

THE EFFECTS OF RAISING
SPEED LIMITS ON
MOTOR VEHICLE EMISSIONS

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A. INTRODUCTION

In 1974 the Federal government introduced a national speed limit of 55 miles per hour (mph) in response to the Arab oil embargo and subsequent energy crisis. This limit was raised to 65 mph for rural interstate freeways in 1987. In November of 1995, as part of the National Highway System Bill (H.R. 2274, 1995), these limitations were eliminated and control of maximum highway speeds was relinquished to the States. This analysis investigates the impact on air quality that is expected to occur as a result of the elimination of Federal speed limits. This was done by determining where speed limits have changed in the past year (by State and roadway type) and modeling expected resulting speed changes using the U.S. Environmental Protection Agency's (EPA's) MOBILE5a highway vehicle emission factor model.

B. ANALYSIS METHODS

National Analysis

Four scenarios were modeled in the analysis. Case 1 represents the expected 1995 annual emissions at typical speeds prior to the elimination of the national speed limit. In Case 2, speeds were adjusted to represent the revised speed limits posted by States after the national speed limit was revoked. In both of these cases, the maximum speed modeled was 65 mph, the upper limit of modeled speeds in MOBILE5a. The modeling assumptions for Cases 3 and 4 are identical to Cases 1 and 2, respectively, except that speeds above the 65 mph limitation of MOBILE5a were modeled, where appropriate. For these cases, emission factors above 65 mph were estimated by extrapolation assuming a linear change between 55 mph and 65 mph and above*. This may underestimate emissions above 65 mph since emissions tend to increase at a faster rate than the linear assumption used (especially for NO_x). The following equation illustrates how NO_x emission factors were calculated at 67 mph. Similar equations were used to generate emission factors for VOC and CO.

$$\text{NO}_x67_{\text{veh}} = (\text{NO}_x65_{\text{veh}} - \text{NO}_x55_{\text{veh}}) * (2/10) + \text{NO}_x65_{\text{veh}}$$

where:

$\text{NO}_x67_{\text{veh}}$ is the vehicle type specific 67 mph NO_x emission factor,
 $\text{NO}_x65_{\text{veh}}$ is the vehicle type specific 65 mph NO_x emission factor,
 $\text{NO}_x55_{\text{veh}}$ is the vehicle type specific 55 mph NO_x emission factor, and
veh represents each of the eight vehicle types.

The fraction (2/10) represents the ratio of the incremental speed above the upper speed endpoint (65 mph) divided by the delta between the upper and lower speed endpoints or $((67-65)/(65-55))$. Similar calculations were performed to develop 70 mph and 75 mph emission factors. All emission factors in this analysis, including those representing a 65 mph vehicular speed, were modeled using the operating mode of the Federal test procedure (FTP). This assumption probably overestimates the percentage of cold start and hot start mode operation on freeways.

Existing vehicle miles traveled (VMT) data were mapped to new speeds (67 mph, 70 mph, and 75 mph) based on the ratio of the number of roadway miles affected by changes in speed limit to the total roadway mileage (FHWA, 1996) for a given roadway type. For example, if the maximum speed limit on 75% of rural interstate mileage was increased to 70 mph, 75% of the VMT assigned to that roadway type was assigned to the 70 mph emission factor. This percentage allocation of VMT affected by new speed limits was calculated at the State and roadway type level. For the affected roadway type, this same percentage of VMT was modeled at the higher speed for all counties and vehicle types within

*This may underestimate emissions above 65 mph since emissions tend to increase at a faster rate than the linear assumption used (especially for NO_x).

the State. For States that did not specify which roadway types had speed limit changes (but did specify the total affected roadway mileage), the mileage affected by speed limit changes was allocated to roadtypes in the following order:

- Rural - Interstate
- Urban - Interstate
- Rural - Other Principal Arterial
- Urban - Other Freeways and Expressways
- Rural - Minor Arterial
- Rural - Major Collector

For example, if a State specified that speed limits were increased to 70 mph on 1,000 roadway miles and that State had a total of 750 miles of rural interstate and 500 miles of urban interstate, then all of the rural interstate VMT would have been assumed to be affected by the speed limit change and 50 percent (250 miles out of 500 miles) of the urban interstate VMT would have been assumed to have the higher speed limit. For instances where more than one speed limit category was added (i.e., 70 mph and 75 mph), the higher speed limit mileage was assigned first.

In Case 1, the speeds modeled for each roadway type and vehicle type combination were determined using data from the Federal Highway Administration's (FHWA) 1987 through 1990 HPMS speed impact analyses. Speeds varied less than 1 mph over this four year time period for all vehicle type/roadway type combinations (Pechan, 1993). This data was then aggregated and rounded to the nearest five mile per hour increment to determine average speeds for two vehicle classifications (light duty vehicles and heavy duty vehicles). This data was supplemented with fleet average roadway speed trend data, which is based on the average speed reported by the States for fiscal year 1993 (FHWA, 1994). Only highways with a posted 55 mph speed limit are included in these averages. In Case 1, the observed national average speed of 67 mph for rural interstates was lowered to 65 mph, corresponding to the 65 mph limitation of MOBILE5a. It should be noted that the data collected was fleet average and, therefore, one speed was modeled for each of these roadway types with no distinction in speed made by vehicle class (e.g., the same speed was modeled for passenger cars and heavy-duty trucks on urban interstates). Table 1 shows the aggregated speeds by vehicle group and roadway class, as modeled.

Case 2 corresponds to our best estimate of post National Highway Systems Bill vehicle speeds, within the constraints of MOBILE5a, assuming Case 1 speeds for roadway types where no speed limit changes took place. These estimates are representative of each State's speed limit by roadway class. For this case, State specific data was utilized. Each affected State reported changes in speed limits and the number of miles of roadway by functional class affected by these changes. The mapping of roadway mileage with increased speed limits to county/SCC-specific VMT was discussed above. Table 2 summarizes the State provided data.

Case 3 is similar to Case 1 except that it does not restrict Case 1 speeds exceeding 65 mph to 65 mph. Specifically, rural interstate speeds were modeled at 67 mph. For this case, emission factors were extrapolated beyond the current MOBILE5a limit of 65 mph, as discussed above.

Case 4 is our best estimate of post-speed limit change emissions in that it attempts to include the higher emissions likely to be observed at speeds above the 65 mph maximum allowed by MOBILE5, again using extrapolation to estimate emission factors at speeds above 65 mph.

Case Study

Three urban areas were selected for case study analyses at the metropolitan area level. They are the Dallas-Fort Worth, TX CMSA, the Phoenix-Mesa, AZ MSA, and the Salt Lake City-Ogden, UT MSA. Emissions for the case study were extracted from the county/SCC level inventory generated for the national analysis. As mentioned earlier, roadtype specific changes in the maximum speed limit were reported at the State level. Therefore, the percentage change in emissions by roadtype at the MSA level are identical to changes seen at the State level.

C. RESULTS

National Analysis

Resulting emissions from each of the four cases are summarized nationally by pollutant in Table 3. Table 4, Table 5, and Table 6 summarize Case 1 emissions for VOC, NO_x and CO, respectively at the State level. Case 2 summaries by pollutant and State are presented as Table 7, Table 8, and Table 9, for the same three pollutants. State-level comparisons of Case 1 and Case 2 by pollutant are found in Table 10, Table 11, and Table 12 for VOC, NO_x and CO, respectively. Table 10 shows a 1 percent increase in VOC emissions nationally. Table 11 shows a 2 percent increase in NO_x emissions nationally. The largest increases between Case 1 and Case 2 are seen in CO emissions where nationally a 4 percent increase was observed. These increases are primarily attributed to the large increase in Texas emissions. Texas showed a 5 percent increase in VOC emissions, a thirteen percent increase in NO_x emissions, and a twenty three percent increase in CO emissions. These increases are primarily due to the large percentage of roadway mileage affected by increases in speed limits in Texas. Texas data indicates that speed limit changes have occurred for six roadway types (rural - interstate, other principal arterial; minor arterial, and major collector and urban - interstate, other freeways and expressways, and other principal arterial) and that speed limits on these roadways were increased from 55 mph to 70 mph for the majority of the VMT. Light duty vehicles and heavy duty vehicles contributed equally to the increase in NO_x emissions from Texas. Montana also shows a significant increase in NO_x emissions. In this State, a speed of 75 mph was assumed for roadways with unrestricted speed limits. Any State with high mileage on rural roads that had large speed limit increases would tend to account for a larger share of the nationwide NO_x increase. Obviously, this may not be a concern locally unless specific analyses demonstrate otherwise.

Case 3 emissions are summarized in Table 13, Table 14, and Table 15 for VOC, NO_x and CO, respectively. Similarly, Case 4 emissions are summarized in Table 16, Table 17, and Table 18 for VOC, NO_x and CO, respectively. Table 20, Table 21, and Table 22 show a comparison of Case 3 and Case 4 emissions for VOC, NO_x and CO emissions, respectively. Case 3 and Case 4 represent our best estimate of the changes in emissions that are expected to occur as a result of the recent increase in speed limits. For these cases, maximum roadway speeds were not restricted to 65 mph, as in Case 1 and Case 2. As expected, this comparison shows the largest increase in emissions - 2 percent for VOC, 6 percent for NO_x, and 7 percent for CO nationally. In this comparison several States show increases in NO_x emissions above ten percent, with the largest increases seen in Montana and Texas. As in the Case 1 and Case 2 comparison, the national NO_x emission change is predominantly due to the large increase in emissions from Texas. A commonality found between the majority of the States seeing increases in NO_x emissions above ten percent is that the maximum speed was increased to 75 mph in these States. NO_x emission factors increase rapidly beyond 48 mph, so our linear extrapolation methodology may actually underestimate the increase in NO_x emission factors beyond 65 mph. The largest increase in VOC emissions between Case 3 and Case 4 was seen in Montana where emissions increased by 17 percent, this increase is primarily attributed to increases from light duty vehicle. Some significant CO emission increases were observed in several States with the largest increase being 48 percent in Montana.

Case Study

MSA level comparisons of Case 1 and Case 2 by pollutant are summarized in Table 22, Table 23, and Table 24 for VOC, NO_x, and CO, respectively. Similarly, Table 25, Table 26, and Table 27 compare Case 3 and Case 4 emissions for VOC, NO_x, and CO, respectively. The comparison of Case 1 and Case 2 for the Phoenix-Mesa, AZ MSA shows no change. This is expected given that only rural interstate roadways were affected by speed limit changes in Arizona and that in both cases maximum speeds were limited to 65 mph, producing equivalent emission estimates for both Case 1 and Case 2. Comparing Case 3 and Case 4 for this area does, however, show a change. These changes reflect the increase in speed on rural interstates.

Comparing Case 1 and Case 2 emissions for the Dallas-Fort Worth, TX CMSA shows an increase of 20% in both NO_x and CO emissions. This NO_x increase is slightly higher than the Statewide average due to the relatively large fraction of Urban VMT in this area. Urban activity is modeled with the highest incremental change in speed between

the cases. This large speed delta may be partially inflated given that posted speeds were modeled and that traffic congestion will have a larger impact on lowering average roadway speeds in urban areas than it would in rural areas. The Case 3 and Case 4 comparison for NO_x and CO shows that the incremental increase in NO_x emissions more than doubled when compared to the changes between Case 1 and Case 2, while the CO increases were slightly less than double. These changes follow the trends seen in emission factors. NO_x emission factors increase rapidly with speed starting at 48 mph (EPA, 1994). CO emission factors increase at a higher rate than NO_x but do not start to increase until 55 mph. VOC emissions show an unexpected decrease from Case 1 to Case 2 for the Dallas-Fort Worth, TX CMSA. This decrease in VOC emissions occurs because emission factors representing 65 mph are lower than those representing the base case speeds. This trend is not seen when comparing Case 3 and Case 4, as modeled speeds beyond 65 mph produce emission rates above the base case factors.

Comparing Case 1 and Case 2 for the Salt Lake City-Ogden, UT MSA shows a 3% increase in VOC emissions, a 5% increase in NO_x emissions, and a 12% increase in CO emissions. The Case 3 and Case 4 emissions comparison shows only a slight increase in emissions above those observed for Case 1 versus Case 2. The relatively small change between the Case 1 versus Case 2 summary and the Case 3 versus Case 4 summary is reflective of the relatively low incremental speed increases for Utah. In Utah, only rural interstate speed limits were increased to 75 mph. The other three of the top four functional classes of roadways are limited to 65 mph.

D. IMPLICATIONS

This study shows that actual changes in State maximum speed limits have potentially produced significant increases in highway vehicle NO_x emissions, and, to a lesser extent, CO and VOC emissions, in the 23 States that have raised their speed limits to 70 mph or higher. The most significant increases are in States with a large fraction of rural highways like Texas or Montana. While many western States have few ozone and CO nonattainment areas, and perhaps little concern about 5 to 10 percent increases in motor vehicle emissions, Texas does have some significant nonattainment problems, which may be more difficult to solve with increasing vehicle speeds offsetting the gains obtained through Federal and State control programs. Texas is cited as an example of potential impacts in a State that had significant increases in speed limits.

If States follow EPA's current guidance that VMT that occurs at speeds over 65 mph be modeled as occurring at 65 mph, then estimated increases in NO_x, VOC and CO emissions with speed limit changes will be modest. However, it is likely that the real world emission increases associated with a higher fraction of vehicle travel being above the current MOBILE5 allowed maximum of 65 mph will be higher than estimated using this conservative assumption. The next version of MOBILE (MOBILE6) needs to expand the maximum speed allowed to a value closer to observed maximum freeway speeds. Vehicle emission measurements used to support speed correction factors in this high speed regime need to reflect fully warmed-up, cruise speed conditions.

Note also that recent Insurance Institute for Highway Safety (IIHS) data indicate that raising speed limits increases the average speed and the percentage of cars traveling faster than 70 mph (Griffith, 1996). Research needs to investigate how speed limit increases affect driver behavior, particularly with respect to changes to the distribution of different speeds by roadway type/functional classification. In addition, increases in speed allow motorists to travel further, and can thereby increase total vehicle miles of travel. This can result in long-run relocation of residential, industrial, and commercial activities that further increase VMT (National Academy of Sciences, 1995).

Table 1
Vehicle Speeds by Road Type and Vehicle Type - Case 1

Vehicle Group	Rural						Urban					
	Interstate	Other Principal Arterial	Minor Arterial	Major Collector	Minor Collector	Local	Interstate	Other Freeway and Expressways	Other Principal Arterial	Minor Arterial	Collector	Local
Light Duty Vehicle	65	57	40	35	30	30	59	58	20	20	20	20
Heavy Duty Vehicles	65	57	30	25	25	25	59	58	15	15	15	15

Table 2
Summary of State Provided Roadway Mileage Affected By Increases
in Speed Limits

State	Roadway Type	Old Speed Limit	New Speed Limit	Affected Mileage	Total Mileage
AL	Rural Interstate	65	70	601	601
AZ	Rural Interstate	65	75	872	991
AR	Rural Interstate	65	70	400	400
	Rural Other Principal Art	65	70	225	2190
	Urban Interstate	55	60	119	144
CA	Rural Interstate	65	70	1134	1346
	Rural Other Principal Art	65	70	163	3691
	Urban Interstate	55	65	775	1076
	Urban Other Freeway & Expressway	55	65	1328	1328
CO	Rural Interstate	65	75	768	768
	Rural Other Principal Art	55	65	1699	2200
	Urban Other Freeway & Expressway	55	60	10	217
DE	Rural Other Principal Art	55	65	15	216
	Urban Interstate	55	65	10	40
FL	Rural Interstate	65	70	889	946
	Rural Other Principal Art	65	70	48	3443
	Urban Interstate	55	70	42	526
	Urban Other Freeway & Expressway	55	60	16	389
	Urban Other Freeway & Expressway	55	70	100	389
GA	Rural Interstate	65	70	776	807
	Rural Interstate	55	65	31	807
ID	Rural Interstate	65	75	532	532
IL	Rural Interstate	55	65	250	1528
IA	Rural Interstate	55	65	230	634
KS	Rural Interstate	65	70	698	698
	Rural Other Principal Art	55	70	28	3167
	Urban Interstate	55	70	174	174
	Rural Other Principal Art	55	60	500	3167
MD	Rural Interstate	55	65	227	227
	Urban Interstate	55	65	41	255
	Urban Interstate	55	60	65	255

Table 2 (continued)

State	Roadway Type	Old Speed Limit	New Speed Limit	Affected Mileage	Total Mileage
MA	Rural Interstate	55	65	162	162
	Rural Other Principal Art	55	65	70	318
	Urban Interstate	55	65	275	403
MI	Rural Interstate	65	70	499	740
	Rural Other Principal Art	65	70	86	2753
	Urban Other Freeway & Expressway	55	65	218	218
MS	Rural Interstate	65	70	490	558
	Rural Other Principal Art	55	65	745	1795
	Rural Other Principal Art	65	70	115	1795
	Urban Interstate	65	70	100	127
	Urban Other Freeway & Expressway	55	65	30	41
	Urban Other Freeway & Expressway	55	70	3	41
MO	Rural Interstate	65	70	810	810
	Urban Other Freeway & Expressway	55	65	219	282
	Urban Other Freeway & Expressway	55	60	63	282
MT	Rural Interstate	65	75	1137	1137
	Rural Other Principal Art	65	75	2622	2622
	Urban Interstate	65	75	53	53
NE	Rural Interstate	65	75	430	437
	Rural Interstate	55	65	7	437
	Urban Interstate	55	65	6	43
	Urban Interstate	55	60	36	43
NV	Rural Interstate	65	70	30	480
	Rural Interstate	65	75	400	480
	Rural Other Principal Art	65	70	1392	1392
	Urban Interstate	55	65	35	83
	Urban Interstate	55	70	15	83
	Urban Other Freeway & Expressway	55	65	23	23
NM	Rural Interstate	65	75	700	892
NY	Rural Interstate	55	65	796	796
	Urban Interstate	55	65	7	702
NC	Rural Interstate	65	70	306	631
	Rural Interstate	55	65	45	631
	Rural Interstate	55	60	30	631
ND	Rural Interstate	65	70	530	530
	Rural Other Principal Art	55	65	958	2930
	Urban Interstate	65	70	19	40

Table 2 (continued)

State	Roadway Type	Old Speed Limit	New Speed Limit	Affected Mileage	Total Mileage
OK	Rural Interstate	65	75	721	721
PA	Rural Interstate	55	65	1081	1081
	Urban Interstate	55	65	295	507
RI	Rural Interstate	55	65	21	21
	Urban Interstate	55	65	23	48
SD	Rural Interstate	65	75	629	629
TN	Urban Interstate	55	65	17	323
TX	Rural Interstate	65	70	2203	2203
	Urban Interstate	55	70	497	1031
	Rural Other Principal Art	55	70	6739	6739
	Urban Other Freeway & Expressway	55	70	1240	1240
	Rural Minor Arterial	55	70	9447	9447
	Urban Other Principal Art	55	70	4963	4963
	Rural Major Collector	55	70	777	35723
	Rural Major Collector	55	65	1600	35723
	Rural Major Collector	55	60	1400	35723
UT	Rural Interstate	65	75	759	771
	Rural Other Principal Art	55	65	23	1008
	Urban Interstate	55	65	125	169
	Urban Other Freeway & Expressway	55	65	8	8
WA	Rural Interstate	65	70	501	501
	Rural Other Principal Art	55	70	64	2094
	Rural Other Principal Art	55	65	129	2094
	Rural Other Principal Art	55	60	1097	2094
	Urban Interstate	55	65	30	262
	Urban Interstate	55	60	178	262
	Urban Other Freeway & Expressway	55	60	316	316
WI	Rural Interstate	55	65	40	490
	Rural Other Principal Art	55	65	370	3432
WY	Rural Interstate	65	75	826	826

Table 3
Impact of National Speed Limit Changes on
1995 National Highway Vehicle Emissions

Case	NO_x	VOC	CO
Case 1 (tons/year)	8,911,400	6,233,900	67,243,800
Case 2 (tons/year)	9,104,800	6,305,200	70,132,700
Emission Increase (Case 1 to Case 2)	193,400	71,300	2,888,900
Percent Increase (Case 1 to Case 2)	2%	1%	4%
Case 3 (tons/year)	9,130,800	6,262,500	68,366,000
Case 4 (tons/year)	9,705,700	6,385,100	73,297,400
Emission Increase (Case 3 to Case 4)	574,900	122,600	4,931,400
Percent Increase (Case 3 to Case 4)	6%	2%	7%

Table 4
1995 Case 1 Highway Vehicle VOC Emissions

State Name	VOC (tons/year)		
	Light-Duty Vehicles	Heavy-Duty Vehicles	All Vehicles
Alabama	121,300	14,600	135,900
Alaska	12,900	1,200	14,100
Arizona	75,200	10,800	86,000
Arkansas	59,500	7,500	67,000
California	570,800	62,600	633,400
Colorado	74,000	13,800	87,800
Connecticut	54,800	5,800	60,600
District of Columbia	7,300	800	8,100
Delaware	15,000	1,900	16,900
Florida	308,100	33,400	341,500
Georgia	197,500	22,700	220,200
Hawaii	23,800	2,700	26,500
Idaho	28,700	3,500	32,200
Illinois	223,500	23,500	247,000
Indiana	161,000	18,100	179,100
Iowa	66,900	7,300	74,200
Kansas	57,600	6,400	64,000
Kentucky	94,800	11,600	106,400
Louisiana	94,800	11,800	106,600
Maine	28,800	3,600	32,400
Maryland	91,300	10,300	101,600
Massachusetts	103,000	10,400	113,400
Michigan	226,400	22,300	248,700
Minnesota	107,300	11,300	118,600
Mississippi	70,400	9,500	79,900
Missouri	134,000	14,400	148,400
Montana	22,000	2,500	24,500
Nebraska	39,100	4,400	43,500
Nevada	31,000	4,900	35,900
New Hampshire	23,900	2,800	26,700
New Jersey	131,300	14,200	145,500
New Mexico	49,200	9,400	58,600
New York	262,700	28,000	290,700
North Carolina	177,600	21,000	198,600
North Dakota	17,300	1,800	19,100
Ohio	257,900	26,200	284,100

Table 4 (continued)

State Name	VOC (tons/year)		
	Light-Duty Vehicles	Heavy-Duty Vehicles	All Vehicles
Oklahoma	87,900	10,400	98,300
Oregon	63,400	7,700	71,100
Pennsylvania	235,000	25,700	260,700
Rhode Island	15,900	1,600	17,500
South Carolina	93,100	11,600	104,700
South Dakota	19,100	2,200	21,300
Tennessee	133,300	15,100	148,400
Texas	422,200	47,600	469,800
Utah	48,800	7,600	56,400
Vermont	16,100	1,800	17,900
Virginia	147,400	17,000	164,400
Washington	113,400	11,400	124,800
West Virginia	41,500	5,100	46,600
Wisconsin	122,000	13,800	135,800
Wyoming	16,600	1,900	18,500
Total	5,596,400	637,500	6,233,900

Table 5
1995 Case 1 Highway Vehicle NO_x Emissions

State Name	NO _x (tons/year)		
	Light-Duty Vehicles	Heavy-Duty Vehicles	All Vehicles
Alabama	120,600	63,700	184,300
Alaska	12,500	5,800	18,300
Arizona	85,800	46,100	131,900
Arkansas	65,000	37,200	102,200
California	609,600	274,300	883,900
Colorado	83,900	40,500	124,400
Connecticut	75,700	28,600	104,300
DC	8,200	2,500	10,700
Delaware	17,800	8,100	25,900
Florida	288,500	132,900	421,400
Georgia	209,700	102,100	311,800
Hawaii	18,500	7,800	26,300
Idaho	31,700	18,000	49,700
Illinois	244,300	103,300	347,600
Indiana	166,900	83,100	250,000
Iowa	71,700	38,700	110,400
Kansas	65,300	33,300	98,600
Kentucky	105,600	55,500	161,100
Louisiana	94,000	51,800	145,800
Maine	34,500	19,300	53,800
Maryland	118,800	50,000	168,800
Massachusetts	126,100	45,800	171,900
Michigan	230,400	99,700	330,100
Minnesota	123,200	56,000	179,200
Mississippi	71,600	42,800	114,400
Missouri	154,900	74,100	229,000
Montana	26,700	15,600	42,300
Nebraska	42,300	22,700	65,000
Nevada	31,600	16,000	47,600
New Hampshire	29,600	15,200	44,800
New Jersey	154,800	59,400	214,200
New Mexico	48,700	28,300	77,000
New York	288,700	117,300	406,000
North Carolina	185,300	94,300	279,600
North Dakota	18,600	10,300	28,900
Ohio	266,700	117,100	383,800

Table 5 (continued)

State Name	NO _x (tons/year)		
	Light-Duty Vehicles	Heavy-Duty Vehicles	All Vehicles
Oklahoma	95,300	49,100	144,400
Oregon	79,200	41,200	120,400
Pennsylvania	244,700	114,500	359,200
Rhode Island	18,600	6,600	25,200
South Carolina	96,100	55,400	151,500
South Dakota	22,300	12,900	35,200
Tennessee	142,000	71,200	213,200
Texas	453,500	204,500	658,000
Utah	49,200	22,500	71,700
Vermont	17,600	9,500	27,100
Virginia	178,800	86,300	265,100
Washington	130,300	55,400	185,700
West Virginia	47,100	27,400	74,500
Wisconsin	135,700	67,500	203,200
Wyoming	20,200	11,800	32,000
Total	6,058,400	2,853,000	8,911,400

Table 6
1995 Case 1 Highway Vehicle CO Emissions

State Name	CO (tons/year)		
	Light-Duty Vehicles	Heavy-Duty Vehicles	All Vehicles
Alabama	1,310,900	152,900	1,463,800
Alaska	157,500	13,200	170,700
Arizona	771,200	122,500	893,700
Arkansas	655,400	77,700	733,100
California	5,515,000	591,500	6,106,500
Colorado	954,300	138,700	1,093,000
Connecticut	553,400	56,500	609,900
DC	69,900	8,000	77,900
Delaware	138,600	17,800	156,400
Florida	3,203,800	358,500	3,562,300
Georgia	2,197,300	243,000	2,440,300
Hawaii	216,900	23,300	240,200
Idaho	330,900	37,300	368,200
Illinois	2,360,400	244,100	2,604,500
Indiana	1,821,300	190,600	2,011,900
Iowa	791,200	81,300	872,500
Kansas	686,100	73,000	759,100
Kentucky	1,037,200	119,500	1,156,700
Louisiana	1,009,300	118,600	1,127,900
Maine	327,700	37,400	365,100
Maryland	951,000	105,500	1,056,500
Massachusetts	1,086,500	109,700	1,196,200
Michigan	2,605,100	243,600	2,848,700
Minnesota	1,206,400	122,600	1,329,000
Mississippi	745,200	94,000	839,200
Missouri	1,569,200	163,800	1,733,000
Montana	278,300	29,500	307,800
Nebraska	462,300	49,000	511,300
Nevada	330,800	49,100	379,900
New Hampshire	267,100	29,500	296,600
New Jersey	1,272,500	137,400	1,409,900
New Mexico	613,800	91,300	705,100
New York	2,724,900	279,500	3,004,400
North Carolina	1,949,700	219,100	2,168,800
North Dakota	206,400	20,600	227,000
Ohio	2,949,900	283,100	3,233,000

Table 6 (continued)

State Name	CO (tons/year)		
	Light-Duty Vehicles	Heavy-Duty Vehicles	All Vehicles
Oklahoma	998,100	112,300	1,110,400
Oregon	705,700	82,500	788,200
Pennsylvania	2,538,100	262,500	2,800,600
Rhode Island	160,700	16,500	177,200
South Carolina	1,031,200	119,000	1,150,200
South Dakota	235,500	25,000	260,500
Tennessee	1,502,600	164,100	1,666,700
Texas	4,335,800	491,000	4,826,800
Utah	619,000	76,700	695,700
Vermont	195,700	19,700	215,400
Virginia	1,641,300	183,600	1,824,900
Washington	1,239,000	119,500	1,358,500
West Virginia	488,900	54,300	543,200
Wisconsin	1,377,700	149,000	1,526,700
Wyoming	216,700	22,000	238,700
Total	60,613,400	6,630,400	67,243,800

Table 7
1995 Case 2 Highway Vehicle VOC Emissions

State Name	VOC (tons/year)		
	Light-Duty Vehicles	Heavy-Duty Vehicles	All Vehicles
Alabama	121,300	14,600	135,900
Alaska	12,900	1,200	14,100
Arizona	75,200	10,800	86,000
Arkansas	59,800	7,500	67,300
California	596,300	62,600	658,900
Colorado	75,400	13,800	89,200
Connecticut	54,800	5,800	60,600
District of Columbia	7,300	800	8,100
Delaware	15,200	1,900	17,100
Florida	309,200	33,400	342,600
Georgia	197,500	22,700	220,200
Hawaii	23,800	2,700	26,500
Idaho	28,700	3,500	32,200
Illinois	223,500	23,500	247,000
Indiana	161,000	18,100	179,100
Iowa	66,900	7,300	74,200
Kansas	58,800	6,400	65,200
Kentucky	94,800	11,600	106,400
Louisiana	94,800	11,800	106,600
Maine	28,800	3,600	32,400
Maryland	92,000	10,300	102,300
Massachusetts	106,100	10,400	116,500
Michigan	228,700	22,300	251,000
Minnesota	107,300	11,300	118,600
Mississippi	71,900	9,500	81,400
Missouri	135,100	14,400	149,500
Montana	23,300	2,500	25,800
Nebraska	39,200	4,400	43,600
Nevada	32,200	4,900	37,100
New Hampshire	23,900	2,800	26,700
New Jersey	131,300	14,200	145,500
New Mexico	49,200	9,400	58,600
New York	262,800	28,000	290,800
North Carolina	177,600	21,000	198,600
North Dakota	17,700	1,800	19,500
Ohio	257,900	26,200	284,100

Table 7 (continued)

State Name	VOC (tons/year)		
	Light-Duty Vehicles	Heavy-Duty Vehicles	All Vehicles
Oklahoma	87,900	10,400	98,300
Oregon	63,400	7,700	71,100
Pennsylvania	237,100	25,700	262,800
Rhode Island	16,100	1,600	17,700
South Carolina	93,100	11,600	104,700
South Dakota	19,100	2,200	21,300
Tennessee	133,400	15,100	148,500
Texas	447,700	45,700	493,400
Utah	50,100	7,600	57,700
Vermont	16,100	1,800	17,900
Virginia	147,400	17,000	164,400
Washington	115,300	11,400	126,700
West Virginia	41,500	5,100	46,600
Wisconsin	122,600	13,800	136,400
Wyoming	16,600	1,900	18,500
Total	5,669,600	635,600	6,305,200

Table 8
1995 Case 2 Highway Vehicle NO_x Emissions

State Name	NO _x (tons/year)		
	Light-Duty Vehicles	Heavy-Duty Vehicles	All Vehicles
Alabama	120,600	63,700	184,300
Alaska	12,500	5,800	18,300
Arizona	85,800	46,100	131,900
Arkansas	65,400	37,500	102,900
California	651,200	292,800	944,000
Colorado	85,600	42,200	127,800
Connecticut	75,700	28,600	104,300
DC	8,200	2,500	10,700
Delaware	18,000	8,200	26,200
Florida	290,200	133,600	423,800
Georgia	209,700	102,100	311,800
Hawaii	18,500	7,800	26,300
Idaho	31,700	18,000	49,700
Illinois	244,300	103,300	347,600
Indiana	166,900	83,100	250,000
Iowa	71,700	38,700	110,400
Kansas	66,900	34,000	100,900
Kentucky	105,600	55,500	161,100
Louisiana	94,000	51,800	145,800
Maine	34,500	19,300	53,800
Maryland	119,900	50,400	170,300
Massachusetts	130,800	47,700	178,500
Michigan	233,300	100,700	334,000
Minnesota	123,200	56,000	179,200
Mississippi	73,700	44,400	118,100
Missouri	156,500	74,600	231,100
Montana	28,300	16,900	45,200
Nebraska	42,400	22,700	65,100
Nevada	33,300	17,200	50,500
New Hampshire	29,600	15,200	44,800
New Jersey	154,800	59,400	214,200
New Mexico	48,700	28,300	77,000
New York	288,800	117,300	406,100
North Carolina	185,300	94,300	279,600
North Dakota	19,000	10,600	29,600
Ohio	266,700	117,100	383,800

Table 8 (continued)

State Name	NO _x (tons/year)		
	Light-Duty Vehicles	Heavy-Duty Vehicles	All Vehicles
Oklahoma	95,300	49,100	144,400
Oregon	79,200	41,200	120,400
Pennsylvania	247,700	115,600	363,300
Rhode Island	19,000	6,700	25,700
South Carolina	96,100	55,400	151,500
South Dakota	22,300	12,900	35,200
Tennessee	142,200	71,300	213,500
Texas	505,700	239,500	745,200
Utah	50,800	23,100	73,900
Vermont	17,600	9,500	27,100
Virginia	178,800	86,300	265,100
Washington	133,200	56,700	189,900
West Virginia	47,100	27,400	74,500
Wisconsin	136,400	68,000	204,400
Wyoming	20,200	11,800	32,000
Total	6,182,900	2,921,900	9,104,800

Table 9
1995 Case 2 Highway Vehicle CO Emissions

State Name	CO (tons/year)		
	Light-Duty Vehicles	Heavy-Duty Vehicles	All Vehicles
Alabama	1,310,900	152,900	1,463,800
Alaska	157,500	13,200	170,700
Arizona	771,200	122,500	893,700
Arkansas	668,600	78,100	746,700
California	6,446,800	617,700	7,064,500
Colorado	1,014,400	141,800	1,156,200
Connecticut	553,400	56,500	609,900
DC	69,900	8,000	77,900
Delaware	142,800	18,000	160,800
Florida	3,247,300	359,700	3,607,000
Georgia	2,197,300	243,000	2,440,300
Hawaii	216,900	23,300	240,200
Idaho	330,900	37,300	368,200
Illinois	2,360,400	244,100	2,604,500
Indiana	1,821,300	190,600	2,011,900
Iowa	791,200	81,300	872,500
Kansas	730,400	74,100	804,500
Kentucky	1,037,200	119,500	1,156,700
Louisiana	1,009,300	118,600	1,127,900
Maine	327,700	37,400	365,100
Maryland	972,700	106,100	1,078,800
Massachusetts	1,184,300	112,400	1,296,700
Michigan	2,686,600	245,400	2,932,000
Minnesota	1,206,400	122,600	1,329,000
Mississippi	806,200	96,200	902,400
Missouri	1,610,200	164,700	1,774,900
Montana	324,200	31,200	355,400
Nebraska	466,200	49,000	515,200
Nevada	379,700	51,300	431,000
New Hampshire	267,100	29,500	296,600
New Jersey	1,272,500	137,400	1,409,900
New Mexico	613,800	91,300	705,100
New York	2,726,700	279,500	3,006,200
North Carolina	1,949,700	219,100	2,168,800
North Dakota	219,100	21,000	240,100
Ohio	2,949,900	283,100	3,233,000

Table 9 (continued)

State Name	CO (tons/year)		
	Light-Duty Vehicles	Heavy-Duty Vehicles	All Vehicles
Oklahoma	998,100	112,300	1,110,400
Oregon	705,700	82,500	788,200
Pennsylvania	2,612,600	264,200	2,876,800
Rhode Island	168,900	16,800	185,700
South Carolina	1,031,200	119,000	1,150,200
South Dakota	235,500	25,000	260,500
Tennessee	1,508,000	164,300	1,672,300
Texas	5,402,000	521,700	5,923,700
Utah	672,400	78,200	750,600
Vermont	195,700	19,700	215,400
Virginia	1,641,300	183,600	1,824,900
Washington	1,307,800	121,200	1,429,000
West Virginia	488,900	54,300	543,200
Wisconsin	1,395,300	149,700	1,545,000
Wyoming	216,700	22,000	238,700
Total	63,420,800	6,711,900	70,132,700

Table 10
Comparison of Case 1 and Case 2 Highway Vehicle VOC Emissions

State Name	VOC Emissions (tons/year)		Increase in 1995 VOC Emissions (tons/year)	Percent Increase in Emissions
	Case 1 All Vehicles	Case 2 All Vehicles		
Alabama	135,900	135,900	0	0%
Alaska	14,100	14,100	0	0%
Arizona	86,000	86,000	0	0%
Arkansas	67,000	67,300	300	0%
California	633,400	658,900	25,500	4%
Colorado	87,800	89,200	1,400	2%
Connecticut	60,600	60,600	0	0%
District of Columbia	8,100	8,100	0	0%
Delaware	16,900	17,100	200	1%
Florida	341,500	342,600	1,100	0%
Georgia	220,200	220,200	0	0%
Hawaii	26,500	26,500	0	0%
Idaho	32,200	32,200	0	0%
Illinois	247,000	247,000	0	0%
Indiana	179,100	179,100	0	0%
Iowa	74,200	74,200	0	0%
Kansas	64,000	65,200	1,200	2%
Kentucky	106,400	106,400	0	0%
Louisiana	106,600	106,600	0	0%
Maine	32,400	32,400	0	0%
Maryland	101,600	102,300	700	1%
Massachusetts	113,400	116,500	3,100	3%
Michigan	248,700	251,000	2,300	1%
Minnesota	118,600	118,600	0	0%
Mississippi	79,900	81,400	1,500	2%
Missouri	148,400	149,500	1,100	1%
Montana	24,500	25,800	1,300	5%
Nebraska	43,500	43,600	100	0%
Nevada	35,900	37,100	1,200	3%
New Hampshire	26,700	26,700	0	0%
New Jersey	145,500	145,500	0	0%
New Mexico	58,600	58,600	0	0%
New York	290,700	290,800	100	0%
North Carolina	198,600	198,600	0	0%
North Dakota	19,100	19,500	400	2%
Ohio	284,100	284,100	0	0%

Table 10 (continued)

State Name	VOC Emissions (tons/year)		Increase in 1995 VOC Emissions (tons/year)	Percent Increase in Emissions
	Case 1 All Vehicles	Case 2 All Vehicles		
Oklahoma	98,300	98,300	0	0%
Oregon	71,100	71,100	0	0%
Pennsylvania	260,700	262,800	2,100	1%
Rhode Island	17,500	17,700	200	1%
South Carolina	104,700	104,700	0	0%
South Dakota	21,300	21,300	0	0%
Tennessee	148,400	148,500	100	0%
Texas	469,800	493,400	23,600	5%
Utah	56,400	57,700	1,300	2%
Vermont	17,900	17,900	0	0%
Virginia	164,400	164,400	0	0%
Washington	124,800	126,700	1,900	2%
West Virginia	46,600	46,600	0	0%
Wisconsin	135,800	136,400	600	0%
Wyoming	18,500	18,500	0	0%
Total	6,233,900	6,305,200	71,300	1%

Table 11
Comparison of Case 1 and Case 2 Highway Vehicle NO_x Emissions

State Name	NO _x Emissions (tons/year)		Increase in 1995 NO _x Emissions (tons/year)	Percent Increase in Emissions
	Case 1 All Vehicles	Case 2 All Vehicles		
Alabama	184,300	184,300	0	0%
Alaska	18,300	18,300	0	0%
Arizona	131,900	131,900	0	0%
Arkansas	102,200	102,900	700	1%
California	883,900	944,000	60,100	7%
Colorado	124,400	127,800	3,400	3%
Connecticut	104,300	104,300	0	0%
DC	10,700	10,700	0	0%
Delaware	25,900	26,200	300	1%
Florida	421,400	423,800	2,400	1%
Georgia	311,800	311,800	0	0%
Hawaii	26,300	26,300	0	0%
Idaho	49,700	49,700	0	0%
Illinois	347,600	347,600	0	0%
Indiana	250,000	250,000	0	0%
Iowa	110,400	110,400	0	0%
Kansas	98,600	100,900	2,300	2%
Kentucky	161,100	161,100	0	0%
Louisiana	145,800	145,800	0	0%
Maine	53,800	53,800	0	0%
Maryland	168,800	170,300	1,500	1%
Massachusetts	171,900	178,500	6,600	4%
Michigan	330,100	334,000	3,900	1%
Minnesota	179,200	179,200	0	0%
Mississippi	114,400	118,100	3,700	3%
Missouri	229,000	231,100	2,100	1%
Montana	42,300	45,200	2,900	7%
Nebraska	65,000	65,100	100	0%
Nevada	47,600	50,500	2,900	6%
New Hampshire	44,800	44,800	0	0%
New Jersey	214,200	214,200	0	0%
New Mexico	77,000	77,000	0	0%
New York	406,000	406,100	100	0%
North Carolina	279,600	279,600	0	0%
North Dakota	28,900	29,600	700	2%
Ohio	383,800	383,800	0	0%

Table 11 (continued)

State Name	NO _x Emissions (tons/year)		Increase in 1995 NO _x Emissions (tons/year)	Percent Increase in Emissions
	Case 1 All Vehicles	Case 2 All Vehicles		
Oklahoma	144,400	144,400	0	0%
Oregon	120,400	120,400	0	0%
Pennsylvania	359,200	363,300	4,100	1%
Rhode Island	25,200	25,700	500	2%
South Carolina	151,500	151,500	0	0%
South Dakota	35,200	35,200	0	0%
Tennessee	213,200	213,500	300	0%
Texas	658,000	745,200	87,200	13%
Utah	71,700	73,900	2,200	3%
Vermont	27,100	27,100	0	0%
Virginia	265,100	265,100	0	0%
Washington	185,700	189,900	4,200	2%
West Virginia	74,500	74,500	0	0%
Wisconsin	203,200	204,400	1,200	1%
Wyoming	32,000	32,000	0	0%
Total	8,911,400	9,104,800	193,400	2%

Table 12
Comparison of Case 1 and Case 2 Highway Vehicle CO Emissions

State Name	CO Emissions (tons/year)		Increase in 1995 CO Emissions (tons/year)	Percent Increase in Emissions
	Case 1 All Vehicles	Case 2 All Vehicles		
Alabama	1,463,800	1,463,800	0	0%
Alaska	170,700	170,700	0	0%
Arizona	893,700	893,700	0	0%
Arkansas	733,100	746,700	13,600	2%
California	6,106,500	7,064,500	958,000	16%
Colorado	1,093,000	1,156,200	63,200	6%
Connecticut	609,900	609,900	0	0%
DC	77,900	77,900	0	0%
Delaware	156,400	160,800	4,400	3%
Florida	3,562,300	3,607,000	44,700	1%
Georgia	2,440,300	2,440,300	0	0%
Hawaii	240,200	240,200	0	0%
Idaho	368,200	368,200	0	0%
Illinois	2,604,500	2,604,500	0	0%
Indiana	2,011,900	2,011,900	0	0%
Iowa	872,500	872,500	0	0%
Kansas	759,100	804,500	45,400	6%
Kentucky	1,156,700	1,156,700	0	0%
Louisiana	1,127,900	1,127,900	0	0%
Maine	365,100	365,100	0	0%
Maryland	1,056,500	1,078,800	22,300	2%
Massachusetts	1,196,200	1,296,700	100,500	8%
Michigan	2,848,700	2,932,000	83,300	3%
Minnesota	1,329,000	1,329,000	0	0%
Mississippi	839,200	902,400	63,200	8%
Missouri	1,733,000	1,774,900	41,900	2%
Montana	307,800	355,400	47,600	15%
Nebraska	511,300	515,200	3,900	1%
Nevada	379,900	431,000	51,100	13%
New Hampshire	296,600	296,600	0	0%
New Jersey	1,409,900	1,409,900	0	0%
New Mexico	705,100	705,100	0	0%
New York	3,004,400	3,006,200	1,800	0%
North Carolina	2,168,800	2,168,800	0	0%
North Dakota	227,000	240,100	13,100	6%
Ohio	3,233,000	3,233,000	0	0%

Table 12 (continued)

State Name	CO Emissions (tons/year)		Increase in 1995 CO Emissions (tons/year)	Percent Increase in Emissions
	Case 1 All Vehicles	Case 2 All Vehicles		
Oklahoma	1,110,400	1,110,400	0	0%
Oregon	788,200	788,200	0	0%
Pennsylvania	2,800,600	2,876,800	76,200	3%
Rhode Island	177,200	185,700	8,500	5%
South Carolina	1,150,200	1,150,200	0	0%
South Dakota	260,500	260,500	0	0%
Tennessee	1,666,700	1,672,300	5,600	0%
Texas	4,826,800	5,923,700	1,096,900	23%
Utah	695,700	750,600	54,900	8%
Vermont	215,400	215,400	0	0%
Virginia	1,824,900	1,824,900	0	0%
Washington	1,358,500	1,429,000	70,500	5%
West Virginia	543,200	543,200	0	0%
Wisconsin	1,526,700	1,545,000	18,300	1%
Wyoming	238,700	238,700	0	0%
Total	67,243,800	70,132,700	2,888,900	4%

Table 13
1995 Case 3 Highway Vehicle VOC Emissions

State Name	VOC (tons/year)		
	Light-Duty Vehicles	Heavy-Duty Vehicles	All Vehicles
Alabama	122,000	14,600	136,600
Alaska	13,000	1,200	14,200
Arizona	75,800	10,800	86,600
Arkansas	59,900	7,500	67,400
California	572,200	62,600	634,800
Colorado	74,600	13,800	88,400
Connecticut	54,900	5,800	60,700
District of Columbia	7,300	800	8,100
Delaware	15,000	1,900	16,900
Florida	309,200	33,400	342,600
Georgia	198,600	22,700	221,300
Hawaii	23,800	2,700	26,500
Idaho	29,000	3,500	32,500
Illinois	224,700	23,500	248,200
Indiana	162,100	18,000	180,100
Iowa	67,500	7,300	74,800
Kansas	58,000	6,400	64,400
Kentucky	95,500	11,600	107,100
Louisiana	95,400	11,800	107,200
Maine	29,100	3,600	32,700
Maryland	91,700	10,300	102,000
Massachusetts	103,200	10,400	113,600
Michigan	227,400	22,200	249,600
Minnesota	107,900	11,300	119,200
Mississippi	70,800	9,500	80,300
Missouri	134,800	14,400	149,200
Montana	22,300	2,500	24,800
Nebraska	39,400	4,400	43,800
Nevada	31,200	4,900	36,100
New Hampshire	24,100	2,800	26,900
New Jersey	131,500	14,200	145,700
New Mexico	49,700	9,400	59,100
New York	263,500	28,000	291,500
North Carolina	178,400	21,000	199,400
North Dakota	17,500	1,800	19,300
Ohio	259,100	26,200	285,300

Table 13 (continued)

State Name	VOC (tons/year)		
	Light-Duty Vehicles	Heavy-Duty Vehicles	All Vehicles
Oklahoma	88,400	10,400	98,800
Oregon	63,900	7,700	71,600
Pennsylvania	236,100	25,700	261,800
Rhode Island	15,900	1,600	17,500
South Carolina	94,000	11,600	105,600
South Dakota	19,300	2,200	21,500
Tennessee	134,300	15,100	149,400
Texas	423,800	47,600	471,400
Utah	49,200	7,600	56,800
Vermont	16,200	1,800	18,000
Virginia	148,500	17,000	165,500
Washington	113,900	11,400	125,300
West Virginia	41,900	5,100	47,000
Wisconsin	122,800	13,800	136,600
Wyoming	16,900	1,900	18,800
Total	5,625,200	637,300	6,262,500

Table 14
1995 Case 3 Highway Vehicle NO_x Emissions

State Name	NO _x (tons/year)		
	Light-Duty Vehicles	Heavy-Duty Vehicles	All Vehicles
Alabama	123,000	66,200	189,200
Alaska	12,900	6,200	19,100
Arizona	88,300	48,800	137,100
Arkansas	66,600	38,900	105,500
California	615,700	281,400	897,100
Colorado	85,700	42,400	128,100
Connecticut	76,500	29,300	105,800
DC	8,200	2,500	10,700
Delaware	17,800	8,100	25,900
Florida	293,200	137,900	431,100
Georgia	214,000	106,500	320,500
Hawaii	18,500	7,800	26,300
Idaho	32,700	18,900	51,600
Illinois	248,700	107,700	356,400
Indiana	170,800	87,000	257,800
Iowa	73,600	40,600	114,200
Kansas	66,700	34,700	101,400
Kentucky	108,200	58,100	166,300
Louisiana	96,600	54,500	151,100
Maine	35,400	20,200	55,600
Maryland	120,400	51,500	171,900
Massachusetts	127,300	46,900	174,200
Michigan	233,600	102,900	336,500
Minnesota	124,900	57,800	182,700
Mississippi	73,200	44,600	117,800
Missouri	157,900	77,100	235,000
Montana	27,700	16,600	44,300
Nebraska	43,400	23,700	67,100
Nevada	32,300	16,800	49,100
New Hampshire	30,400	15,900	46,300
New Jersey	155,900	60,500	216,400
New Mexico	50,400	30,100	80,500
New York	291,600	120,100	411,700
North Carolina	188,600	97,600	286,200
North Dakota	19,100	10,800	29,900
Ohio	271,000	121,500	392,500

Table 14 (continued)

State Name	NO _x (tons/year)		
	Light-Duty Vehicles	Heavy-Duty Vehicles	All Vehicles
Oklahoma	97,400	51,200	148,600
Oregon	81,200	43,200	124,400
Pennsylvania	248,700	118,500	367,200
Rhode Island	18,800	6,700	25,500
South Carolina	99,300	58,800	158,100
South Dakota	23,100	13,700	36,800
Tennessee	145,700	75,000	220,700
Texas	460,000	211,200	671,200
Utah	50,400	23,700	74,100
Vermont	18,100	10,000	28,100
Virginia	182,900	90,500	273,400
Washington	132,400	57,500	189,900
West Virginia	48,800	29,000	77,800
Wisconsin	138,200	69,900	208,100
Wyoming	21,200	12,800	34,000
Total	6,167,000	2,963,800	9,130,800

Table 15
1995 Case 3 Highway Vehicle CO Emissions

State Name	CO (tons/year)		
	Light-Duty Vehicles	Heavy-Duty Vehicles	All Vehicles
Alabama	1,334,900	153,900	1,488,800
Alaska	162,500	13,300	175,800
Arizona	792,800	123,600	916,400
Arkansas	671,800	78,300	750,100
California	5,564,500	593,800	6,158,300
Colorado	978,800	139,900	1,118,700
Connecticut	558,400	56,700	615,100
DC	69,900	8,000	77,900
Delaware	138,600	17,800	156,400
Florida	3,248,600	360,400	3,609,000
Georgia	2,238,900	244,700	2,483,600
Hawaii	216,900	23,300	240,200
Idaho	340,100	37,700	377,800
Illinois	2,404,700	245,700	2,650,400
Indiana	1,861,700	192,000	2,053,700
Iowa	812,400	82,100	894,500
Kansas	700,400	73,600	774,000
Kentucky	1,062,300	120,500	1,182,800
Louisiana	1,034,800	119,600	1,154,400
Maine	336,700	37,700	374,400
Maryland	963,800	106,100	1,069,900
Massachusetts	1,095,100	110,100	1,205,200
Michigan	2,639,400	244,800	2,884,200
Minnesota	1,225,800	123,300	1,349,100
Mississippi	761,800	94,600	856,400
Missouri	1,599,100	164,900	1,764,000
Montana	289,100	29,900	319,000
Nebraska	473,900	49,400	523,300
Nevada	340,200	49,600	389,800
New Hampshire	274,000	29,800	303,800
New Jersey	1,279,900	137,700	1,417,600
New Mexico	637,400	92,400	729,800
New York	2,753,800	280,500	3,034,300
North Carolina	1,981,900	220,300	2,202,200
North Dakota	212,800	20,800	233,600
Ohio	2,995,900	284,700	3,280,600

Table 15 (continued)

State Name	CO (tons/year)		
	Light-Duty Vehicles	Heavy-Duty Vehicles	All Vehicles
Oklahoma	1,018,300	113,100	1,131,400
Oregon	723,000	83,200	806,200
Pennsylvania	2,578,800	263,900	2,842,700
Rhode Island	161,700	16,600	178,300
South Carolina	1,064,200	120,300	1,184,500
South Dakota	244,500	25,300	269,800
Tennessee	1,539,800	165,600	1,705,400
Texas	4,396,800	493,500	4,890,300
Utah	636,100	77,500	713,600
Vermont	201,800	19,900	221,700
Virginia	1,680,400	185,100	1,865,500
Washington	1,258,300	120,200	1,378,500
West Virginia	506,000	54,900	560,900
Wisconsin	1,402,800	149,900	1,552,700
Wyoming	227,100	22,300	249,400
Total	61,693,200	6,672,800	68,366,000

Table 16
1995 Case 4 Highway Vehicle VOC Emissions

State Name	VOC (tons/year)		
	Light-Duty Vehicles	Heavy-Duty Vehicles	All Vehicles
Alabama	122,900	14,600	137,500
Alaska	13,000	1,200	14,200
Arizona	77,700	10,800	88,500
Arkansas	61,000	7,500	68,500
California	599,500	62,500	662,000
Colorado	78,400	13,800	92,200
Connecticut	54,900	5,800	60,700
District of Columbia	7,300	800	8,100
Delaware	15,200	1,900	17,100
Florida	312,700	33,400	346,100
Georgia	200,200	22,700	222,900
Hawaii	23,800	2,700	26,500
Idaho	30,000	3,500	33,500
Illinois	224,700	23,500	248,200
Indiana	162,100	18,000	180,100
Iowa	67,500	7,300	74,800
Kansas	60,700	6,400	67,100
Kentucky	95,500	11,600	107,100
Louisiana	95,400	11,800	107,200
Maine	29,100	3,600	32,700
Maryland	92,300	10,300	102,600
Massachusetts	106,300	10,400	116,700
Michigan	230,700	22,200	252,900
Minnesota	107,900	11,300	119,200
Mississippi	73,400	9,500	82,900
Missouri	137,100	14,400	151,500
Montana	26,500	2,500	29,000
Nebraska	40,800	4,400	45,200
Nevada	33,600	4,900	38,500
New Hampshire	24,100	2,800	26,900
New Jersey	131,500	14,200	145,700
New Mexico	51,400	9,400	60,800
New York	263,600	28,000	291,600
North Carolina	179,100	21,000	200,100
North Dakota	18,200	1,800	20,000
Ohio	259,100	26,200	285,300

Table 16 (continued)

State Name	VOC (tons/year)		
	Light-Duty Vehicles	Heavy-Duty Vehicles	All Vehicles
Oklahoma	90,600	10,300	100,900
Oregon	63,900	7,700	71,600
Pennsylvania	238,200	25,700	263,900
Rhode Island	16,200	1,600	17,800
South Carolina	94,000	11,600	105,600
South Dakota	20,300	2,200	22,500
Tennessee	134,400	15,100	149,500
Texas	468,500	45,600	514,100
Utah	52,100	7,600	59,700
Vermont	16,200	1,800	18,000
Virginia	148,500	17,000	165,500
Washington	116,700	11,400	128,100
West Virginia	41,900	5,100	47,000
Wisconsin	123,300	13,800	137,100
Wyoming	18,100	1,800	19,900
Total	5,750,100	635,000	6,385,100

Table 17
1995 Case 4 Highway Vehicle NO_x Emissions

State Name	NO _x (tons/year)		
	Light-Duty Vehicles	Heavy-Duty Vehicles	All Vehicles
Alabama	126,700	70,000	196,700
Alaska	12,900	6,200	19,100
Arizona	97,100	58,000	155,100
Arkansas	70,000	42,200	112,200
California	665,900	309,700	975,600
Colorado	94,900	51,700	146,600
Connecticut	76,500	29,300	105,800
DC	8,200	2,500	10,700
Delaware	18,000	8,200	26,200
Florida	305,000	147,100	452,100
Georgia	220,200	112,900	333,100
Hawaii	18,500	7,800	26,300
Idaho	36,300	22,500	58,800
Illinois	248,700	107,700	356,400
Indiana	170,800	87,000	257,800
Iowa	73,600	40,600	114,200
Kansas	73,600	38,800	112,400
Kentucky	108,200	58,100	166,300
Louisiana	96,600	54,500	151,100
Maine	35,400	20,200	55,600
Maryland	121,500	51,900	173,400
Massachusetts	132,100	48,800	180,900
Michigan	240,100	107,500	347,600
Minnesota	124,900	57,800	182,700
Mississippi	79,500	49,400	128,900
Missouri	163,900	82,100	246,000
Montana	39,000	27,100	66,100
Nebraska	47,800	28,100	75,900
Nevada	38,400	22,400	60,800
New Hampshire	30,400	15,900	46,300
New Jersey	155,900	60,500	216,400
New Mexico	55,700	35,800	91,500
New York	291,700	120,200	411,900
North Carolina	191,000	100,000	291,000
North Dakota	20,500	12,000	32,500
Ohio	271,000	121,500	392,500

Table 17 (continued)

State Name	NO _x (tons/year)		
	Light-Duty Vehicles	Heavy-Duty Vehicles	All Vehicles
Oklahoma	105,700	59,600	165,300
Oregon	81,200	43,200	124,400
Pennsylvania	251,700	119,600	371,300
Rhode Island	19,200	6,900	26,100
South Carolina	99,300	58,800	158,100
South Dakota	26,300	17,000	43,300
Tennessee	145,900	75,100	221,000
Texas	596,000	306,900	902,900
Utah	56,900	29,300	86,200
Vermont	18,100	10,000	28,100
Virginia	182,900	90,500	273,400
Washington	138,500	62,000	200,500
West Virginia	48,800	29,000	77,800
Wisconsin	138,800	70,400	209,200
Wyoming	25,000	16,600	41,600
Total	6,494,800	3,210,900	9,705,700

Table 18
1995 Case 4 Highway Vehicle CO Emissions

State Name	CO (tons/year)		
	Light-Duty Vehicles	Heavy-Duty Vehicles	All Vehicles
Alabama	1,370,900	155,300	1,526,200
Alaska	162,500	13,300	175,800
Arizona	868,900	127,300	996,200
Arkansas	714,900	79,900	794,800
California	6,564,700	623,000	7,187,700
Colorado	1,136,900	147,400	1,284,300
Connecticut	558,400	56,700	615,100
DC	69,900	8,000	77,900
Delaware	142,800	18,000	160,800
Florida	3,387,200	365,100	3,752,300
Georgia	2,298,900	247,100	2,546,000
Hawaii	216,900	23,300	240,200
Idaho	377,000	39,000	416,000
Illinois	2,404,700	245,700	2,650,400
Indiana	1,861,700	192,000	2,053,700
Iowa	812,400	82,100	894,500
Kansas	799,300	76,000	875,300
Kentucky	1,062,300	120,500	1,182,800
Louisiana	1,034,800	119,600	1,154,400
Maine	336,700	37,700	374,400
Maryland	985,400	106,700	1,092,100
Massachusetts	1,192,800	112,800	1,305,600
Michigan	2,758,500	247,900	3,006,400
Minnesota	1,225,800	123,300	1,349,100
Mississippi	864,200	98,200	962,400
Missouri	1,684,900	167,500	1,852,400
Montana	436,800	35,000	471,800
Nebraska	523,300	51,100	574,400
Nevada	441,700	54,400	496,100
New Hampshire	274,000	29,800	303,800
New Jersey	1,279,900	137,700	1,417,600
New Mexico	711,500	95,800	807,300
New York	2,755,600	280,600	3,036,200
North Carolina	2,005,300	221,200	2,226,500
North Dakota	236,600	21,500	258,100
Ohio	2,995,900	284,700	3,280,600

Table 18 (continued)

State Name	CO (tons/year)		
	Light-Duty Vehicles	Heavy-Duty Vehicles	All Vehicles
Oklahoma	1,099,100	116,300	1,215,400
Oregon	723,000	83,200	806,200
Pennsylvania	2,653,300	265,700	2,919,000
Rhode Island	169,900	16,800	186,700
South Carolina	1,064,200	120,300	1,184,500
South Dakota	280,500	26,500	307,000
Tennessee	1,545,200	165,700	1,710,900
Texas	6,188,600	548,600	6,737,200
Utah	757,000	82,000	839,000
Vermont	201,800	19,900	221,700
Virginia	1,680,400	185,100	1,865,500
Washington	1,357,700	123,100	1,480,800
West Virginia	506,000	54,900	560,900
Wisconsin	1,420,400	150,600	1,571,000
Wyoming	268,700	23,700	292,400
Total	66,469,800	6,827,600	73,297,400

Table 19
Comparison of Case 3 and Case 4 Highway Vehicle VOC Emissions

State Name	VOC Emissions (tons/year) Increase in 1995			Percent Increase in Emissions
	Case 3 All Vehicles	Case 4 All Vehicles	VOC Emissions (tons/year)	
Alabama	136,600	137,500	900	1%
Alaska	14,200	14,200	0	0%
Arizona	86,600	88,500	1,900	2%
Arkansas	67,400	68,500	1,100	2%
California	634,800	662,000	27,200	4%
Colorado	88,400	92,200	3,800	4%
Connecticut	60,700	60,700	0	0%
District of Columbia	8,100	8,100	0	0%
Delaware	16,900	17,100	200	1%
Florida	342,600	346,100	3,500	1%
Georgia	221,300	222,900	1,600	1%
Hawaii	26,500	26,500	0	0%
Idaho	32,500	33,500	1,000	3%
Illinois	248,200	248,200	0	0%
Indiana	180,100	180,100	0	0%
Iowa	74,800	74,800	0	0%
Kansas	64,400	67,100	2,700	4%
Kentucky	107,100	107,100	0	0%
Louisiana	107,200	107,200	0	0%
Maine	32,700	32,700	0	0%
Maryland	102,000	102,600	600	1%
Massachusetts	113,600	116,700	3,100	3%
Michigan	249,600	252,900	3,300	1%
Minnesota	119,200	119,200	0	0%
Mississippi	80,300	82,900	2,600	3%
Missouri	149,200	151,500	2,300	2%
Montana	24,800	29,000	4,200	17%
Nebraska	43,800	45,200	1,400	3%
Nevada	36,100	38,500	2,400	7%
New Hampshire	26,900	26,900	0	0%
New Jersey	145,700	145,700	0	0%
New Mexico	59,100	60,800	1,700	3%
New York	291,500	291,600	100	0%
North Carolina	199,400	200,100	700	0%
North Dakota	19,300	20,000	700	4%
Ohio	285,300	285,300	0	0%

Table 19 (continued)

State Name	VOC Emissions (tons/year) Increase in 1995			Percent Increase in Emissions
	Case 3 All Vehicles	Case 4 All Vehicles	VOC Emissions (tons/year)	
Oklahoma	98,800	100,900	2,100	2%
Oregon	71,600	71,600	0	0%
Pennsylvania	261,800	263,900	2,100	1%
Rhode Island	17,500	17,800	300	2%
South Carolina	105,600	105,600	0	0%
South Dakota	21,500	22,500	1,000	5%
Tennessee	149,400	149,500	100	0%
Texas	471,400	514,100	42,700	9%
Utah	56,800	59,700	2,900	5%
Vermont	18,000	18,000	0	0%
Virginia	165,500	165,500	0	0%
Washington	125,300	128,100	2,800	2%
West Virginia	47,000	47,000	0	0%
Wisconsin	136,600	137,100	500	0%
Wyoming	18,800	19,900	1,100	6%
Total	6,262,500	6,385,100	122,600	2%

Table 20
Comparison of Case 3 and Case 4 Highway Vehicle NO_x Emissions

State Name	NO _x Emissions (tons/year)		Increase in 1995 NO _x Emissions (tons/year)	Percent Increase in Emissions
	Case 3 All Vehicles	Case 4 All Vehicles		
Alabama	189,200	196,700	7,500	4%
Alaska	19,100	19,100	0	0%
Arizona	137,100	155,100	18,000	13%
Arkansas	105,500	112,200	6,700	6%
California	897,100	975,600	78,500	9%
Colorado	128,100	146,600	18,500	14%
Connecticut	105,800	105,800	0	0%
DC	10,700	10,700	0	0%
Delaware	25,900	26,200	300	1%
Florida	431,100	452,100	21,000	5%
Georgia	320,500	333,100	12,600	4%
Hawaii	26,300	26,300	0	0%
Idaho	51,600	58,800	7,200	14%
Illinois	356,400	356,400	0	0%
Indiana	257,800	257,800	0	0%
Iowa	114,200	114,200	0	0%
Kansas	101,400	112,400	11,000	11%
Kentucky	166,300	166,300	0	0%
Louisiana	151,100	151,100	0	0%
Maine	55,600	55,600	0	0%
Maryland	171,900	173,400	1,500	1%
Massachusetts	174,200	180,900	6,700	4%
Michigan	336,500	347,600	11,100	3%
Minnesota	182,700	182,700	0	0%
Mississippi	117,800	128,900	11,100	9%
Missouri	235,000	246,000	11,000	5%
Montana	44,300	66,100	21,800	49%
Nebraska	67,100	75,900	8,800	13%
Nevada	49,100	60,800	11,700	24%
New Hampshire	46,300	46,300	0	0%
New Jersey	216,400	216,400	0	0%
New Mexico	80,500	91,500	11,000	14%
New York	411,700	411,900	200	0%
North Carolina	286,200	291,000	4,800	2%
North Dakota	29,900	32,500	2,600	9%
Ohio	392,500	392,500	0	0%

Table 20 (continued)

State Name	NO _x Emissions (tons/year)		Increase in 1995 NO _x Emissions (tons/year)	Percent Increase in Emissions
	Case 3 All Vehicles	Case 4 All Vehicles		
Oklahoma	148,600	165,300	16,700	11%
Oregon	124,400	124,400	0	0%
Pennsylvania	367,200	371,300	4,100	1%
Rhode Island	25,500	26,100	600	2%
South Carolina	158,100	158,100	0	0%
South Dakota	36,800	43,300	6,500	18%
Tennessee	220,700	221,000	300	0%
Texas	671,200	902,900	231,700	35%
Utah	74,100	86,200	12,100	16%
Vermont	28,100	28,100	0	0%
Virginia	273,400	273,400	0	0%
Washington	189,900	200,500	10,600	6%
West Virginia	77,800	77,800	0	0%
Wisconsin	208,100	209,200	1,100	1%
Wyoming	34,000	41,600	7,600	22%
Total	9,130,800	9,705,700	574,900	6%

Table 21
Comparison of Case 3 and Case 4 Highway Vehicle CO Emissions

State Name	CO Emissions (tons/year)		Increase in 1995 CO Emissions (tons/year)	Percent Increase in Emissions
	Case 3 All Vehicles	Case 4 All Vehicles		
Alabama	1,488,800	1,526,200	37,400	3%
Alaska	175,800	175,800	0	0%
Arizona	916,400	996,200	79,800	9%
Arkansas	750,100	794,800	44,700	6%
California	6,158,300	7,187,700	1,029,400	17%
Colorado	1,118,700	1,284,300	165,600	15%
Connecticut	615,100	615,100	0	0%
DC	77,900	77,900	0	0%
Delaware	156,400	160,800	4,400	3%
Florida	3,609,000	3,752,300	143,300	4%
Georgia	2,483,600	2,546,000	62,400	3%
Hawaii	240,200	240,200	0	0%
Idaho	377,800	416,000	38,200	10%
Illinois	2,650,400	2,650,400	0	0%
Indiana	2,053,700	2,053,700	0	0%
Iowa	894,500	894,500	0	0%
Kansas	774,000	875,300	101,300	13%
Kentucky	1,182,800	1,182,800	0	0%
Louisiana	1,154,400	1,154,400	0	0%
Maine	374,400	374,400	0	0%
Maryland	1,069,900	1,092,100	22,200	2%
Massachusetts	1,205,200	1,305,600	100,400	8%
Michigan	2,884,200	3,006,400	122,200	4%
Minnesota	1,349,100	1,349,100	0	0%
Mississippi	856,400	962,400	106,000	12%
Missouri	1,764,000	1,852,400	88,400	5%
Montana	319,000	471,800	152,800	48%
Nebraska	523,300	574,400	51,100	10%
Nevada	389,800	496,100	106,300	27%
New Hampshire	303,800	303,800	0	0%
New Jersey	1,417,600	1,417,600	0	0%
New Mexico	729,800	807,300	77,500	11%
New York	3,034,300	3,036,200	1,900	0%
North Carolina	2,202,200	2,226,500	24,300	1%
North Dakota	233,600	258,100	24,500	10%
Ohio	3,280,600	3,280,600	0	0%
Oklahoma	1,131,400	1,215,400	84,000	7%
Oregon	806,200	806,200	0	0%
Pennsylvania	2,842,700	2,919,000	76,300	3%

Table 21 (continued)

State Name	CO Emissions (tons/year)		Increase in 1995 CO Emissions (tons/year)	Percent Increase in Emissions
	Case 3 All Vehicles	Case 4 All Vehicles		
Rhode Island	178,300	186,700	8,400	5%
South Carolina	1,184,500	1,184,500	0	0%
South Dakota	269,800	307,000	37,200	14%
Tennessee	1,705,400	1,710,900	5,500	0%
Texas	4,890,300	6,737,200	1,846,900	38%
Utah	713,600	839,000	125,400	18%
Vermont	221,700	221,700	0	0%
Virginia	1,865,500	1,865,500	0	0%
Washington	1,378,500	1,480,800	102,300	7%
West Virginia	560,900	560,900	0	0%
Wisconsin	1,552,700	1,571,000	18,300	1%
Wyoming	249,400	292,400	43,000	17%
Total	68,366,000	73,297,400	4,931,400	7%

Table 22
Comparison of Case 1 and Case 2 Highway Vehicle VOC Emissions

MSA Name	VOC Emissions (tons/year)		Increase in 1995 VOC Emissions (tons/year)	Percent Increase in Emissions
	Case 1 All Vehicles	Case 2 All Vehicles		
Dallas-Fort Worth, TX	95,400	92,800	-2,600	-3%
Phoenix-Mesa, AZ	42,300	42,300	0	0%
Salt Lake City-Ogden, UT	27,700	28,600	900	3%

Table 23
Comparison of Case 1 and Case 2 Highway Vehicle NO_x Emissions

MSA Name	NO _x Emissions (tons/year)		Increase in 1995 NO _x Emissions (tons/year)	Percent Increase in Emissions
	Case 1 All Vehicles	Case 2 All Vehicles		
Dallas-Fort Worth, TX	134,600	161,400	26,800	20%
Phoenix-Mesa, AZ	60,900	60,900	0	0%
Salt Lake City-Ogden, UT	29,400	31,000	1,600	5%

Table 24
Comparison of Case 1 and Case 2 Highway Vehicle CO Emissions

MSA Name	CO Emissions (tons/year)		Increase in 1995 CO Emissions (tons/year)	Percent Increase in Emissions
	Case 1 All Vehicles	Case 2 All Vehicles		
Dallas-Fort Worth, TX	904,900	1,088,500	183,600	20%
Phoenix-Mesa, AZ	401,700	401,700	0	0%
Salt Lake City-Ogden, UT	319,500	357,700	38,200	12%

Table 25
Comparison of Case 3 and Case 4 Highway Vehicle VOC Emissions

MSA Name	VOC Emissions (tons/year)		Increase in 1995 VOC Emissions (tons/year)	Percent Increase in Emissions
	Case 3 All Vehicles	Case 4 All Vehicles		
Dallas-Fort Worth, TX	95,600	97,800	2,200	2%
Phoenix-Mesa, AZ	42,400	42,900	500	1%
Salt Lake City-Ogden, UT	27,700	28,700	1,000	4%

Table 26
Comparison of Case 3 and Case 4 Highway Vehicle NO_x Emissions

MSA Name	NO _x Emissions (tons/year)		Increase in 1995 NO _x Emissions (tons/year)	Percent Increase in Emissions
	Case 3 All Vehicles	Case 4 All Vehicles		
Dallas-Fort Worth, TX	136,195	201,059	64,863	48%
Phoenix-Mesa, AZ	62,243	67,090	4,847	8%
Salt Lake City-Ogden, UT	29,585	31,924	2,338	8%

Table 27
Comparison of Case 3 and Case 4 Highway Vehicle CO Emissions

MSA Name	CO Emissions (tons/year)		Increase in 1995 CO Emissions (tons/year)	Percent Increase in Emissions
	Case 3 All Vehicles	Case 4 All Vehicles		
Dallas-Fort Worth, TX	911,485	1,270,879	359,393	39%
Phoenix-Mesa, AZ	406,875	424,931	18,056	4%
Salt Lake City-Ogden, UT	320,730	363,772	43,042	13%

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