49
119	Boston	49	23	28	37	20	43	27	24	49
124	Toledo	36	18	46	24	15	61	17	18	65
153	El Paso-Las Cruces	59	28	13	50	30	20	36	38	26
160	Genesse-Finger Lakes	57	26	17	46	24	30	31	27	42
173	Dayton	47	22	31	34	20	46	22	21	57
193	Portland	42	19	39	29	16	55	19	18	63
197	S.W. Pennsylvania	48	23	29	35	20	45	23	23	54
212	Austin-Waco	61	28	11	50	28	22	35	33	32
214	Corpus-Christi	18	9	73	11	7	82	7	7	86
215	Dallas-Ft. Worth	62	29	9	54	30	16	41	38	21
216	Houston-Galvaston	28	13	59	19	11	70	12	11	77
217	San Antonio	60	29	11	51	29	20	36	36	28
229	Pudget Sound	59	27	14	48	26	26	34	31	35
	Average:	47	22	31	36	21	43	25	24	51

Table C-28

Source Contribution (by percent)
Pollutant: Hydrocarbons
Standard: California standard 1977-81, Statutory standard 1982-85
Growth Rate: Metropolitan

No.	City	1970			1980			1985		
		LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary
004	Birmingham	46	21	33	41	20	39	33	26	41
009	Mobile-Pensacola	61	28	11	54	28	18	43	35	22
013	Clark-Mohave	61	31	8	54	32	14	41	40	19
015	Phoenix-Tucson	39	10	51	28	16	56	18	16	66
024	Los Angeles	47	22	31	32	33	35	20	16	64
028	Sacramento Valley	39	18	43	24	13	63	14	12	74
029	San Diego	54	25	21	42	22	36	29	24	47
030	San Francisco	39	18	64	26	14	60	16	13	71
031	San Joaquin	37	17	46	25	13	62	16	13	71
033	S.E. Desert	23	9	68	11	5	84	5	4	91
036	Denver	55	26	19	45	24	31	33	29	38
043	NY-NJ-Conn.	50	23	27	39	20	41	30	25	45
045	Philadelphia	54	25	21	44	23	33	32	27	41
047	National Capitol	55	25	20	43	22	35	29	23	48
079	Cincinnati	48	22	30	38	20	42	26	22	52
080	Indianapolis	44	21	35	33	18	49	23	20	57
106	S. Lou.-S.E. Texas	43	20	37	36	19	45	28	24	48
119	Boston	49	23	28	39	20	41	29	24	47
124	Toledo	36	18	46	25	15	60	19	18	63
153	El Paso-Las Cruces	59	28	13	51	30	19	38	37	25
160	Genesse-Finger Lakes	57	26	17	48	23	29	34	26	40
173	Dayton	47	22	31	35	19	46	24	21	55
193	Portland	42	19	39	30	16	54	21	17	62
197	S.W. Pennsylvania	48	23	29	36	20	44	26	23	51
212	Austin-Waco	61	28	11	51	27	22	38	32	30
214	Corpus-Christi	18	9	73	11	6	83	7	7	86
215	Dallas-Ft. Worth	62	29	9	55	29	16	43	37	20
216	Houston-Galvaston	28	13	59	20	11	69	13	11	76
217	San Antonio	60	29	11	52	29	19	39	34	27
229	Pudget Sound	59	27	14	49	26	25	36	30	34
	Average:	47	22	31	37	21	42	27	23	50

Table C-29

Source Contribution (by percent)
Pollutant: Hydrocarbons
Standard: Interim standard 1977-81, Statutory standard 1982-85
Growth Rate: Metropolitan

No.	City	1970			1980			1985		
		LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary
004	Birmingham	46	21	33	42	20	38	35	25	40
009	Mobile-Pensacola	61	28	11	55	27	18	45	33	22
013	Clark-Mohave	61	31	8	55	32	13	44	38	18
015	Phoenix-Tucson	39	10	51	29	15	56	19	16	65
024	Los Angeles	47	22	31	33	16	51	21	16	63
028	Sacramento Valley	39	18	43	25	13	62	15	12	73
029	San Diego	54	25	21	44	22	34	31	23	46
030	San Francisco	39	18	64	27	13	60	18	13	69
031	San Joaquin	37	17	46	26	13	61	17	13	70
033	S.E. Desert	23	9	68	11	5	84	6	4	90
036	Denver	55	26	19	46	24	30	36	28	36
043	NY-NJ-Conn.	50	23	27	40	20	40	32	24	44
045	Philadelphia	54	25	21	45	23	32	34	27	39
047	National Capitol	55	25	20	44	22	34	31	23	46
079	Cincinnati	48	22	30	39	20	41	28	22	50
080	Indianapolis	44	21	35	35	18	47	25	20	55
106	S. Lou.-S.E. Texas	43	20	37	37	19	44	30	24	46
119	Boston	49	23	28	40	20	40	31	23	46
124	Toledo	36	18	46	26	15	59	20	17	63
153	El Paso-Las Cruces	59	28	13	52	29	19	41	35	24
160	Genesse-Finger Lakes	57	26	17	49	23	28	36	25	39
173	Dayton	47	22	31	36	19	45	26	20	54
193	Portland	42	19	39	32	16	52	23	17	60
197	S.W. Pennsylvania	48	23	29	37	20	43	27	22	51
212	Austin-Waco	61	28	11	52	27	21	40	31	29
214	Corpus-Christi	18	9	73	12	6	82	8	7	85
215	Dallas-Ft. Worth	62	29	9	57	29	14	46	35	19
216	Houston-Galvaston	28	13	59	20	10	70	14	11	75
217	San Antonio	60	29	11	53	28	19	41	33	26
229	Pudget Sound	59	27	14	50	25	25	39	29	32
	Average:	47	22	31	38	20	42	29	22	49

Table C-30

Source Contribution (by percent)
Pollutant: Hydrocarbons
Standard: California standard 1977-85
Growth Rate: Metropolitan

No.	City	1970			1980			1985		
		LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary
004	Birmingham	46	21	33	41	20	39	36	25	39
009	Mobile-Pensacola	61	28	11	54	28	18	46	33	21
013	Clark-Mohave	61	31	8	54	32	14	45	38	17
015	Phoenix-Tucson	39	10	51	28	16	56	20	16	64
024	Los Angeles	47	22	31	32	17	51	22	16	62
028	Sacramento Valley	39	18	43	24	13	63	16	12	72
029	San Diego	54	25	21	42	22	36	32	23	45
030	San Francisco	39	18	64	26	14	60	18	13	69
031	San Joaquin	37	17	46	25	13	62	18	26	56
033	S.E. Desert	23	9	68	11	5	84	6	4	90
036	Denver	55	26	19	45	24	31	37	27	36
043	NY-NJ-Conn.	50	23	27	39	20	41	33	24	43
045	Philadelphia	54	25	21	44	23	33	35	26	39
047	National Capitol	55	25	20	43	22	35	32	22	46
079	Cincinnati	48	22	30	38	20	42	29	21	50
080	Indianapolis	44	21	35	33	18	49	26	20	54
106	S. Lou.-S.E. Texas	43	20	37	36	19	45	31	23	46
119	Boston	49	23	28	39	20	41	32	23	45
124	Toledo	36	18	46	25	15	60	21	17	62
153	El Paso-Las Cruces	59	28	13	51	30	19	42	35	23
160	Genesse-Finger Lakes	57	26	17	48	23	29	37	24	39
173	Dayton	47	22	31	35	19	46	26	20	54
193	Portland	42	19	39	30	16	54	24	17	59
197	S.W. Pennsylvania	48	23	29	36	20	44	28	22	50
212	Austin-Waco	61	28	11	51	28	21	41	30	29
214	Corpus-Christi	18	9	73	11	6	83	9	7	84
215	Dallas-Ft. Worth	62	29	9	55	29	16	47	34	19
216	Houston-Galvaston	28	13	59	20	11	69	15	11	74
217	San Antonio	60	29	11	52	29	19	43	32	25
229	Pudget Sound	59	27	14	49	26	25	40	28	32
	Average:	47	22	31	37	20	43	30	22	48

Table C-31

Source Contribution (by percent)
Pollutant: Hydrocarbons
Standard: Interim standard 1977-85
Growth Rate: Metropolitan

No.	City	1970			1980			1985		
		LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary
004	Birmingham	46	21	33	42	20	38	40	23	37
009	Mobile-Pensacola	61	28	11	55	27	18	51	30	19
013	Clark-Mohave	61	31	8	55	32	13	49	35	16
015	Phoenix-Tucson	39	10	51	29	15	56	23	15	62
024	Los Angeles	47	22	31	33	16	51	25	15	60
028	Sacramento Valley	39	18	43	25	13	62	18	12	70
029	San Diego	54	25	21	44	22	34	35	22	43
030	San Francisco	39	18	64	27	13	60	21	13	66
031	San Joaquin	37	17	46	26	13	61	20	12	68
033	S.E. Desert	23	9	68	11	5	84	7	3	90
036	Denver	55	26	19	46	24	30	41	25	34
043	NY-NJ-Conn.	50	23	27	40	20	40	37	22	41
045	Philadelphia	54	25	21	45	23	32	39	24	37
047	National Capitol	55	25	20	44	22	34	36	21	43
079	Cincinnati	48	22	30	39	20	41	33	20	47
080	Indianapolis	44	21	35	35	18	47	30	19	51
106	S. Lou.-S.E. Texas	43	20	37	37	19	44	35	22	43
119	Boston	49	23	28	40	20	40	36	22	42
124	Toledo	36	18	46	26	15	59	24	17	59
153	El Paso-Las Cruces	59	28	13	52	29	19	46	32	22
160	Genesse-Finger Lakes	57	26	17	49	23	28	41	23	36
173	Dayton	47	22	31	36	19	45	30	19	51
193	Portland	42	19	39	32	16	52	27	16	57
197	S.W. Pennsylvania	48	23	29	37	20	43	32	21	47
212	Austin-Waco	61	28	11	52	27	21	45	28	27
214	Corpus-Christi	18	9	73	12	6	82	10	7	83
215	Dallas-Ft. Worth	62	29	9	57	29	14	51	32	17
216	Houston-Galvaston	28	13	59	20	10	70	17	11	72
217	San Antonio	60	29	11	53	28	19	47	30	23
229	Pudget Sound	59	27	14	50	25	25	44	27	29
	Average:	47	22	31	38	20	42	33	21	46

ADDENDUM D

IMPACT ON AIR QUALITY OF STANDARDS SELECTED BY THE AGENCY

This addendum contains the results of an analysis on the projected air quality impacts as a result of the specific LDV emissions standards selected by the Agency. This separate analysis is presented because of slight differences between the selected standards and those parametrically studied in the text.

Tables D-1 and D-2 contain projected data and pertinent statistics for CO and HC, respectively, under the assumption that VMT growth rate is essentially the same as CBD growth rate. Tables D-3 and D-4 provide a summary of emission contribution by various sources for CO and HC under the CBD assumption for growth rate. Table D-5 contains projected air quality data for HC where the VMT growth rate is based upon growth of the entire metropolitan area (see Addendum B). Finally Table D-6 contains a summary of HC emission contribution for various sources for a VMT growth rate based upon the metropolitan area growth rate.

TABLE D-1

Projected Impact of Decision Standard For
Carbon Monoxide (15 gm/mi 1977-1979,
9 gm/mi 1980-1981, Statutory 1982)
VMT Growth Rate Based on CBD
Predicted Ambient Conc. and No. of Occasions
Standard is Exceeded (#)

No.	Region	1971/73	1980		1985	
		conc.	conc.	#	conc.	#
004	Birmingham	18	7	-	5	-
009	North Alaska	35	13	10	10	2
013	Clark-Mohave	15	8	-	5	-
015	Phoenix-Tucson	42	21	157	14	16
024	Los Angeles	41	19	101	11	4
028	Sacremento Valley	22	9	-	6	-
029	San Diego	15	7	-	5	-
030	San Francisco	18	8	-	5	-
031	San Joaquin	13	6	-	4	-
036	Denver	33	15	26	9	-
042	Hartford-N. Haven	27	12	6	7	-
043	NY-NJ-Conn.	51	22	184	12	6
045	Philadelphia	32	13	10	8	-
047	National Capitol	20	10	2	6	-
062	E. Wash. - N. Idaho	18	10	2	6	-
067	Chicago	23	9	-	6	-
080	Indianapolis	15	7	-	4	-
094	Kansas City	15	7	-	5	-
115	Baltimore	18	9	-	6	-
119	Boston	18	8	-	5	-
131	Minn. - St. Paul	22	12	6	8	-
158	Central New York	15	7	-	4	-
193	Portland	26	12	6	8	-
197	S. W. Pennsylvania	22	10	2	6	-
220	Wasatch Front	41	19	101	13	10
229	Puget Sound	24	13	10	8	-
Total # of Regions Exceeding Standards		26	14		5	
Total # of Occasions Standard is Exceeded				623		38
Average % Air Quality Reduction from 1970			54		70	

TABLE D-2

Projected Impact of Decision Standard for Hydrocarbons
(1.5 gm/mi 1977-1979, .9 gm/mi 1980-1981, Statutory 1982-)
VMT Growth Rate Based on CBD
Predicted Ambient Conc. and No. of Occasions
Standard is Exceeded (#)

No.	Region	1971--73	1980		1985	
		conc.	conc.	#	conc.	#
004	Birmingham	.22	.15	80	11	14
009	Mobile-Pensacola	.11	.06	-	.04	-
013	Clark-Mohave	.22	.15	80	.12	24
015	Phoenix-Tucson	.19	.17	153	.16	114
024	Los Angeles	.62	.47	4117	.42	3416
028	Sacremento Valley	.24	.21	412	.20	333
029	San Diego	.30	.22	490	.20	333
030	San Francisco	.30	.25	780	.23	578
031	San Joaquin	.26	.22	490	.21	412
033	S.E. Desert	.28	.30	1507	.32	1866
036	Denver	.28	.20	333	.16	114
043	NY-NJ-Conn.	.26	.17	153	.13	39
045	Philadelphia	.20	.13	39	10	6
047	National Capitol	.38	.28	1165	.25	780
079	Cincinnati	.17	.13	39	.12	24
080	Indianapolis	.14	.10	6	.08	-
106	S. Lou. - S.E. Texas	.32	.24	666	.19	263
119	Boston	.21	.14	58	.10	6
124	Toledo	.14	.10	6	.07	-
153	El Paso-Las Cruces	.13	.08	-	.06	
150	Genesse-Finger Lakes	.15	.09	3	.08	
173	Dayton	.18	.14	58	.12	24
193	Portland	.14	.10	6	.08	-
197	S.W. Pennsylvania	.21	.15	80	.11	14
212	Austin-Waco	.16	.09	3	.07	-
214	Corpus-Christi	.19	.17	153	.14	58
215	Dallas-Ft. Worth	.13	.07	-	.05	-
216	Houston-Galvaston	.32	.29	1331	.27	1034
217	San Antonio	15	.09	3	.07	
229	Puget Sound	.16	.11	14	.08	
Total # of Regions Exceeding Standards		30	27		20	
Total # of Occasions Standard is Exceeded				12,225		9452
Average % Air Quality Reduction from 1970			27		39	

Source Contribution (by percent)*
Pollutant: CO
Standard: 15 gm/mi 1977-79; 9 gm/mi 1980-81; Statutory 1982-
Growth Rate: CBD

No.	City	1970			1980			1985		
		LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationa
004	Birmingham	71	23	6	55	31	14	36	38	26
009	North Alaska	69	21	10	48	25	27	28	26	46
013	Clark-Mohave	73	27	0	62	37	1	46	52	2
015	Phoenix-Tucson	73	26	1	60	37	3	43	51	6
024	Los Angeles	74	25	1	62	36	2	46	50	4
028	Sacremento Valley	72	25	3	57	34	9	39	43	18
029	San Diego	74	26	0	62	38	0	47	52	1
030	San Francisco	73	26	1	60	35	5	43	47	10
031	San Joaquin Valley	72	27	1	59	34	7	41	46	13
036	Denver	73	26	1	60	38	2	44	52	4
042	Hartford-N. Haven	74	26	0	62	37	1	47	51	2
043	NY-NJ-Conn.	74	25	1	62	36	2	46	51	3
045	Philadelphia	72	26	2	59	36	5	42	48	10
047	National Capitol	73	26	1	61	35	4	44	48	8
062	E. Wash.-N. Idaho	73	26	1	61	35	4	44	48	8
067	Chicago	70	26	4	55	33	12	36	43	21
080	Indianapolis	72	26	2	58	35	7	40	47	13
094	Kansas City	72	27	1	59	38	3	41	53	6
115	Baltimore	72	26	2	59	36	5	42	49	9
119	Boston	74	26	0	62	37	1	46	51	3
131	Minn.-St. Paul	73	26	1	61	38	1	45	52	3
158	Central New York	74	25	1	62	36	2	46	49	5
193	Portland	71	25	4	56	33	11	37	43	20
197	S. W. Penna.	72	26	2	59	37	4	43	49	8
220	Wasatch Front	72	26	2	60	36	4	44	50	6
229	Puget Sound	73	26	1	61	37	2	45	50	5
	Average	73	26	2	60	35	5	42	48	10

* Note: Tables reflect an adjustment factor for stationary source categories to account for receptor location (see text).

TABLE D-4

Source Contribution (by percent)
Pollutant: Hydrocarbons
Standard: 1.5 gm/mi 1977-79; 0.9 gm/mi 1980-81; Statutory 1982-
Growth Rate: CBD

No.	City	1970			1980			1985		
		LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary
004	Birmingham	46	21	33	34	16	50	24	18	58
009	Mobile-Pensacola	61	28	11	53	26	21	41	31	28
013	Clark-Mohave	61	31	8	53	30	17	38	35	27
015	Phoenix-Tucson	39	10	51	25	13	62	14	12	74
024	Los Angeles	47	22	31	31	15	54	19	15	66
028	Sacramento Valley	39	18	43	22	11	67	11	9	80
029	San Diego	54	25	21	38	19	43	23	18	59
030	San Francisco	39	18	64	23	12	65	13	11	76
031	San Joaquin	37	17	46	21	10	69	11	9	80
033	S.E. Desert	23	9	68	10	4	86	4	3	93
036	Denver	55	26	19	43	22	35	30	25	45
043	NY-NJ-Conn.	50	23	27	38	19	43	28	22	50
045	Philadelphia	54	25	21	42	22	36	29	24	47
047	National Capitol	55	25	20	41	20	39	25	19	56
079	Cincinnati	48	22	30	34	17	49	21	17	62
080	Indianapolis	44	21	35	30	16	54	19	16	65
106	S. Lou.-S.E. Texas	43	20	37	30	15	55	20	17	63
119	Boston	49	23	28	38	19	43	27	21	52
124	Toledo	36	18	46	24	14	62	17	15	68
153	El Paso-Las Cruces	59	28	13	48	27	25	34	31	35
160	Genesse-Finger Lakes	57	26	17	44	20	36	28	20	52
173	Dayton	47	22	31	35	18	47	23	19	58
193	Portland	42	19	39	31	15	54	21	17	62
197	S.W. Pennsylvania	48	23	29	36	19	45	25	21	54
212	Austin-Waco	61	28	11	50	25	25	35	28	37
214	Corpus-Christi	18	9	73	8	5	88	6	5	89
215	Dallas-Ft. Worth	62	29	9	53	27	20	39	31	30
216	Houston-Galvaston	28	13	59	15	7	78	8	7	85
217	San Antonio	60	29	11	50	26	24	34	28	38
229	Pudget Sound	59	27	14	51	25	24	38	30	32
	Average	47	22	31	35	18	47	24	19	57

TABLE D-5

Projected Impact of Decision Standard for Hydrocarbons
(1.5 gm/mi 1977-1979, .9 gm/mi 1980-1981, Statutory 1982-)
VMT Growth Rate Based on Metropolitan Area
Predicted Ambient Conc. and No. of Occasions
Standard is Exceeded (#)

No.	Region	1971-73	1980		1985	
		conc.	conc.	#	conc.	#
004	Birmingham	.22	.19	263	.15	80
009	Mobile-Pensacola	.11	.07	-	.05	-
013	Clark-Mohave	.22	.19	263	.16	114
015	Phoenix-Tucson	.19	.18	201	.18	201
024	Los Angeles	.62	.49	4468	.43	3630
028	Sacremento Valley	.24	.22	490	.22	490
029	San Diego	.30	.25	780	.23	578
030	San Francisco	.30	.26	902	.24	666
031	San Joaquin	.26	.25	780	.24	666
033	S.E. Desert	.28	.30	1507	.33	2040
036	Denver	.28	.22	490	.18	201
043	NY-NJ-Conn.	.26	.18	201	.14	58
045	Philadelphia	.20	.14	58	.11	14
047	National Capitol	.38	.32	1866	.28	1165
079	Cincinnati	.17	.15	80	.14	58
080	Indianapolis	.14	.11	14	.09	3
106	S. Lou. - S.E. Texas	.32	.28	1165	.24	666
119	Boston	.21	.15	80	.11	14
124	Toledo	.14	.10	6	.08	-
153	El Paso-Las Cruces	.13	.10	6	.08	-
150	Genesse-Finger Lakes	.15	.12	24	.10	6
173	Dayton	.18	.15	80	.13	39
193	Portland	.14	.10	6	.08	-
197	S.W. Pennsylvania	.21	.15	80	.12	24
212	Austin-Waco	.16	.11	14	.08	-
214	Corpus-Christi	.19	.17	153	.15	80
215	Dallas-Ft. Worth	.13	.10	6	.08	-
216	Houston-Galvaston	.32	.31	1621	.29	1331
217	San Antonio	.15	.11	14	.09	3
229	Puget Sound	.16	.10	6	.08	-
Total # of Regions Exceeding Standards		30	29		23	
Total # of Occasions Standard is Exceeded				15,624		12,127
Average % Air Quality Reduction from 1970			19		30	

Pollutant: Hydrocarbons
Standard: 1.5 gm/mi 1977-79, 0.9 gm/mi 1980-81; statutory 1982-
Growth Rate: Metropolitan

No.	City	1970			1980			1985		
		LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary	LDV	Other Mobile	Stationary
004	Birmingham	46	21	33	42	20	38	34	25	41
009	Mobile-Pensacola	61	28	11	55	27	18	44	34	22
013	Clark-Mohave	61	31	8	55	32	13	43	39	18
015	Phoenix-Tucson	39	10	51	29	15	56	19	16	65
024	Los Angeles	47	22	31	33	16	51	21	16	63
028	Sacramento Valley	39	18	43	25	13	62	15	12	73
029	San Diego	54	25	21	44	22	34	30	24	46
030	San Francisco	39	18	64	27	13	60	17	13	70
031	San Joaquin	37	17	46	26	13	61	17	13	70
033	S.E. Desert	23	9	68	11	5	84	5	4	91
036	Denver	55	26	19	46	24	30	34	28	38
043	NY-NJ-Conn.	50	23	27	40	20	40	31	24	45
045	Philadelphia	54	25	21	45	23	32	33	27	40
047	National Capitol	55	25	20	44	22	34	30	23	47
079	Cincinnati	48	22	30	39	20	41	27	22	51
080	Indianapolis	44	21	35	35	18	47	25	20	45
106	S. Lou.-S.E. Texas	43	20	37	37	19	44	29	23	48
119	Boston	49	23	28	40	20	40	30	23	47
124	Toledo	36	18	46	26	15	59	19	18	63
153	El Paso-Las Cruces	59	28	13	52	28	20	40	36	24
160	Genesse-Finger Lakes	57	26	17	49	23	28	35	25	40
173	Dayton	47	22	31	36	19	45	25	20	55
193	Portland	42	19	39	32	16	52	22	17	61
197	S.W. Pennsylvania	48	23	29	37	20	43	26	22	52
212	Austin-Waco	61	28	11	52	27	21	39	31	30
214	Corpus-Christi	18	9	73	12	6	82	8	7	85
215	Dallas-Ft. Worth	62	29	9	57	29	14	45	36	19
216	Houston-Galvaston	28	13	59	20	10	70	14	11	75
217	San Antonio	60	29	11	53	28	19	40	33	27
229	Pudget Sound	59	27	14	50	25	25	37	30	33
	Average	47	22	31	38	20	42	28	24	50