SANDIA REPORT

SAND96–2178 • UC–600
Unlimited Release
Printed September 1996

Estimation of the Carbon Monoxide Emissions Due to Sandia National Laboratories Commuter and On-base Traffic for Conformity Determination

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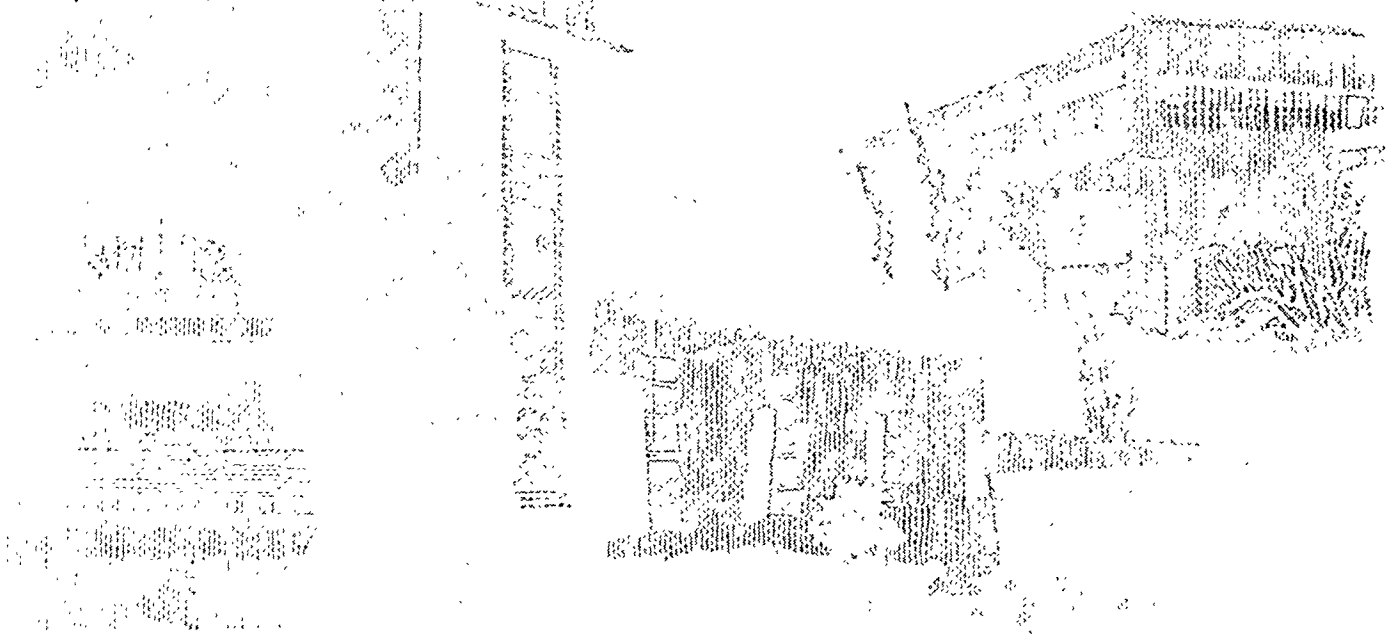
Prepared by
Sandia National Laboratories
Albuquerque, New Mexico 87185 and Livermore, California 94550
for the United States Department of Energy
under Contract DE-AC04-94AL85000



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NTIS price codes
Printed copy: A03
Microfiche copy: A01

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Distribution
Category UC-600

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Abstract

This report describes the analysis and conclusion of an investigation of the carbon monoxide emissions resulting from Sandia National Laboratories and Department of Energy (DOE) commuter and on-base traffic for the Clean Air Act (CAA) Conformity Determination. Albuquerque/Bernalillo County was classified as a nonattainment area by the Environmental Protection Agency. Nonattainment area is an area which is shown by monitored data or which is calculated by air quality modeling to exceed any National Ambient Air Quality Standard (NAAQS) for the pollutant. Albuquerque/Bernalillo County exceeds the NAAQS for carbon monoxide and ozone. The Conformity Determination was needed to complete the CAA Title V Permitting process for SNL and the DOE . The analysis used the EPA approved MOBILE5a Carbon Monoxide (CO) emissions modeling program. This analysis will provide a baseline for mobile sources to allow Sandia to estimate any future activity and how that activity will impact CO emissions. The General Conformity Rule (AQCR 43) requires that operations which will increase CO emissions in nonattainment or maintenance areas such as Bernalillo County undergo conformity analyses to determine whether or not they will impact ambient air quality in the area.

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EXECUTIVE SUMMARY

Local, state, and federal regulations governing air quality require that federal agencies assess the impact of their activities on ambient air quality. The Albuquerque/Bernalillo County Air Quality Board enacted the General Conformity Regulation in November 1994 in the Air Quality Regulation (AQCR 43). This regulation requires the DOE and SNL/NM to evaluate all CO emissions from activities onsite. As a result, this effort was undertaken to evaluate all moving source CO emissions from DOE and SNL/NM commuter and onbase vehicles. The investigation calculated emissions for a given year as a baseline to predict future emissions. The Mobil5a modeling investigation showed that over the next ten years a decrease in vehicle emissions occurred due to improvements in vehicle fleet emissions.

ESTIMATION OF THE CARBON MONOXIDE EMISSIONS DUE TO SANDIA NATIONAL LABORATORIES COMMUTER AND ON-BASE TRAFFIC FOR CONFORMITY DETERMINATION

Introduction

Local, State, and Federal regulations governing air quality require federal agencies to assess the impact of their activities on ambient air quality in nonattainment areas. As a result, this report describes the analysis and results of the carbon monoxide emissions resulting from commuter and on-base traffic activities from Sandia National Laboratories/New Mexico and the Department of Energy. The Environmental Protection Agency (EPA) approved carbon monoxide (CO) emissions computer model, MOBILE5a, was used to determine emission factors for CO vehicle emissions. Model input parameters of vehicle traffic counts and miles traveled per vehicle per day were based on best available information from the Middle Rio Grande Council of Governments (MRGCOG) and the preliminary Kirtland Air Force Conformity Determination. Input parameters were obtained and used when appropriate from the Albuquerque Environmental Health Department (AEHD).

Background

The Clean Air Act (CAA) and associated regulations require that "Federal Actions" not adversely effect the attainment of the National Ambient Air Quality Standards (NAAQS) for regulated pollutants (ozone, carbon monoxide, nitrogen oxides, particulate matter, sulfur dioxide, and lead). The EPA classifies the states that fail to meet NAAQS as nonattainment areas. For the past three years Albuquerque/Bernalillo County has been considers a nonattainment area for carbon monoxide. The State of New Mexico is responsible for meeting NAAQS within a set timeframe. The State of New Mexico must issue a State Implementation Plan (SIP) that identifies how the state plans to bring all areas within the state into attainment of the NAAQS for each regulated pollutant. The term "conformity" has been applied to this type of requirement. Due to the conformity requirements of the CAA, SNL must not take any actions which would interfere with timely reduction of CO emissions identified in the SIP. From these calculated CO emission figures any future federal activities will be evaluated for impact to CO emissions in the nonattainment area.

The General Conformity Rule applies to Federal actions occurring in areas designated as nonattainment for criteria pollutants or in attainment areas subject to maintenance plans (maintenance areas). A criteria pollutant is a pollutant for which an air

quality standard has been established under the Clean Air Act (CAA). The designation of nonattainment is based on the exceedances or violations of the air quality standard. A maintenance plan establishes measures to control emissions to ensure the air quality standard is maintained in areas that have been redesigned as attainment from a previous nonattainment status.

DOE and SNL/NM are located within the confines of the Kirtland Air Forces Base (KAFB) military reservation. KAFB is located within Bernalillo County. All of Bernalillo County is considered to be a nonattainment area for carbon monoxide.

The Albuquerque Environmental Health Department's (AEHD) Air Pollution Control Division plans to resubmit a Carbon Monoxide Redesignation Request and Maintenance Plan for Albuquerque/Bernalillo County, New Mexico within the next few months. Once approved by EPA, this will make Albuquerque a maintenance area for carbon monoxide (CO). Although other criteria pollutants, such as ozone and nitrogen oxides (NOx) may become important limitations to Albuquerque/Bernalillo County attainment, these pollutants were not analyzed in this document.

Methods Used to Determine CO Emissions

This section describes the methodology used to determine CO emissions due to SNL and DOE vehicle traffic onto KAFB. The EPA computer model, MOBILE5a, was used to estimate CO emissions factors. The source of the MOBILE5a input parameters and other calculations are described below. This report estimates CO emissions for the year 1995 as a baseline and then estimates CO emissions for the years 1996-2006. From this proposed baseline any future federal activities will be evaluated for impact to CO emissions in the nonattainment area.

Estimation of SNL Generated Vehicular Traffic

The following is a description of the methods used in this report to estimate the number of "commuter" and SNL and DOE operated vehicles. The term, "commuter traffic," is taken here to include all traffic other than SNL-owned vehicles. It includes vehicles operated by SNL employees, SNL contractors, SNL visitors, DOE personnel and additional traffic such as delivery vehicles. On-base vehicles are vehicles operated by SNL. The basis for the commuter vehicle estimate is a study done by the Middle Rio Grande Council of Governments (MRGCOG) in 1993 which included a count of the total number of vehicles passing through KAFB gates over a 24-hour period. Normally, traffic studies by the MRGCOG in the vicinity of KAFB do not provide a figure for the number of vehicles entering and exiting the base. The total gate count entering and exiting the base in the MRGCOG study was 75,453. Assuming that each vehicle passed through the gates twice each day, the total number of commuter vehicles was 37,727 per day. The fraction of this number attributed to SNL was estimated in the following manner. The total number of vehicle decals issued to SNL employees, SNL contractors and DOE personnel for the years 1993, 1994 and 1995 (through September 6, 1995) was obtained from the SNL Decal Office and the DOE Decal Office. The total decals issued for these years was 22,940 (see Table 1.a). During the same time period, the number of decals issued by the KAFB traffic division was 40,959 (see Table 1.b).

Table 1. Total Number of Vehicle Decals Issued

a.) SNL/DOE Vehicle Decals Issued

	SNL Employees	SNL Contractors	DOE Personnel	TOTAL
1993	4,601	4,365	608	9,574
1994	3,810	3,615	685	8,110
1995	2,422	2,298	536	5,256
	10,833	10,278	1,829	22,940

b.) KAFB Vehicle Decals Issued

1993	12,833
1994	13,653
1995	14,473
TOTAL	**40,959**

The total number of decals issued was used to determine the percentage attributed to SNL and DOE commuter vehicles. The percentage of the total due to SNL/DOE was 36%. Applying 36% to the number of commuter vehicles calculated from the MRGCOG 1993 gate count provides an estimate of 13,582 commuter vehicles per day due to SNL activities for 1993. The data and calculations are as follows:

Calculation of percentage of commuter vehicular traffic due to SNL/DOE:

40,959 (KAFB) + 22,940 (SNL/DOE) = 63,899 Total Decals Issued

22,940 / 63,899 = 36%

36% × 37,727 = 13,582 SNL/DOE commuters per day

The total number of vehicle decals issued to SNL, SNL contractor, and DOE personnel did not show an increase over the 1993 figure in either 1994 or 1995; in fact the number has trended lower. Therefore, the 1993 figure was used as a conservative estimate of 1995 vehicular traffic. According to the KAFB Civil Engineering Department, there were 1,428 base assigned vehicles in 1994, approximately 600 of which were operated by SNL/DOE. The 600 vehicle figure was used for 1995 for the purposes of this report.

Miles Traveled Per Vehicle Per Day

The number of miles traveled per day for each vehicle was estimated by the Draft KAFB Conformity Report, 1995, to be 30 for both commuter and on-base vehicles. It was felt that this figure is a reasonable but somewhat conservative (i.e., upper limit) estimate. There is no evidence to support changing this estimate.

Estimation of CO Emission Factors

The CO emission factors were estimated with the MOBILE5a computer program which is the EPA approved program for modeling emission factors in conjunction with sips. The program calculates exhaust CO, exhaust NO_x and volatile organic compounds (VOC) from exhaust and evaporation. MOBILE5a calculates emission factors in grams per mile for nine categories of vehicle and a composite emission factor for all vehicles. The composite emission factor calculation uses an estimate of the relative number of each type of vehicle in the fleet. A discussion of the parameters used in the MOBILE5a input files for SNL which affect the values of emission factor output follows. Input parameters (e.g., Inspection and maintenance program) which do not affect CO emission factors are noted. A complete MOBILE5a input file for January, 1995 is shown in Appendix A on page A1 with a brief explanation of all the input parameters, including those which do not affect emission factors. In most cases the input parameters are the same as those used by the Albuquerque Environmental Health Department (AEHD) for MOBILE5a at the time of preparation of this report. They were provided by Mr. Dan Warren of the City of Albuquerque Environmental Health Department, Air Pollution Control Division. The use of these parameters should not only provide accuracy on an absolute basis but should also give results which can be evaluated in relation to total Bernalillo County vehicular CO emissions.

Altitude parameter. Option 2 (high altitude) was used for the altitude parameter. The high altitude option of the model assumes atmospheric conditions at approximately 5,500 feet above mean sea level; the low altitude option models conditions at approximately 500 feet above mean sea level.

Average minimum and maximum daily temperatures. The temperatures used for January were 28.5°F and 43.5°F. These average minimum and maximum daily temperatures for the month of January were obtained from AEHD. This information was not available from AEHD for the month of July. The average minimum and maximum temperatures used for July were 60.1°F and 97.8°F. The July figures were provided by

Regina Deola of Department 7575, SNL. Average temperatures were also entered (they are mandatory entries and must be between the minimum and maximum temperatures) but were not used by the program. Average minimum and maximum daily temperatures give more accurate results than average temperatures.

Average speed. One average speed (19.6 mph) which is commonly used in MOBILE5a for city driving was used for all vehicle types.

Vehicle miles traveled (VMT) mix. The default MOBILE5a vehicle miles traveled (VMT) mix was used. This VMT mix takes into account of vehicles in the fleet mix inclined to be driven more miles than others. The VMT mix adjusts for the fact that some vehicle types typically accumulate more mileage per time period than others.

Registration distribution. The default (national average) registration distribution was used. The registration distribution means the fleet consists of more of some kinds of vehicles than others (this was determined by registration).

Mileage accumulation rates by model year. The default mileage accumulation rates by model year were accepted. This means that cars of a certain age are driven more than cars of other ages (e.g., a new car might be driven more than an old car).

Diesel sales fraction. The default MOBILE5a diesel sales fraction was used.

Adjustment for exhaust emission rates. The default adjustment for exhaust emission rates by model year was accepted.

Adjustment for load. The default values for air conditioner usage, load, trailers and humidity were obtained from the AEHD (i.e., no local area corrections for these factors were made).

Inspection and maintenance program. The local inspection and maintenance (IM) program was modeled by entering the same IM record used by the AEHD. The IM record and an explanation of the values are shown Appendix A.

Tampering rates. The option to use the MOBILE5a default tampering rates (the rates at which people are expected to "tamper" with their vehicles in a way which would

adversely affect emissions) was used. This option would normally be used except where evidence could be obtained to document an exceptionally low tampering rate for a certain fleet of vehicles. It is clearly the appropriate choice for the SNL commuter fleet. However, it is the conservative option for the SNL motor pool fleet which should be subject to very little tampering.

Anti-tampering program. The effects of an anti-tampering program were modeled by using the same Anti-tampering Record used by the AEHD.

Oxyfuels record. The effects of the use of oxygenated fuels was modeled by using the same Oxyfuels record used by the AEHD.

Reformulated gasoline. The use of reformulated gasoline was not taken into account.

Cold start parameters. The MOBILE5a default numbers (20.6 27.3 20.6) were used for the three percentages which must be input into MOBILE5a to deal with the fact that emissions are greater when a vehicle is started cold than when it is started hot. The default numbers were also used by the AEHD.

Fuel volatility class. Fuel volatility class C was used. Class C is used for most areas of the country. It does not affect CO emission factors because the volatility has no significatn effect on the CO production in the combustion process.

Reid vapor pressure. The AEHD value of 13.7 was used for the Reid vapor pressure (RVP), a measure of fuel volatility. However, the RVP does not affect CO or other exhaust emission factors; it affects evaporative and refueling HC emissions.

Vapor recovery system. The effect of an "at the pump" vapor recovery system was not modeled. Such modeling would not affect CO emission factors.

Hydrocarbons. The option to include aldehydes but not methane or ethane in the calculation of hydrocarbon emission factors was used. This option is most often used for SIP-related applications of MOBILE5a and does not affect CO emissions factors.

Years and months. The MOBILE5a program can estimate emission factors for the years 1960 through 2020. It accepts two options for the month, January or July. The complete output file for January 1995 is shown in Appendix A, beginning on page A8. January is the month in which environmental CO concentrations reach problem levels most often. The month of July is the month in which environmental ozone concentrations reach problem levels most often. The computer program calculates January because it is considered to be the highest month for ambient CO levels. Emission factors for other months are obtained by extrapolation. The composite emission factors for each year were obtained by extrapolating between the emission factors for January of that year, July of the same year, and January of the next year to obtain an emission factor for each month and, then, averaging the monthly values. The composite emission factor for 1995 was 34.6 grams per mile.

Calculation of Total CO Emissions

The total vehicular CO emissions due to SNL activity for the years 1995 through 2005 were estimated using the parameters described in the previous section. The method of calculation is shown in Table 1, using the 1995 year as an example. This evaluation assumes that there is no change in the number of vehicles used for all time peroids (1995-2006).

Table 2. Total Vehicular CO Emissions Due to SNL Activity for the Year 1995

Commuter	On-Base	
37,727		total KAFB commuters/day
× .36		estimated fraction due to SNL
13,582	600	SNL vehicles/day
× 30	× 30	miles/day/vehicle
407,452	18,000	total miles/day
× 34.6	× 34.6	emission factor (grams/mile)
1.41E7	6.22E5	CO emissions (grams/day)
× 1.10E-6	× 1.10E-6	conversion: grams to tons
15.5	0.69	CO emissions (tons/day
× 261	× 261	working days/year
4,047	179	CO emissions (tons/year)
4,047 + 179 = 4,226		tons/year **total**

Results: Estimated CO Emission Factors and Total CO Emissions Due to SNL Vehicular Traffic for 1995 Through 2005

Table 3 lists composite CO emission factors and total CO emissions calculated by the method shown in Table 2 for the years 1995 through 2005. Carbon monoxide emission figures are presented for the month of January because it is the month when unacceptably high concentrations of CO most often occur. Carbon monoxide emission figures may also be presented for the "CO emission season" which is considered to be November, December, and January. In the future, the CO emissions for Bernalillo County might be presented for January or for the CO season by the AEHD or other agency. This evaluation addressed three emission periods: total CO, emission season, and the month of January. For purposes of comparison, the SNL emissions were calculated for both of these periods for the years 1995 through 2005 and are presented in Tables 4 and 5.

The results in Tables 3-5 indicate a year to year reduction in total CO emissions. This is because the MOBILE5a program takes factors into account which result in a year to year reduction in composite CO emission factors. The program assumes that future vehicles will have inherently lower emission rates and that more stringent inspection

programs will cause the lower rates to be maintained. In addition, no increase in SNL vehicular traffic was projected. At this point there is no sound bases to predict either an increase or decrease in SNL traffic. The total emission figures presented here are conservative primarily because a conservative figure (19.6 mph) was used as the input for the average vehicle speed in MOBILE5a. MOBILE5a outputs higher emission factors for lower speeds. The number of decals issued by SNL and DOE has decreased somewhat over the past three years. This decrease was not taken into account in calculating total CO emissions.

Table 3. Estimation of CO Emission Factors and Total CO Emissions for the Years 1995 Through 2005

Year	Emission Factor (grams per mile)	Emissions (tons per year)
1995	34.6	4,226
1996	33.4	4,075
1997	32.4	3,958
1998	31.6	3,853
1999	30.9	3,766
2000	30.3	3,691
2001	29.8	3,638
2002	29.4	3,593
2003	29.0	3,541
2004	28.8	3,511
2005	28.5	3,490

Table 4. Estimated CO Emission Factors and Total CO Emissions for the Month of January in the Years 1995 Through 2005

Year	Emission Factor (grams per mile)	Emissions (tons per month)
1995	31.9	325
1996	30.1	306
1997	28.7	292
1998	27.5	280
1999	26.4	269
2000	25.6	260
2001	24.8	252
2002	24.4	248
2003	23.8	242
2004	23.4	238
2005	23.0	234

Table 5. Estimated CO Emission Factors and Total CO Emissions for the Emission Seasons 1995-1996 Through 2005-2006

Year	Emission Factors (grams per mile)	Emissions (tons per season)
1995-6	31.5	960
1996-7	30.2	920
1997-8	29.0	886
1998-9	28.0	855
1999-00	27.3	832
2000-01	26.5	809
2001-02	26.2	799
2002-03	25.6	781
2003-04	25.2	769
2004-05	24.9	761
2005-06	24.7	754

Conclusions

This report describes the analysis and results of the carbon monoxide emissions from commuter and on-base traffic activities from Sandia National Laboratories and the Department of Energy. This report will help determine weather SNL/NM and DOE activities interfere with the State of New Mexico conformity program when it is interpered with respect to AEHD programs to reach attainment. The report establishes a baseline for CO emissions from SNL and DOE present activities (1995) and models emissions for future years. This baseline will provide the information necessary to determine if future SNL and DOE activities will increase CO emissions that may hamper State conformity requirements established in the SIP.

The emission factors (grams per mile) and the emissions (tons per year) are projected to decrease over the years modeled, under the assumption that total traffic (miles per year) remain constant. The emission factors and the total CO emissions for the two time periods, month of January and emission season, are projected to decrease over the years modeled, assuming that total traffic (miles per year) remain constant. Although this decrease could be anticipated, the amount of the decrease is dependent on local factors. The emission factors decrease over the period of time because parameters used in MOBILE5a assume increased efficient of the vehicle fleet. The modeling provides an initial estimate of the trends for the CO emissions of SNL and DOE vehicles, provided the amount of vehicle traffic does not change.

References

1. 1003 Traffic Monitoring Statistics, Oct. 1993. Middle Rio Grande Council of Governments, TR-118.
2. Preliminary Conformity Analysis, Kirtland Air Force Base, New Mexico, March 1995. DCN 95-670-008-06.

APPENDIX A: MOBILE5a INPUT and OUTPUT FILES

APPENDIX A: MOBILE5a Input and Output Files

The following is an example of a MOBILE5a input file. The values are those chosen to model emissions due to SNL commuters for January 1995. An explanation of the significance of each input parameter follows the file listing.

```
1           PROMPT
  SNL MOBILE5a Input File for JAN 1995.
1           TAMFLG
1           SPDFLG
1           VMFLAG
1           MYMRFG
1           NEWFLG
2           IMFLAG
1           ALHFLG
2           ATPFLG
5           RLFLAG
2           LOCFLG
1           TEMFLG
4           OUTFMT
2           PRTFLG
1           IDLFLG
1           NMHFLG
1           HCFLAG
89 20 75 20 00 00 095 2 2 2222 2111 220. 1.20 999.      IM record
90 75 20 2222 22 095. 22221111                           ATP record
SNL LAP rec. #1. C 28.5 43.5 13.0 13.0 90 2 1 1         LAP record
.010 .990 .027 .027 2                                    Oxyfuels
2 95 19.6 38.5 20.6 27.3 20.6 01                         Scenario
0000000000000000000000000000000000000000000000000000000000000000
```

MOBILE5a input files consist of three sections, the Flags, One-time Data and Scenario sections. The following is a brief description of the significance of each data entry in each section:

Flags Section:

1 **PROMPT**

Option 1 chooses to make all of the input by means of the preconstructed input file (highly recommended). The MOBILE5a program will prompt the user for input.

SNL MOBILE5a input File for JAN 1995. This is a user comment which has no effect.

1 **TAMFLG**

Tampering Rates: Option 1 uses the MOBILE5a default tampering rates (the rates at which people are expected to make changes in their vehicles, especially in pollution control devices).

1 **SPDFLG**

Average Speed: One average speed (19.6 mph) which is commonly used in MOBILE5a for city driving was used for all vehicle types. Option 1 specifies that the user will enter one average speed for all eight types of vehicle. Option 2 would specify that the user will enter an average speed for each type of vehicle.

1 **VMFLAG**

Vehicle miles traveled (VMT) mix: Option 1 accepts the default MOBILE5a vehicle miles traveled (VMT) mix. The VMT

mix adjusts for the fact that some vehicle types typically accumulate more mileage per time period than others.

1 **MYMRFG**

Mileage accumulation rates by model year: Option 1 accepts the default MOBILE5a (national average) annual mileage accumulation rates and registration distributions by model year.

1 **NEWFLG**

Adjustment for exhaust emission rates: Option 1 accepts the default MOBILE5a adjustment for exhaust emission rates by model year.

2 **IMFLAG**

Inspection and Maintenance Program: Option 2 specifies that there is an inspection and maintenance (IM) program in operation in the area. It requires entries in the One-time Data section to define the characteristics of one or more IM programs. Option 2 would assume that there is no IM program which would affect emissions.

1 **ALHFLG**

Adjustment for load: Under option 1, MOBILE5a does not make corrections for air conditioner usage, load, trailers and humidity. Other options require additional input in the Scenario Section of the input file. The ALHFLG input only affects the calculations of emissions for gasoline powered vehicles.

2 **ATPFLG**

Anti-tampering program: Option 2 specifies that an anti-tampering program (ATP) is in effect. It requires the user to supply additional information about the ATP in the

One-time Data Section. Option 1 does not take into account the effects of an anti-tampering program.

5 **RLFLAG**

Reformulated gasoline: Under option 5, MOBILE5a does not take into account any "at the pump" vapor recovery system(VRS). A VRS does not affect CO emission factors.

2 **LOCFLG**

Average minimum and maximum daily temperatures: Option 2 only requires the user to enter one local area parameter (LAP) record. Option 1 requires the user to enter a LAP record for each scenario. A lap record (described below) contains seven to ten fields including such things as the volatility class of the fuel in use and minimum and maximum daily temperatures.

1 **TEMFLG**

Average minimum and maximum daily temperatures: Under option 1, MOBILE5a uses minimum and maximum daily temperatures for temperature corrections to emission rates. Under option 2, MOBILE5a would use the average daily temperature.

4 **OUTFMT**

Option 4 provides an 80 column text file output. Option 6 would provide a comma separated output suitable for importing into a spreadsheet such as Microsoft Excel.

2 **PRTFLG**

Option 2 causes MOBILE5a to print out emission factors for CO only. Other options specify calculation and printout of hydrocarbons and NOx in addition to CO.

1 **IDLFLG**

This feature, the calculation of idle emissions has been disabled in MOBILE5a. The number one (1) should be used.

1 **NMHFLG**

The NMHFLG specifies the types of components (eg. methane, ethane or aldehydes) to be included in the hydrocarbon emission factors. It is not utilized if only CO emissions are to be calculated (ie. if PRTFLG = 2).

1 **HCFLAG**

The HCFLAG is not used if PRTFLG = 2. Otherwise it would determine whether hydrocarbon emission factor components (exhaust, evaporative, refueling, running loss and resting loss) would be itemized or summed in the output file.

One-time Data Section (information which is input only once per input file):

I/M Record (required if IMFLAG = 2)
89 20 75 20 00 00 095 2 2 2222 2111 220. 1.20 999.
The I/M record consists of the following parameters:

1. Program start year: 1989.
2. Stringency level: 20%
3. Earliest model year subject to the requirements: 1975.
4. Latest model year subject to the requirements: 2020.
5. Waiver rates for pre 1981 model year: 0.
6. Waiver rates for pre 1981 and later model years: 0.
7. Compliance rate: 95%.
8. Program type: 2 = test and repair.
9. Frequency of inspection: 2 = biennial.
10. Vehicle types covered: 2222 = LDGV, LDGT1, LDGT2, HDGV.
11. Test type: 2 = 2,500/idle.

12. Whether or not user is specifying non-default cutpoints for test pass/fail: 1 = use default cutpoints.
13. Whether or not the user is specifying alternate I/M credit files for each of two technology groups: 11 = use defaults.
14. Cutpoints for HC, CO and NOx: defaults (220, 1.20, 999) were entered.

Anti-tampering Record (required if ATPFLG = 2)
90 75 20 2222 22 095. 22221111

The anti-tampering record consists of the following parameters:

1. Program start year: 1990.
2. Earliest model year subject to the program: 1975.
3. Latest model year subject to the program: 2020.
4. Vehicle types covered: 2222 = LDGV, LDGT1, LDGT2, HDGV.
5. Program type: 2 = inspection and repair.
6. Frequency of inspection: 2 = biennial.
7. Compliance rate: 95%.
8. Inspections performed: 22221111 = air pump system, catalyst, and fuel inlet restrictor are checked, tailpipe lead deposit test is done.

LAP Record
SNL Scenario #1. C 28.5 43.5 13.0 13.0 90 2 1 1
Since LOCFLG option 2 was chosen (applying the same local area parameter record to all scenarios), the LAP record is entered in the One-time Data Section. It consists of the following parameters:

1. A scenario title which occupies sixteen columns and is followed by a space.
2. Fuel volatility class: C (no effect on CO emission factors).

3. The minimum daily temperature: 28.5 ^{o}F.
4. The maximum daily temperature: 43.5 ^{o}F.
5. Period 1 Reid vapor pressure (RVP) of gasoline in use.
6. Period 2 Reid vapor pressure (RVP) of gasoline in use.
7. The year that EPA mandated RVP controls came into effect in the area: 1990 (will have no effect on and future modelling.
8. OXYFLG: 2 = oxygenated fuel modelling (requires the entry of an oxyfuels record in the One-time Data section).
9. DSFLAG: 1 = default MOBILE5a diesel sales fractions will be used.
10. RFGFLG: 1 = reformulated gasoline effects should not be taken into account.

Oxyfuels Record (required if OXYFLG = 2)
.010 .990 .027 .027 2

The oxyfuels record consists of the following parameters:

1. Ether blend market share: .010 = 1%.
2. Alcohol blend market share: .990 = 99%.
3. Ave. oxygen content of ether blend fuels: 2.7%.
4. Ave. oxygen content of alcohol blend fuels: 2.7%.
5. RVP waiver switch: 2 = oxygenated fuels need not meet the same RVP requirements as regular fuels.

Scenario Section:
2 95 20.0 32.0 20.6 27.3 20.6 01

The Scenario section consists of the following parameters:

1. The region's altitude: 2 = high altitude (approx. 5,500 ft.).
2. Modelling year: 1995.
3. Average speed: 20 mph.
4. Ambient temperature: 32 ^{o}F (not used because TEMFLG = 1).

5,6,7. Percentages which deal with the fact that emissions are greater when a vehicle is started cold than when it is started hot. 20.6, 27.3, 20.6 = EPA recommended values.

8. The month: 01 = January (7 = July) January is the worst month for environmental CO and July is the worst month for ozone.

The following is a MOBILE5a output file corresponding to the input file shown above:

```
1  SNL MOBILE5a Input File for JAN 1995.

 MOBILE5a (26-Mar-93)
0I/M program selected:

0     Start year (January 1):              1989
      Pre-1981 MYR stringency rate:         20%
      First model year covered:            1975
      Last model year covered:             2020
      Waiver rate (pre-1981):               0.%
      Waiver rate (1981 and newer):         0.%
      Compliance Rate:                     95.%
      Inspection type:                     Computerized Test and
Repair
      Inspection frequency                 Biennial
      Vehicle types covered:               LDGV - Yes
                                          LDGT1 - Yes
                                          LDGT2 - Yes
                                           HDGV - Yes
      1981 & later MYR test type:          2500 rpm / Idle
      Cutpoints, HC:  220.000   CO:    1.200   NOx:  999.000
0Functional Check Program Description:
0Check Start   Model Yrs  Vehicle Classes Covered   Inspection
  (Jan1)         Covered    LDGV   LDGT1  LDGT2  HDGV    Type
Freq
   1990        1975-2020    Yes    Yes    Yes    Yes Test &
Repair Biennial
 Comp Rate
   95.0%

ATP
```

0Air pump system disablements: Yes Catalyst removals: Yes
Fuel inlet restrictor disablements: Yes Tailpipe lead deposit test: Yes
EGR disablement: No Evaporative system disablements: No
PCV system disablements: No Missing gas caps: No
0SNL LAP rec. #1.
Minimum Temp: 29. (F) Maximum Temp: 44. (F)
Period 1 RVP: 13.0 Period 2 RVP: 13.0 Period 2 Yr: 1990
0Total HC emission factors include evaporative HC emission factors.

0Emission factors are as of Jan. 1st of the indicated calendar year.
0Cal. Year: 1995 Region: High Altitude: 5500. Ft.
I/M Program: Yes Ambient Temp: 39.7 (F)
Anti-tam. Program: Yes Operating Mode: 20.6/27.3/20.6
Reformulated Gas: No
0 Ether Blend Market Share: 0.010 Alcohol Blend Market Share: 0.990
Ether Blend Oxygen Content: 0.027 Alcohol Blend Oxygen Content: 0.027
Alcohol Blend RVP Waiver: Yes

0Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC All Veh
+									
Veh. Spd.:	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6

VMT Mix: 0.633 0.180 0.084 0.031 0.004 0.002 0.061 0.007

0Composite Emission Factors (Gm/Mile)

Exhst CO: 26.21 34.58 46.53 38.38 119.70 2.30 4.29 20.21 41.15 31.93

The vehicle class categories in the MOBILE5a output file are:

LDGV	Gasoline-fueled light duty vehicles
LDGT1	Gasoline-fueled light duty trucks up to 6,000 lb gross vehicle weight (GVW)
LDGT2	Gasoline-fueled light duty trucks between 6,001 and 8500 lb GVW
LDGT	Gasoline-fueled light duty trucks (composite for LDGT1 and LDGT2)
HDGV	Gasoline-fueled heavy duty vehicles
LDDV	Diesel-fueled light duty vehicles
LDDT	Diesel-fueled light duty trucks
HDDV	Diesel-fueled heavy duty vehicles
MC	Motor cycles
All Veh	Composite for all vehicles

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