UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VIII
999 18th STREET - SUITE 500
DENVER, COLORADO 80202-2466

Ref: 8ART-AP

MEMORANDUM

DATE: June 12, 1993

TO: Rich Valentine, Salt Lake County Health Department

FROM: Scott P. Lee, Environmental Engineer

SUBJECT: Transmittal of Mobile5.0 Input File

Please coordinate MOBILE input parameters and obtain input files, which included Utah specific registration data, from Steve Parkin at DAQ. This will ensure all modeling efforts in Utah use nified modeling parameters. "Basic Program" performance standard parameters are attached. I have enclosed a copy of the I/M implementation regulations containing more detailed information concerning both basic program and enhanced program parameters. If you have any question feel free to contact me at (303) 293-1887.

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COMPLIANCE WITH THE BASIC I/M PERFORMANCE STANDARD
SECTION 51.352

Utah law requires that any County which exceeds the federal ambient air quality standards to implement an I/M program. Because of this there are 4 different I/M programs operating in the State Of Utah. By the use of a computerized analyzer it is possible to have the appropriate test performed at any station in the four county area.

The I/M programs required by each county are very similar. Vehicle coverage, pass fail cut points, maximum test fee and waiver cost limits are identical. The most noticeable differences among the counties are the implementation dates and slightly different tampering requirements.

Based on consultation with EPA region 8 we have used the Utah specific input parameters supplied by the Utah Division of Air Quality which were used in their emissions inventory. As suggested by EPA, in order to avoid a "modelling frenzy", limited our analysis to a single speed (off peak arterials and collectors) and the meteorological parameters used for the annual inventory. Since the purpose of this demonstration is to compare the Utah I/M programs with the EPA Basic program we believe that difference shown under these conditions will be obtained regardless of variations in the input parameters. All of the Utah programs are more effective than the program used to for the emissions inventory in terms of fail rate and waiver rates. Since the inventory I/M Program exceeds the basic program it has been used for this compliance demonstration to maintain consistency. Minor format changes have been made in the Mobile5a model.

Salt Lake and Utah Counties have more lenient tampering requirements for older vehicles (less than model year 1990). Since Mobile5a does not allow for separate ATP's based on model years two separate runs were made, one for 1996 and 1997, and another for 2000 and 2003. In the run for the earlier years the more lenient requirements were used for all vehicles, in the later years the more stringent requirements were used for all vehicles. The net effect of this is that the earlier years are modeled as slightly less than "true" effectiveness and later years are modeled at slightly more than "true" effectiveness. These variations are very slight and don't materially affect the comparison of these programs with the EPA Performance Standard Program.

	EPABASICIM	SLIM	DAVISIM	UTAHIM	WEBERIM
START I/M & ATP	1983	1984	1984	1986	1991
STRINGENCY	20	22	22	22	22
FIRST MOD. YR	1968	1968	1968	1968	1968
LAST MOD. YR	2020	2020	2020	2020	2020
PRE 81 WAIVER RT.	0%	5%	5%	5%	5%
81 PLUS WAIV RT.	0%	5%	5%	5%	5%
COMPLIANCE RT.	100%	95%	95%	95%	95%
PROGRAM TYPE	TEST ONLY	TEST&REPAIR	T&R	T&R	T&R
FREQUENCY	ANNUAL	ANNUAL	ANNUAL	ANNUAL	ANNUAL
LIGHT DUTY VEH.	YES	YES	YES	YES	YES
LIGHT DUTY TK1	NO	YES	YES	YES	YES
LIGHT DUTY TK2	NO	YES	YES	YES	YES
HEAVY DUTY TK	NO	YES	YES	YES	YES
ANTI TAMPERING	NO	YES	YES	YES	YES
1ST YEAR		1984	1984	1977	1990
AIR SYSTEM		YES	YES	YES	YES
CATALYST		YES	YES	YES	YES
FUEL INLET		YES	YES	YES	YES
LEAD TEST		NO	NO	NO	NO
EGR		90+	YES	90+	YES
EVAPORATIVE		90+	YES	90+	YES
PCV		90+	YES	90+	YES
GAS CAP		90+	YES	90+	YES

EMISSIONS FACTORS IN GRAMS PER MILE

1996	VOC	CO	NOx
NO I/M	2.97	25.20	2.68
EPA BASIC I/M	2.79	22.85	2.66
SALT LAKE I/M	2.75	22.14	2.62
DAVIS I/M	2.72	22.14	2.62
UTAH I/M	2.73	21.89	2.61
WEBER I/M	2.78	22.72	2.65

1997	VOC	CO	NOx
NO I/M	2.88	24.00	2.60
EPA BASIC I/M	2.70	21.74	2.57
SALT LAKE I/M	2.66	21.02	2.53
DAVIS I/M	2.64	21.02	2.53
UTAH I/M	2.65	20.83	2.53
WEBER I/M	2.69	21.51	2.56

2000	VOC	CO	NOx
NO I/M	2.63	20.67	2.38
EPA BASIC I/M	2.47	18.69	2.36
SALT LAKE I/M	2.40	17.92	2.32
DAVIS I/M	2.40	17.92	2.32
UTAH I/M	2.38	17.83	2.32
WEBER I/M	2.43	18.21	2.33

2003	VOC	CO	NOx
NO I/M	2.45	18.69	2.23
EPA BASIC I/M	2.30	16.92	2.21
SALT LAKE I/M	2.22	16.12	2.17
DAVIS I/M	2.22	16.12	2.17
UTAH I/M	2.22	16.08	2.16
WEBER I/M	2.24	16.27	2.17

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1MOBILE5A              1996,7,2000,2003    NO I/M
 MOBILE5a (26-Mar-93)
0WASATCH FRONT
                    Minimum Temp: 33. (F)   Maximum Temp: 73. (F)
                    Period 1 RVP: 10.8      Period 2 RVP: 10.8 Period 2 Yr: 1992
0VOC HC emission factors include evaporative HC emission factors.
0
0Emission factors are as of July 1st of the indicated calendar year.
0User supplied veh registration distributions.
0Cal. Year: 1996            Region: High          Altitude: 5500. Ft.
                     I/M Program: No        Ambient Temp:   60.5 / 60.5 / 60.5 F
                Anti-tam. Program: No      Operating Mode:   20.6 / 27.3 / 20.6
                 Reformulated Gas: No
0Veh. Type:  LDGV  LDGT1  LDGT2   LDGT   HDGV   LDDV   LDDT   HDDV   MC   All Veh
+
 Veh. Spd.: 33.8   33.8   33.8          33.8   33.8   33.8   33.8   33.8
   VMT Mix:  0.617  0.195  0.078         0.031  0.003  0.001  0.071  0.005
0Composite Emission Factors (Gm/Mile)
 VOC    HC:  2.49   2.64   5.83   3.55   6.34   0.59   0.84   3.30   5.74   2.97
 Exhst  CO: 21.21  23.21  55.58  32.45  76.36   1.31   2.08  10.83  29.43  25.20
 Exhst NOX:  1.93   2.01   3.07   2.31   4.61   1.42   1.47  10.05   0.87   2.68

0Emission factors are as of July 1st of the indicated calendar year.
0User supplied veh registration distributions.
0Cal. Year: 1997            Region: High          Altitude: 5500. Ft.
                     I/M Program: No        Ambient Temp:   60.5 / 60.5 / 60.5 F
                Anti-tam. Program: No      Operating Mode:   20.6 / 27.3 / 20.6
                 Reformulated Gas: No
0Veh. Type:  LDGV  LDGT1  LDGT2   LDGT   HDGV   LDDV   LDDT   HDDV   MC   All Veh
+
 Veh. Spd.: 33.8   33.8   33.8          33.8   33.8   33.8   33.8   33.8
   VMT Mix:  0.613  0.197  0.078         0.031  0.002  0.001  0.072  0.005
0Composite Emission Factors (Gm/Mile)
 VOC    HC:  2.44   2.56   5.49   3.39   5.93   0.57   0.77   3.25   5.71   2.88
 Exhst  CO: 20.36  22.08  52.23  30.64  69.78   1.25   1.94  10.74  29.43  24.00
 Exhst NOX:  1.88   1.94   3.03   2.25   4.53   1.37   1.38   9.34   0.87   2.60

0Emission factors are as of July 1st of the indicated calendar year.
0User supplied veh registration distributions.
0Cal. Year: 2000            Region: High          Altitude: 5500. Ft.
                     I/M Program: No        Ambient Temp:   60.5 / 60.5 / 60.5 F
                Anti-tam. Program: No      Operating Mode:   20.6 / 27.3 / 20.6
                 Reformulated Gas: No
0Veh. Type:  LDGV  LDGT1  LDGT2   LDGT   HDGV   LDDV   LDDT   HDDV   MC   All Veh
+
 Veh. Spd.: 33.8   33.8   33.8          33.8   33.8   33.8   33.8   33.8
   VMT Mix:  0.603  0.203  0.079         0.031  0.001  0.001  0.077  0.005
0Composite Emission Factors (Gm/Mile)
 VOC    HC:  2.24   2.36   4.81   3.05   4.89   0.47   0.59   3.15   5.66   2.63
 Exhst  CO: 17.69  19.32  45.14  26.57  50.82   1.07   1.63  10.55  29.43  20.67
 Exhst NOX:  1.73   1.76   3.14   2.15   4.18   1.19   1.16   7.69   0.87   2.38

0Emission factors are as of July 1st of the indicated calendar year.
0User supplied veh registration distributions.
0Cal. Year: 2003            Region: High          Altitude: 5500. Ft.
                     I/M Program: No        Ambient Temp:   60.5 / 60.5 / 60.5 F
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                 Anti-tam. Program: No      Operating Mode:   20.6 / 27.3 / 20.6
                  Reformulated Gas: No
0Veh. Type:  LDGV  LDGT1  LDGT2   LDGT   HDGV   LDDV   LDDT   HDDV   MC   All Veh
+
 Veh. Spd.: 33.8   33.8   33.8          33.8   33.8   33.8   33.8   33.8
   VMT Mix:  0.593  0.206  0.080         0.031  0.002  0.002  0.082  0.004
0Composite Emission Factors (Gm/Mile)
 VOC    HC:  2.09   2.22   4.23   2.78   4.34   0.43   0.57   3.10   5.66   2.45
 Exhst  CO: 16.34  18.20  38.14  23.75  39.23   0.99   1.55  10.46  29.43  18.69
 Exhst NOX:  1.64   1.63   3.02   2.02   4.02   1.11   1.11   6.66   0.87   2.23
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1MOBILE5A            1996,7,2000,3  sipsubPS.in  STANDARD PROGRAM
 MOBILE5a (26-Mar-93)
0I/M program selected:

0    Start year (January 1):              1983
     Pre-1981 MYR stringency rate:         20%
     First model year covered:            1968
     Last model year covered:             2020
     Waiver rate (pre-1981):               0.%
     Waiver rate (1981 and newer):         0.%
     Compliance Rate:                    100.%
     Inspection type:                     Test Only
     Inspection frequency                 Annual
     Vehicle types covered:               LDGV - Yes
                                         LDGT1 - No
                                         LDGT2 - No
                                          HDGV - No
     1981 & later MYR test type:          Idle
     Cutpoints, HC:  220.000   CO:    1.200   NOx:  999.000
0WASTCH FRONT
                     Minimum Temp: 33. (F)   Maximum Temp: 73. (F)
                     Period 1 RVP: 10.8      Period 2 RVP: 10.8 Period 2 Yr: 1992
0VOC HC emission factors include evaporative HC emission factors.
0
0Emission factors are as of July 1st of the indicated calendar year.
0User supplied veh registration distributions.
0Cal. Year: 1996          Region: High          Altitude: 5500. Ft.
                     I/M Program: Yes      Ambient Temp:   60.5 / 60.5 / 60.5 F
                 Anti-tam. Program: No     Operating Mode:   20.6 / 27.3 / 20.6
                  Reformulated Gas: No
0Veh. Type:  LDGV  LDGT1  LDGT2   LDGT   HDGV   LDDV   LDDT   HDDV   MC   All Veh
+
 Veh. Spd.: 33.8   33.8   33.8          33.8   33.8   33.8   33.8   33.8
   VMT Mix:  0.617  0.195  0.078         0.031  0.003  0.001  0.071  0.005
0Composite Emission Factors (Gm/Mile)
 VOC    HC:  2.20   2.64   5.83   3.55   6.34   0.59   0.84   3.30   5.74   2.79
 Exhst  CO: 17.39  23.21  55.58  32.45  76.36   1.31   2.08  10.83  29.43  22.85
 Exhst NOX:  1.89   2.01   3.07   2.31   4.61   1.42   1.47  10.05   0.87   2.66
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0Emission factors are as of July 1st of the indicated calendar year.
0User supplied veh registration distributions.
0Cal. Year: 1997            Region: High          Altitude: 5500. Ft.
                        I/M Program: Yes       Ambient Temp:   60.5 / 60.5 / 60.5 F
                  Anti-tam. Program: Yes     Operating Mode:   20.6 / 27.3 / 20.6
                   Reformulated Gas: No
0Veh. Type:  LDGV  LDGT1  LDGT2   LDGT   HDGV   LDDV   LDDT   HDDV   MC   All Veh
+
 Veh. Spd.: 33.8   33.8   33.8          33.8   33.8   33.8   33.8   33.8
   VMT Mix:  0.613  0.197  0.078         0.031  0.002  0.001  0.072  0.005
0Composite Emission Factors (Gm/Mile)
 VOC    HC:  2.25   2.30   4.92   3.04   5.76   0.57   0.77   3.25   5.71   2.66
 Exhst  CO: 17.67  18.97  45.11  26.39  64.52   1.25   1.94  10.74  29.43  21.02
 Exhst NOX:  1.84   1.82   2.84   2.11   4.48   1.37   1.38   9.34   0.87   2.53
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1MOBILE5A            2000,2003  SLIM PROGRAM
 MOBILE5a (26-Mar-93)
0I/M program selected:

0     Start year (January 1):                1984
      Pre-1981 MYR stringency rate:           22%
      First model year covered:              1968
      Last model year covered:               2020
      Waiver rate (pre-1981):                 5.%
      Waiver rate (1981 and newer):           5.%
      Compliance Rate:                       95.%
      Inspection type:                       Computerized Test and Repair
      Inspection frequency                   Annual
      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        Comp
       (Janl)  Covered    LDGV   LDGT1  LDGT2  HDGV    Type       Freq      Rate

 ATP   1984    1984-2020  Yes    Yes    Yes    Yes Test & Repair Annual    95.0%
0Air pump system disablements:        Yes  Catalyst removals:                  Yes
 Fuel inlet restrictor disablements: Yes  Tailpipe lead deposit test:          No
 EGR disablement:                     Yes  Evaporative system disablements:    Yes
 PCV system disablements:             Yes  Missing gas caps:                   Yes
0WASATCH FRONT
                      Minimum Temp: 33. (F)   Maximum Temp: 73. (F)
                      Period 1 RVP: 10.8      Period 2 RVP: 10.8 Period 2 Yr: 1992
0VOC HC emission factors include evaporative HC emission factors.
0
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0Emission factors are as of July 1st of the indicated calendar year.
0User supplied veh registration distributions.
0Cal. Year: 2000 Region: High Altitude: 5500. Ft.
I/M Program: Yes Ambient Temp: 60.5 / 60.5 / 60.5 F
Anti-tam. Program: Yes Operating Mode: 20.6 / 27.3 / 20.6
Reformulated Gas: No

0Veh. Type: +	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Spd.:	33.8	33.8	33.8		33.8	33.8	33.8	33.8	33.8	
VMT Mix:	0.603	0.203	0.079		0.031	0.001	0.001	0.077	0.005	
0Composite Emission Factors (Gm/Mile)										
VOC HC:	2.05	2.05	4.17	2.65	4.62	0.47	0.59	3.15	5.66	2.40
Exhst CO:	15.24	16.43	38.03	22.49	46.69	1.07	1.63	10.55	29.43	17.92
Exhst NOX:	1.70	1.64	2.95	2.01	4.10	1.19	1.16	7.69	0.87	2.32

0Emission factors are as of July 1st of the indicated calendar year.
0User supplied veh registration distributions.
0Cal. Year: 2003 Region: High Altitude: 5500. Ft.
I/M Program: Yes Ambient Temp: 60.5 / 60.5 / 60.5 F
Anti-tam. Program: Yes Operating Mode: 20.6 / 27.3 / 20.6
Reformulated Gas: No

0Veh. Type: +	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Spd.:	33.8	33.8	33.8		33.8	33.8	33.8	33.8	33.8	
VMT Mix:	0.593	0.206	0.080		0.031	0.002	0.002	0.082	0.004	
0Composite Emission Factors (Gm/Mile)										
VOC HC:	1.91	1.92	3.60	2.39	4.04	0.43	0.57	3.10	5.66	2.22
Exhst CO:	14.06	15.42	31.37	19.86	35.74	0.99	1.55	10.46	29.43	16.12
Exhst NOX:	1.60	1.51	2.84	1.88	3.91	1.11	1.11	6.66	0.87	2.17

1MOBILE5A 1996,1997,2000,2003 DAIM PROGRAM
MOBILE5a (26-Mar-93)
0I/M program selected:

0	Start year (January 1):	1984
	Pre-1981 MYR stringency rate:	22%
	First model year covered:	1968
	Last model year covered:	2020
	Waiver rate (pre-1981):	5.%
	Waiver rate (1981 and newer):	5.%
	Compliance Rate:	95.%
	Inspection type:	Computerized Test and Repair
	Inspection frequency	Annual
	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	

0Emission factors are as of July 1st of the indicated calendar year.
0User supplied veh registration distributions.
0Cal. Year: 1997 Region: High Altitude: 5500. Ft.
I/M Program: Yes Ambient Temp: 60.5 / 60.5 / 60.5 F
Anti-tam. Program: No Operating Mode: 20.6 / 27.3 / 20.6
Reformulated Gas: No

0Veh. Type: +	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Spd.:	33.8	33.8	33.8		33.8	33.8	33.8	33.8	33.8	
VMT Mix:	0.613	0.197	0.078		0.031	0.002	0.001	0.072	0.005	
0Composite Emission Factors (Gm/Mile)										
VOC HC:	2.15	2.56	5.49	3.39	5.93	0.57	0.77	3.25	5.71	2.70
Exhst CO:	16.67	22.08	52.23	30.64	69.78	1.25	1.94	10.74	29.43	21.74
Exhst NOX:	1.84	1.94	3.03	2.25	4.53	1.37	1.38	9.34	0.87	2.57

0Emission factors are as of July 1st of the indicated calendar year.
0User supplied veh registration distributions.
0Cal. Year: 2000 Region: High Altitude: 5500. Ft.
I/M Program: Yes Ambient Temp: 60.5 / 60.5 / 60.5 F
Anti-tam. Program: No Operating Mode: 20.6 / 27.3 / 20.6
Reformulated Gas: No

0Veh. Type: +	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Spd.:	33.8	33.8	33.8		33.8	33.8	33.8	33.8	33.8	
VMT Mix:	0.603	0.203	0.079		0.031	0.001	0.001	0.077	0.005	
0Composite Emission Factors (Gm/Mile)										
VOC HC:	1.97	2.36	4.81	3.05	4.89	0.47	0.59	3.15	5.66	2.47
Exhst CO:	14.39	19.32	45.14	26.57	50.82	1.07	1.63	10.55	29.43	18.69
Exhst NOX:	1.71	1.76	3.14	2.15	4.18	1.19	1.16	7.69	0.87	2.36

0Emission factors are as of July 1st of the indicated calendar year.
0User supplied veh registration distributions.
0Cal. Year: 2003 Region: High Altitude: 5500. Ft.
I/M Program: Yes Ambient Temp: 60.5 / 60.5 / 60.5 F
Anti-tam. Program: No Operating Mode: 20.6 / 27.3 / 20.6
Reformulated Gas: No

0Veh. Type: +	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Spd.:	33.8	33.8	33.8		33.8	33.8	33.8	33.8	33.8	
VMT Mix:	0.593	0.206	0.080		0.031	0.002	0.002	0.082	0.004	
0Composite Emission Factors (Gm/Mile)										
VOC HC:	1.84	2.22	4.23	2.78	4.34	0.43	0.57	3.10	5.66	2.30
Exhst CO:	13.36	18.20	38.14	23.75	39.23	0.99	1.55	10.46	29.43	16.92
Exhst NOX:	1.61	1.63	3.02	2.02	4.02	1.11	1.11	6.66	0.87	2.21

```
1MOBILE5A              1996-7   SLIM PROGRAM
 MOBILE5a (26-Mar-93)
0I/M program selected:

0     Start year (January 1):                1984
      Pre-1981 MYR stringency rate:           22%
      First model year covered:              1968
      Last model year covered:               2020
      Waiver rate (pre-1981):                 5.%
      Waiver rate (1981 and newer):           5.%
      Compliance Rate:                       95.%
      Inspection type:                       Computerized Test and Repair
      Inspection frequency                   Annual
      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        Comp
       (Janl)  Covered    LDGV   LDGT1  LDGT2  HDGV    Type       Freq      Rate

 ATP   1984    1984-2020  Yes    Yes    Yes    Yes Test & Repair Annual    95.0%
0Air pump system disablements:        Yes  Catalyst removals:                  Yes
 Fuel inlet restrictor disablements: Yes  Tailpipe lead deposit test:          No
 EGR disablement:                     No   Evaporative system disablements:    No
 PCV system disablements:             No   Missing gas caps:                   No
0WASATCH FRONT
                     Minimum Temp: 33. (F)   Maximum Temp: 73. (F)
                     Period 1 RVP: 10.8      Period 2 RVP: 10.8 Period 2 Yr: 1992
0VOC HC emission factors include evaporative HC emission factors.
0_____________________________________________________________________________
0Emission factors are as of July 1st of the indicated calendar year.
0User supplied veh registration distributions.
0Cal. Year: 1996            Region: High          Altitude: 5500. Ft.
                       I/M Program: Yes       Ambient Temp:   60.5 / 60.5 / 60.5 F
                 Anti-tam. Program: Yes     Operating Mode:   20.6 / 27.3 / 20.6
                  Reformulated Gas: No
0Veh. Type:  LDGV  LDGT1  LDGT2   LDGT   HDGV   LDDV   LDDT   HDDV   MC   All Veh
+
 Veh. Spd.: 33.8   33.8   33.8          33.8   33.8   33.8   33.8   33.8
   VMT Mix:  0.617  0.195  0.078         0.031  0.003  0.001  0.071  0.005
0Composite Emission Factors (Gm/Mile)
 VOC    HC:  2.30   2.37   5.26   3.19   6.16   0.59   0.84   3.30   5.74   2.75
 Exhst  CO: 18.44  20.00  48.43  28.11  70.68   1.31   2.08  10.83  29.43  22.14
 Exhst NOX:  1.89   1.88   2.87   2.17   4.57   1.42   1.47  10.05   0.87   2.62
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0Functional Check Program Description:

0Check	Start (Jan1)	Model Yrs Covered	Vehicle Classes Covered LDGV	LDGT1	LDGT2	HDGV	Inspection Type	Freq	Comp Rate
ATP	1984	1984-2020	Yes	Yes	Yes	Yes	Test & Repair	Annual	95.0%

0Air pump system disablements: Yes
Fuel inlet restrictor disablements: Yes
EGR disablement: Yes
PCV system disablements: Yes
Catalyst removals: Yes
Tailpipe lead deposit test: No
Evaporative system disablements: Yes
Missing gas caps: Yes

0WEBER COUNTY

Minimum Temp: 33. (F) Maximum Temp: 73. (F)
Period 1 RVP: 10.8 Period 2 RVP: 10.8 Period 2 Yr: 1992

0VOC HC emission factors include evaporative HC emission factors.

0

0Emission factors are as of July 1st of the indicated calendar year.
0User supplied veh registration distributions.

0Cal. Year: 1996 Region: High Altitude: 5500. Ft.
I/M Program: Yes Ambient Temp: 60.5 / 60.5 / 60.5 F
Anti-tam. Program: Yes Operating Mode: 20.6 / 27.3 / 20.6
Reformulated Gas: No

0Veh. Type: +	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Spd.:	33.8	33.8	33.8		33.8	33.8	33.8	33.8	33.8	
VMT Mix:	0.617	0.195	0.078		0.031	0.003	0.001	0.071	0.005	
0Composite Emission Factors (Gm/Mile)										
VOC HC:	2.29	2.32	5.23	3.15	6.09	0.59	0.84	3.30	5.74	2.72
Exhst CO:	18.44	20.00	48.43	28.11	70.68	1.31	2.08	10.83	29.43	22.14
Exhst NOX:	1.89	1.88	2.87	2.17	4.57	1.42	1.47	10.05	0.87	2.62

0Emission factors are as of July 1st of the indicated calendar year.
0User supplied veh registration distributions.

0Cal. Year: 1997 Region: High Altitude: 5500. Ft.
I/M Program: Yes Ambient Temp: 60.5 / 60.5 / 60.5 F
Anti-tam. Program: Yes Operating Mode: 20.6 / 27.3 / 20.6
Reformulated Gas: No

0Veh. Type: +	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Spd.:	33.8	33.8	33.8		33.8	33.8	33.8	33.8	33.8	
VMT Mix:	0.613	0.197	0.078		0.031	0.002	0.001	0.072	0.005	
0Composite Emission Factors (Gm/Mile)										
VOC HC:	2.24	2.25	4.87	3.00	5.68	0.57	0.77	3.25	5.71	2.64
Exhst CO:	17.67	18.97	45.11	26.39	64.52	1.25	1.94	10.74	29.43	21.02
Exhst NOX:	1.84	1.82	2.84	2.11	4.48	1.37	1.38	9.34	0.87	2.53

0Emission factors are as of July 1st of the indicated calendar year.
0User supplied veh registration distributions.
0Cal. Year: 2000 Region: High Altitude: 5500. Ft.
I/M Program: Yes Ambient Temp: 60.5 / 60.5 / 60.5 F
Anti-tam. Program: Yes Operating Mode: 20.6 / 27.3 / 20.6
Reformulated Gas: No

0Veh. Type: +	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Spd.:	33.8	33.8	33.8		33.8	33.8	33.8	33.8	33.8	
VMT Mix:	0.603	0.203	0.079		0.031	0.001	0.001	0.077	0.005	
0Composite Emission Factors (Gm/Mile)										
VOC HC:	2.05	2.05	4.17	2.65	4.62	0.47	0.59	3.15	5.66	2.40
Exhst CO:	15.24	16.43	38.03	22.49	46.69	1.07	1.63	10.55	29.43	17.92
Exhst NOX:	1.70	1.64	2.95	2.01	4.10	1.19	1.16	7.69	0.87	2.32

0Emission factors are as of July 1st of the indicated calendar year.
0User supplied veh registration distributions.
0Cal. Year: 2003 Region: High Altitude: 5500. Ft.
I/M Program: Yes Ambient Temp: 60.5 / 60.5 / 60.5 F
Anti-tam. Program: Yes Operating Mode: 20.6 / 27.3 / 20.6
Reformulated Gas: No

0Veh. Type: +	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Spd.:	33.8	33.8	33.8		33.8	33.8	33.8	33.8	33.8	
VMT Mix:	0.593	0.206	0.080		0.031	0.002	0.002	0.082	0.004	
0Composite Emission Factors (Gm/Mile)										
VOC HC:	1.91	1.92	3.60	2.39	4.04	0.43	0.57	3.10	5.66	2.22
Exhst CO:	14.06	15.42	31.37	19.86	35.74	0.99	1.55	10.46	29.43	16.12
Exhst NOX:	1.60	1.51	2.84	1.88	3.91	1.11	1.11	6.66	0.87	2.17

1MOBILE5A 1993-1996,2000-2003 UTIM PROGRAM
MOBILE5a (26-Mar-93)
0I/M program selected:

0 Start year (January 1): 1984
Pre-1981 MYR stringency rate: 22%
First model year covered: 1968
Last model year covered: 2020
Waiver rate (pre-1981): 5.%
Waiver rate (1981 and newer): 5.%
Compliance Rate: 95.%
Inspection type: Computerized Test and Repair
Inspection frequency Annual
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 (Janl)	Model Yrs Covered	Vehicle Classes Covered LDGV	LDGT1	LDGT2	HDGV	Inspection Type	Freq	Comp Rate
ATP	1984	1977-2020	Yes	Yes	Yes	Yes	Test & Repair	Annual	95.0%

0Air pump system disablements: Yes
Fuel inlet restrictor disablements: Yes
EGR disablement: No
PCV system disablements: No
Catalyst removals: Yes
Tailpipe lead deposit test: No
Evaporative system disablements: No
Missing gas caps: No

0WASATCH FRONT

Minimum Temp: 33. (F) Maximum Temp: 73. (F)
Period 1 RVP: 10.8 Period 2 RVP: 10.8 Period 2 Yr: 1992

0VOC HC emission factors include evaporative HC emission factors.

0

0Emission factors are as of July 1st of the indicated calendar year.
0User supplied veh registration distributions.

0Cal. Year: 1996 Region: High Altitude: 5500. Ft.
I/M Program: Yes Ambient Temp: 60.5 / 60.5 / 60.5 F
Anti-tam. Program: Yes Operating Mode: 20.6 / 27.3 / 20.6
Reformulated Gas: No

0Veh. Type: +	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Spd.:	33.8	33.8	33.8		33.8	33.8	33.8	33.8	33.8	
VMT Mix:	0.617	0.195	0.078		0.031	0.003	0.001	0.071	0.005	
0Composite Emission Factors (Gm/Mile)										
VOC HC:	2.29	2.35	5.16	3.15	6.16	0.59	0.84	3.30	5.74	2.73
Exhst CO:	18.25	19.79	47.30	27.64	70.67	1.31	2.08	10.83	29.43	21.89
Exhst NOX:	1.88	1.88	2.87	2.17	4.57	1.42	1.47	10.05	0.87	2.61

0Emission factors are as of July 1st of the indicated calendar year.
0User supplied veh registration distributions.

0Cal. Year: 1997 Region: High Altitude: 5500. Ft.
I/M Program: Yes Ambient Temp: 60.5 / 60.5 / 60.5 F
Anti-tam. Program: Yes Operating Mode: 20.6 / 27.3 / 20.6
Reformulated Gas: No

0Veh. Type: +	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Spd.:	33.8	33.8	33.8		33.8	33.8	33.8	33.8	33.8	
VMT Mix:	0.613	0.197	0.078		0.031	0.002	0.001	0.072	0.005	
0Composite Emission Factors (Gm/Mile)										
VOC HC:	2.24	2.29	4.83	3.01	5.76	0.57	0.77	3.25	5.71	2.65
Exhst CO:	17.53	18.82	44.14	26.01	64.51	1.25	1.94	10.74	29.43	20.83
Exhst NOX:	1.83	1.82	2.84	2.11	4.48	1.37	1.38	9.34	0.87	2.53

```
1MOBILE5A              2000,2003   UTIM PROGRAM
 MOBILE5a (26-Mar-93)
0I/M program selected:

0     Start year (January 1):                1984
      Pre-1981 MYR stringency rate:           22%
      First model year covered:              1968
      Last model year covered:               2020
      Waiver rate (pre-1981):                 5.%
      Waiver rate (1981 and newer):           5.%
      Compliance Rate:                       95.%
      Inspection type:                       Computerized Test and Repair
      Inspection frequency                   Annual
      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        Comp
       (Janl)  Covered    LDGV   LDGT1  LDGT2  HDGV    Type       Freq      Rate

 ATP   1984    1977-2020  Yes    Yes    Yes    Yes Test & Repair Annual    95.0%
0Air pump system disablements:       Yes  Catalyst removals:                  Yes
 Fuel inlet restrictor disablements: Yes  Tailpipe lead deposit test:          No
 EGR disablement:                    Yes  Evaporative system disablements:    Yes
 PCV system disablements:            Yes  Missing gas caps:                   Yes
0WASATCH FRONT
                      Minimum Temp: 33. (F)   Maximum Temp: 73. (F)
                      Period 1 RVP: 10.8      Period 2 RVP: 10.8 Period 2 Yr: 1992
0VOC HC emission factors include evaporative HC emission factors.
0
0Emission factors are as of July 1st of the indicated calendar year.
0User supplied veh registration distributions.
0Cal. Year: 2000            Region: High          Altitude: 5500. Ft.
                      I/M Program: Yes       Ambient Temp:   60.5 / 60.5 / 60.5 F
                 Anti-tam. Program: Yes     Operating Mode:   20.6 / 27.3 / 20.6
                  Reformulated Gas: No
0Veh. Type:  LDGV  LDGT1  LDGT2   LDGT   HDGV   LDDV   LDDT   HDDV   MC   All Veh
+
 Veh. Spd.: 33.8   33.8   33.8          33.8   33.8   33.8   33.8   33.8
   VMT Mix:  0.603  0.203  0.079          0.031  0.001  0.001  0.077  0.005
0Composite Emission Factors (Gm/Mile)
 VOC    HC:  2.04   2.04   4.10   2.62   4.61   0.47   0.59   3.15   5.66   2.38
 Exhst  CO: 15.18  16.36  37.43  22.28  46.68   1.07   1.63  10.55  29.43  17.83
 Exhst NOX:  1.70   1.64   2.95   2.01   4.10   1.19   1.16   7.69   0.87   2.32
```

0Emission factors are as of July 1st of the indicated calendar year.
0User supplied veh registration distributions.
0Cal. Year: 2003 Region: High Altitude: 5500. Ft.
I/M Program: Yes Ambient Temp: 60.5 / 60.5 / 60.5 F
Anti-tam. Program: Yes Operating Mode: 20.6 / 27.3 / 20.6
Reformulated Gas: No

0Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
+										
Veh. Spd.:	33.8	33.8	33.8		33.8	33.8	33.8	33.8	33.8	
VMT Mix:	0.593	0.206	0.080		0.031	0.002	0.002	0.082	0.004	
0Composite Emission Factors (Gm/Mile)										
VOC HC:	1.91	1.92	3.57	2.38	4.04	0.43	0.57	3.10	5.66	2.22
Exhst CO:	14.04	15.39	31.13	19.78	35.74	0.99	1.55	10.46	29.43	16.08
Exhst NOX:	1.60	1.51	2.84	1.88	3.91	1.11	1.11	6.66	0.87	2.16

1MOBILE5A 1996,1997,2000,2003 WBIM PROGRAM
MOBILE5a (26-Mar-93)
0I/M program selected:

0 Start year (January 1): 1991
Pre-1981 MYR stringency rate: 22%
First model year covered: 1968
Last model year covered: 2020
Waiver rate (pre-1981): 5.%
Waiver rate (1981 and newer): 5.%
Compliance Rate: 95.%
Inspection type: Computerized Test and Repair
Inspection frequency Annual
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 (Janl)	Model Yrs Covered	Vehicle Classes Covered LDGV	LDGT1	LDGT2	HDGV	Inspection Type	Freq	Comp Rate
ATP	1991	1990-2020	Yes	Yes	Yes	Yes	Test & Repair	Annual	95.0%

0Air pump system disablements: Yes Catalyst removals: Yes
Fuel inlet restrictor disablements: Yes Tailpipe lead deposit test: No
EGR disablement: Yes Evaporative system disablements: Yes
PCV system disablements: Yes Missing gas caps: Yes
0WEBER COUNTY
Minimum Temp: 33. (F) Maximum Temp: 73. (F)
Period 1 RVP: 10.8 Period 2 RVP: 10.8 Period 2 Yr: 1992
0VOC HC emission factors include evaporative HC emission factors.
0

0Emission factors are as of July 1st of the indicated calendar year.
0User supplied veh registration distributions.

0Cal. Year: 1996 Region: High Altitude: 5500. Ft.
I/M Program: Yes Ambient Temp: 60.5 / 60.5 / 60.5 F
Anti-tam. Program: Yes Operating Mode: 20.6 / 27.3 / 20.6
Reformulated Gas: No

0Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Spd.:	33.8	33.8	33.8		33.8	33.8	33.8	33.8	33.8	
VMT Mix:	0.617	0.195	0.078		0.031	0.003	0.001	0.071	0.005	
0Composite Emission Factors (Gm/Mile)										
VOC HC:	2.32	2.43	5.45	3.29	6.14	0.59	0.84	3.30	5.74	2.78
Exhst CO:	18.77	20.85	51.16	29.50	70.82	1.31	2.08	10.83	29.43	22.72
Exhst NOX:	1.90	1.94	3.00	2.24	4.57	1.42	1.47	10.05	0.87	2.65

0Emission factors are as of July 1st of the indicated calendar year.
0User supplied veh registration distributions.

0Cal. Year: 1997 Region: High Altitude: 5500. Ft.
I/M Program: Yes Ambient Temp: 60.5 / 60.5 / 60.5 F
Anti-tam. Program: Yes Operating Mode: 20.6 / 27.3 / 20.6
Reformulated Gas: No

0Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Spd.:	33.8	33.8	33.8		33.8	33.8	33.8	33.8	33.8	
VMT Mix:	0.613	0.197	0.078		0.031	0.002	0.001	0.072	0.005	
0Composite Emission Factors (Gm/Mile)										
VOC HC:	2.26	2.34	5.09	3.12	5.74	0.57	0.77	3.25	5.71	2.69
Exhst CO:	17.93	19.65	47.60	27.59	64.66	1.25	1.94	10.74	29.43	21.51
Exhst NOX:	1.85	1.86	2.96	2.17	4.49	1.37	1.38	9.34	0.87	2.56

0Emission factors are as of July 1st of the indicated calendar year.
0User supplied veh registration distributions.

0Cal. Year: 2000 Region: High Altitude: 5500. Ft.
I/M Program: Yes Ambient Temp: 60.5 / 60.5 / 60.5 F
Anti-tam. Program: Yes Operating Mode: 20.6 / 27.3 / 20.6
Reformulated Gas: No

0Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Spd.:	33.8	33.8	33.8		33.8	33.8	33.8	33.8	33.8	
VMT Mix:	0.603	0.203	0.079		0.031	0.001	0.001	0.077	0.005	
0Composite Emission Factors (Gm/Mile)										
VOC HC:	2.06	2.10	4.37	2.73	4.70	0.47	0.59	3.15	5.66	2.43
Exhst CO:	15.36	16.76	39.90	23.25	46.91	1.07	1.63	10.55	29.43	18.21
Exhst NOX:	1.71	1.67	3.05	2.05	4.11	1.19	1.16	7.69	0.87	2.33

0Emission factors are as of July 1st of the indicated calendar year.
0User supplied veh registration distributions.

0Cal. Year: 2003 Region: High Altitude: 5500. Ft.
I/M Program: Yes Ambient Temp: 60.5 / 60.5 / 60.5 F
Anti-tam. Program: Yes Operating Mode: 20.6 / 27.3 / 20.6
Reformulated Gas: No

0Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Spd.:	33.8	33.8	33.8		33.8	33.8	33.8	33.8	33.8	
VMT Mix:	0.593	0.206	0.080		0.031	0.002	0.002	0.082	0.004	
0Composite Emission Factors (Gm/Mile)										
VOC HC:	1.92	1.94	3.74	2.44	4.10	0.43	0.57	3.10	5.66	2.24
Exhst CO:	14.10	15.56	32.51	20.28	35.90	0.99	1.55	10.46	29.43	16.27
Exhst NOX:	1.61	1.52	2.91	1.91	3.91	1.11	1.11	6.66	0.87	2.17

METHODOLOGY AND DOCUMENTATION OF ON-ROAD MOBILE EMISSIONS IN THE SL/DAVIS OZONE NAA DURING THE 1990 OZONE SEASON AND CALENDAR YEAR

Several sources, references, and agencies provided key information used to calculate the on-road mobile emissions. An introduction to each source is listed below after the item provided, refined, or impacted by that source. Each of these items will be discussed later within the body or appendix of this section.

VEHICLE MILES OF TRAVEL (VMT): Wasatch Front Regional Council (WFRC), Utah Department of Transportation (UDOT), Highway Performance Monitoring System (HPMS), MINUTP software.

VEHICLE SPEEDS: Wasatch Front Regional Council (WFRC), Utah Department of Transportation (UDOT), Highway Performance Monitoring System (HPMS), MINUTP software.

VEHICLE I/M AND ANTI-TAMPERING PROGRAMS: Salt Lake and Davis County Health Department records.

AMBIENT AIR TEMPERATURES: National Oceanic and Atmospheric Administration (NOAA) publications.

VEHICLE AGE AND MIX: Utah State Tax Commission database.

REID VAPOR PRESSURE: Division of Air Quality (UDAQ) records, Petroleum representatives.

VEHICLE EMISSION FACTORS: MOBILE5a software.

The HPMS formed the basis for the numbers declared in the UDOT report entitled "1990 VMT By County, City, and FC" dated July 30, 1991. This UDOT summary (hereafter UDOT7-91) is an itemized list of VMT occurring on each of 12 functional classes of roadway in each of 16 areas in Davis County and 13 areas in Salt Lake County. UDOT apportioned VMT to each of the towns and cities within the two counties that comprise the NAA. These towns and cities are listed below:

Davis County: Bountiful, Centerville, Clearfield, Clinton, Farmington, Fruit Heights, Kaysville, Layton, North Salt Lake, South Weber, Sunset, Syracuse, West Bountiful, West Point, and Woods Cross. Areas within Davis County not counted above collectively comprise a final area. (16 total areas in Davis County).

Salt Lake County: Alta, Bluffdale, Draper, Midvale, Murray, Riverton, Salt Lake City, Sandy, South Jordan, South Salt Lake, West Jordan, and West Valley City. Areas within

Salt Lake County not counted above collectively comprise a final area. (13 total areas in Salt Lake County.)

WFRC, the recognized MPO in the NAA, used UDOT's VMT as a starting point for the adjustments discussed in Matt Riffkin's memorandum dated November 6, 1992. Matt's summary document (hereafter WFRC11-92) reassigns the UDOT estimates from functional classification (FC) to physical conditions. WFRC11-92 uses number of lanes as a basis for roadway physical condition. In place of the twelve FC used in UDOT7-91, five road types are given. Urban and rural roadways were combined, and the headings of major arterial, minor collector, and major collector were replaced with the grouping of 1-lane, 2-lane, and 3-or-more lane roadways. Interstate and local roadways retained their HPMS definitions. The distinction between urban and rural roadways was not maintained in WFRC11-92 due to the urban/quasi-rural nature of the entire NAA.

The twelve roadway classes in list A were reduced to the five classes in list B:

LIST A

Rural Interstates	Urban Interstates
Rural Major Arterials	Urban Major Arterials
Rural Minor Arterials	Urban Minor Arterials
Rural Major Collectors	Urban Major Collectors
Rural Minor Collectors	Urban Minor Collectors
Rural Local	Urban Local

LIST B

All Interstates
All 3+ Lane Arterials/Collectors
All 2 Lane Arterials/Collectors
All 1 Lane Arterial/Collectors
All Local Roads.

UDAQ used the March 26, 1993 edition of the MOBILE5a software to determine representative emission factors. The Salt Lake and Davis Health Departments measured, estimated, or confirmed the Inspection/Maintenance and anti-tampering programs in each of their respective counties.

Since the Salt Lake/Davis ozone NAA follows the VMT tracking boundaries of these two counties, no area-related adjustments are needed. MOBILE runs were done separately for each county since the anti-tampering parameters were slightly different in 1990. (In September 1991, Salt Lake and Davis programs were made identical.)

Annual VMT was adjusted to obtain typical summer weekday VMT as discussed by Matt Riffkin of WFRC in his memorandum dated November 6, 1992. The method used to apportion VMT among the functional systems is left to WFRC11-92 for explanation.

UDOT's traffic counts are reported in AADT (average annual daily traffic). WFRC applied adjustment factors to convert annual counts to seasonal summer counts, and average daily to average weekday counts. A single adjustment factor was applied to all road types. The conversion equations applied are (average daily VMT x 1.0855 = average weekday VMT) and (average weekday VMT x 1.018 = average summer weekday VMT). The inverse equations were used when needed.

The emission factors were calculated based on average speeds on each of five roadway types in each of two counties over 24 time periods during a 24-hour weekday. Only two speeds for a given road type are determined; one speed for peak hour traffic and another for off-peak traffic. The average summer weekday VMT is distributed unevenly over 24 one-hour periods as defined in Table 6 of the WFRC11-92 report. The road types and speeds are given in the table below.

Speeds used for each roadway type:

	Davis County Peak/Off Peak (mph/mph)	Salt Lake County Peak/Off Peak (mph/mph)
Interstate	37.4/53.8	40.6/49.1
1 Lane Art/Col*	26.0/35.2	16.1/33.2
2 Lane Art/Col*	25.6/41.2	18.8/32.9
3+Lane Art/Col*	32.0/41.2	25.7/35.0
Local	20.0/20.0	20.0/20.0

*Art/Col refers to the combined group of arterial and collector roads.

MOBILE INPUT PARAMETERS:

TAMFLG=1, meaning that MOBILE5a tampering rates were used.

SPDFLG=1, meaning that one average speed was used for all vehicle types traveling a given road type during a given period of the day.

VMFLAG=1, meaning that MOBILE5a VMT mix was used.

MYMFLG=3, meaning that local registration distribution by age data was used in tandem with MOBILE5a mileage accumulation rates. The local registration distribution data was extracted from Utah State Tax Commission records of vehicles registered to residents

declaring Salt Lake or Davis County as their residence. The database represents registration data current July 1992. The assumption was made that vehicles registered in the two-county area adequately represented all vehicles that drive within the two-county ozone NAA. Although it is assumed that many other vehicles enter the NAA, the assumption was made that these added vehicles were significantly similar to local vehicles that the normalized vehicle type and age matrix would not change.

A copy of the gross vehicle counts and the spreadsheet normalizing the counts into the format compatible with MOBILE5a is included in the appendix. More precisely, the pathway from the Tax Commission (TC) database to the MOBILE5a matrix was as follows:

(1) Since TC database does not use the eight terms that identify vehicle type in the MOBILE model (i.e. LDGV, LDGT1, LDGT2,...), it was necessary to convert groups from the TC database to fit MOBILE5a format. TC records identify the gross vehicle weight (GVW) in increments of 1000 lbs. The MOBILE5a definition of LDGT2 and HDGV cover the weight classes between "6001 to 8500 lbs GVW", and "8500 lbs and above" respectively. Since the 8500 lb cutoff does not fall on a 1000 lb increment, all gasoline trucks under 9000 lbs GVW were defined as LDGT2, and above 9000 lbs GVW were defined as HDGV. The same applied when dividing LDDT and HDDV.

TC records defined model year, vehicle type (passenger car, pickup, motorcycle), fuel type, and county of registration. No added assumptions were needed to align TC records to match MOBILE5a headings.

(2) Bill Harris, UDAQ, extracted all needed data from TC tapes and produced the file entitled TAX.XLS and dated 7/9/92. (See appendix.) This file lists raw vehicle counts for each of the eight vehicle types for each of 25 model years (with the 25th year accounting for vehicles 25 and older.) This was repeated for each of the 29 counties in the state. The matrix for each county has 200 raw values (8 types x 25 years) to define its vehicle makeup.

(3) The assumption was made that vehicles registered in Davis and SL counties move freely throughout the entire two-county NAA; therefore, the 200 raw values for Davis County were added to the 200 raw values for Salt Lake County, giving 200 values for the NAA.

(4) Section 2.2.3.4, paragraph 4, (page 2-25), of the MOBILE5a manual states that the matrix values that define LDGVs and LDDVs must list the same registration distribution by age. LDGT1s and LDDTs must also be identical to one another. In explanation, it states that the software contains an internal function to separate these pairs of vehicle types into distinct gas and diesel distributions, based on diesel sales fractions by model year. For this

reason, the values for each of these pairs were added together. Later, the model will separate them internally.

(5) The resulting 200 raw vehicle counts for the two-county area were normalized (set equal to 1.000) within each of the eight vehicle classes.

(6) TC data generated 25 values (covering 25 years) of motorcycle data. However, Section 2.2.3.4, pargraph 2, (page 2-25), of the MOBILE5a manual states that only 12 years of motorcycles (MC) should be included in the MYR matrix. It states that zeros (.000) should be entered for MC ages 13 through 25. The necessity of this statement is not clear, but it was followed as advised. MC years 13 through 25 were set to zero and MC years 1 through 12 were normalized again.

(7) The resulting 200 values were transferred to the MYR matrix within MOBILE5a.

(8) Dry runs of MOBILE produced warning #49 with an explanation that the MYR sum was not precisely equal to "1" and that the model had normalized to "1". The departure from an exact "1" was only a few 1/000th at most. The departures were due to collective roundoff errors. To mitigate any departure, I adjusted the 25th model year by a nominal amount to remove some of these departures.

NEWFLG=1, meaning that Mobile5a default exhaust emission rates were used.

IMFLAG=2, meaning that Salt Lake Inspection and Maintenance parameters were included as part of the input data for the portion of the ozone NAA that falls within Salt Lake County. Likewise, Davis County I/M parameters were applied to the Davis County portion of the NAA. Every part of the NAA is under one of the two I/M programs. These I/M parameters are defined as follows:

Salt Lake and Davis County:

Program start year	1984
Pre-1981 MYR stringency rate	22%
First model year covered:	1968
Last model year covered:	2020
Waiver rate (pre-1981):	1%
Waiver rate (1981 and newer):	1%
Compliance Rate:	95%
Inspection Type:	Manual, test and repair
Inspection Frequency:	Annual

Vehicle types covered:	LDGV, LDGT1, LDGT2, and HDGV.
1981 & later MYR test type:	Idle
Cutpoints:	HC=220.00, CO=1.200, NOx=999.00

The majority of the I/M parameters listed above are common knowledge to UDAQ and Health Department officials. The three conditions that are not readily known are the stringency, waiver, and compliance rates. The two waiver rates are back up with data taken from Health Department reports. (See appendix.) The stringency rate could not be estimated more closely than the range between 20% to 25%. Twenty-two percent (22%) was arbitrarily selected within this range. The compliance rate has never been measured or surveyed; therefore, the default rate of 95% was accepted in both counties.

ALHFLG=1, meaning that load correction factors for air conditioning, extra heavy loads, trailer towing, and humidity were not made.

ATPFLG=2, meaning that Salt Lake and Davis anti-tampering program parameters were included as part of the input data for the portion of the ozone NAA that falls within Salt Lake and Davis Counties respectively. It was necessary to make separate MOBILE runs for each county in the NAA due to differences in ATP programs in each of the two counties. Every part of the NAA is under one of the two anti-tampering programs. These ATP parameters are defined as follows:

Salt Lake County

Program start year:	1984
First model year covered:	1984
Last model year covered:	2020
Vehicle types subject to ATP:	LDGV, LDGT1, LDGT2, and HDGV.
Program type:	test and repair
Inspection frequency:	annual
Compliance Rate:	95%
Inspections performed:	3 of 8
Air pump system	yes
Catalyst	yes
Fuel inlet restrictor	yes
Tailpipe lead deposit test	no
EGR system	no
Evaporative emission control	no
PCV system	no
Gas cap	no

Davis County. . . ..

Program start year:	1984
First model year covered:	1984
Last model year covered:	2020
Vehicle types subject to ATP:	LDGV, LDGT1, LDGT2, and HDGV.
Program type:	test and repair
Inspection frequency:	annual
Compliance Rate:	95%
Inspections performed:	7 of 8
Air pump system	yes
Catalyst	yes
Fuel inlet restrictor	yes
Tailpipe lead deposit test	no
EGR system	yes
Evaporative emission control	yes
PCV system	yes
Gas cap	yes

Similar to the statement made about I/M documentation, the majority of the ATP parameters listed are common knowledge to UDAQ and Health Department officials. The compliance rate has never been measured or surveyed; therefore, the default rate of 95% was accepted in both counties.

RLFLAG=1, meaning that uncontrolled refueling losses were calculated. Refueling losses at (a) the refineries were included as part of the point source inventory for each refinery, (b) the tanker truck losses from refinery to gasoline stations are included as part of the area source inventory , and the losses due to (c) the refueling of automobiles at gasoline stations are included as part of the mobile source inventory. MOBILE5a does not attempt to estimate (a) or (b).

TEMFLG=1, meaning that the ambient maximum and minimum temperatures will override the average ambient temperature defined in the model. The average maximum and average minimum temperatures (hereafter, Tmax and Tmin) corresponding to the ten highest ozone days were included in the input file. Tmax and Tmin are 97.8 and 62.6 degrees F.

To review the origin of the Tmax and Tmin, the reader is refers to the table labeled TMAXMIN.SP1, "Highest Ozone Days from state monitoring sites in the SL/Davis NAA for the period from January 1988 through December 1990" (see appendix). Fifty-eight (58) candidate highest ozone days were identified at the three monitoring sites within the NAA. These sites are located in Bountiful, Salt Lake City, and Cottonwood. Each of the three sites are approximately fifteen miles apart, dividing the NAA in near equal thirds. All 1-hr ozone readings equal and above 0.100 ppm were tabulated, resulting in the said 58 candidate days. Among these, the highest were easily identified. Only one highest reading from any of the

three stations was needed to add a specific day to the top-ten list. The highest readings were as follows: 0.143, 0.164, 0.121, 0.131, 0.143, 0.131, 0.121, 0.13, 0.19, 0.15, 0.14 ppm. Since the 10th and 11th rank ozone readings are identical to three digits of accuracy, all 11 days were included along with their corresponding max and min daily temperatures. Temperature data published by the National Oceanic and Atmospheric Administration (NOAA) identifies seven temperature stations within the NAA. Among these, two stations are nearest the geographical and VMT centroid; "Salt Lake Triad Center" and "Salt Lake City NWSFO." The first station is nearest the city center, but the second station is located at the headquarters of the national weather service and situated only two miles west of the first. It was believed that the second station would be more likely to report accurate and consistent information for any future needs, and the short distance west of the city center would be negligible.

Season Day Temperatures: The average Tmax and average Tmin for the collective eleven days are listed on the bottom of TMAXMIN.SP1. They are 97.8 and 62.6 degrees F respectively. These temperatures were rounded to 98 and 63 degrees to fit MOBILE5a format. MOBILE5a also required a value for Tambient. Tambient (as part of each scenario record) was set as the mean average of Tmax and Tmin, ([Tmax + Tmin]/2 = Tambient); therefore ([97.8 + 62.6]/2 = 80.2). These three temperatures were used only to determine ozone season day emissions.

Annual Temperatures: The 1990 average annual air temperature of 53.3 degrees F at the Salt Lake weather station (SLC NWSFO) was established as Tambient in the 1990 annual MOBILE5a input file. Tmax and Tmin were set at 20 degrees above and below Tambient; 73 and 33 degrees respectively. (If the daily temperature range exceeded 40 degrees, Warning #98 would appear in the MOBILE output file. A note stated that diurnal evaporative emission factors would be calculated, but may be inaccurate.)

NMHFLG=1, meaning that volatile organic compounds, not total hydrocarbons, are calculated and included in the inventory. Guidance suggests that VOCs, not THCs, contribute to ozone formation.

Local Area Parameters (LAP): The values defined on the LAP line are (1) the name of the study area - Salt Lake and Davis County separately; (2) volatility class -- A for ozone season and C for annual average; (3,4) minimum and maximum ambient air temperature -- 63 and 98 degrees F respectively for the ozone season, and 33 and 73 degrees F respectively for the annual; (5,6) two values for summertime reid vapor pressure and the conversion year -- 9.5, 7.8, 92 for the ozone season, and 11.5, 11.0, 92 for the annual; and (7,8,9) the flags for oxygenated fuel, diesel sales fraction, and reformulated gasoline are all set to the OFF position -- 1. It is noted that the setting for volatility class is believed to be no more than a space holder, since the RVP values define the pressures more precisely. It is also noted that the 1992 RVP conversion year is not used, since the 1990 base year is modelled.

The Reid Vapor Pressure (RVP) applied to the annual inventory was a weighted average based on the assigned changes in RVP from month to month. Petroleum refineries produce a gasoline with differing RVP throughout the year ranging from 9.0 to 15.0 psi. Refineries have the option to produce and sale gasoline with an RVP marginally under the target RVP but never over that RVP.

PERIOD COVERED	TARGET RVP (psi)
January, February	15.0
March, April	13.5
May, June, July, August, September	9.0
October	11.5
November	13.5
December	15.0

The number of months at each RVP are five months at 9.0, one month at 11.5, three months at 13.5, three months at 15.0.

A simple weighted average was determined as follows:

[5 (9) + 1 (11.5) + 3 (13.5) + 3 (15.0)] / 12 = 11.8 psi annual average RVP.

A review of the 1990 motor fuel sales data provided by the Utah State Tax Commission (TC) reveals that sales were not linear. Sales was higher during warm-weather months. By introducing statewide monthly fuel sales into the above equation results in an annual average RVP estimate of 11.6 psi. Fuel sold exclusively within the NAA was not readily available from TC records; however, it is believed that little error is introduced by using statewide sales patterns. (Monthly fuel sales and its effect on the RVP are detailed in a spreadsheet entitled "RVP.SP1". See appendix.)

The Scenario Records: The values defined on the first line of the first scenario record are (1) 5500 ft above MSL is nearer the NAA elevation of 4200 MSL when compared against the alternate elevation of 500 MSL -- flag set to 2; (2) calendar year modeled -- 1990; (3) vehicle speed for each diurnal period and roadway type -- off-peak interstate, off-peak 1-lane arterial/collectors, 2-lane arterial/collectors, and et al; (4) average ambient temperature -- 80.2 degrees F; (5,6,7) the operating mode splits for PCCN, PCNC, and PCCC respectively -- 20.6, 27.3, 20.6; and (8) the month for which emission factors are calculated -- 07 = July; the middle of the ozone season.

TEMFLG=1 states that Tmax and Tmin override Taverage; therefore, the declared value for Taverage is believed to have little or no effect on the output.

SUMMARY SPREADSHEETS:

With MOBILE5a calculations complete, all parts were combined in a spreadsheet entitled EI90-MOB.SP2. EI90-MOB.SP2 is comprised of six tables; three for each county within the NAA. Two tables cover VOC emissions, two cover NOx emission, and two cover CO emissions. The format is identical for each. The first two columns establish the hour of day and percent VMT provided by Matt Riffkin in WFRC11-92, Table 6. Columns 3, 4, 5, 6, and 7 apportion the VMT by road type. Column 8 distinguishes between peak and off-peak traffic periods. Columns 9, 10, 11, 12, and 13 give the grams of pollutant per VMT. These values are transferred directly from the MOBILE5a output files. Columns 14, 15, 16, 17, and 18 contain simple multiplication and unit conversion equations. These columns multiply each VMT column by its respective grams per VMT. It also converts units from grams to tons. Column 19 sums all road types. Up to now, the period of time represented by each value within the body of the spreadsheet is expressed for a given hour with a 24-hour weekday. Column 20 adjusts from summer weekday to average summer day on all ozone season tables, and from average annual weekday to average annual day on all annual tables. Column 21 declares total pollutant for the entire 92-day ozone season (June 1 - August 31) on all ozone tables, or total pollutant for the entire year (Jan 1 - Dec 31) on all annual tables. Column headings are labeled in abbreviated form. A summary description of these headings follow. Repetitive heads are not listed for all three pollutants.

Hour Beginning = The beginning point for each hourly interval; ie. "midnight" identifies the interval from midnight to 1a.m., "1AM" identifies the interval from 1:00 a.m. to 2:00 a.m., and so on.

Percent Summer Wkdy VMT = The percent of summer weekday vehicle miles of travel occurring within the defined one-hour increment.

Interstate, VMT = The average summer weekday VMT occurring on the interstate roads within the county boundaries.

2 lane, VMT = The average summer weekday VMT occurring on two-lane arterials and collectors within the county (similar for all other road types).

Speed Period = Peak verses off-peak indication.

Interstate, gVOC/vmt = Grams of volatile organic carbon per VMT at the speed linked to interstate travel during the peak or off-peak periods.

2 lane, gVOC/vmt = Grams of volatile organic carbon per VMT at the speed linked to two-lane roads during peak or off-peak periods (similar for all other road types).

Interstate, Tvoc/wdy = Tons of volatile organic compounds generated by interstate travel within the county over an average summer weekday.

2 lane, Tvoc/wdy = Tons of volatile organic compounds generated by travel on two-lane arterials and collectors within the county over an average summer weekday.

All Roads, Tvoc/wdy = Tons of VOCs generated by travel on all roads within the area over an average summer weekday.

All Roads, Tvoc/dy = Tons of VOCs generated by travel on all roads within the area over an average summer day.

All Roads, Tvoc/ozsn = Tons of VOCs generated from travel on all roads within the county over the entire 92-day ozone season.

Equations are as follows:

Column	EQUATION
1	no equation, hour of day labels only.
2	no equation, percent summer weekday VMT by hour of day only.
3	(interstate summer weekday VMT x fraction by hour)
4	(one-lane summer weekday VMT x percent by hour)
5	(two-lane summer weekday VMT x percent by hour)
6	(three-and-more lane summer weekday VMT x percent by hour)
7	(local road VMT x percent by hour)
8	no equation, peak v off-peak label by hour.
9	no equation, MOBILE interstate speeds listed as a label. Differs OP v PK.
10	no equation, MOBILE one-lane speeds listed as a label. Differs OP v PK.
11	no equation, MOBILE two-lane speeds listed as a label. Differs OP v PK.
12	no equation, MOBILE three+lane speeds listed. Differs OP v PK.
13	no equation, MOBILE local speeds listed. No difference OP v PK.
14	(interstate VMT x grams/VMT x lb/454 grams x ton/2000 lbs)
15	(one-lane VMT x grams/VMT x lb/454 grams x ton/2000 lbs)
16	(two-lane VMT x grams/VMT x lb/454 grams x ton/2000 lbs)
17	(three+lane VMT x grams/VMT x lb/454 grams x ton/2000 lbs)
18	(local VMT x grams/VMT x lb/454 grams x ton/2000 lbs)
19	(sum columns 14 + 15 + 16 + 17 + 18 = tons pollutant per weekday)
20	(tons per average weekday/1.0855 = tons per average day)
21: season day	(tons per average day x 92 ozone days = tons per ozone season)
21: year	(tons per average day x 365 days = tons during 1990 calendar year))

The on-road mobile contribution of VOC, NOx, and CO in Salt Lake and Davis counties are summarized as follows:

Expressed as TONS PER OZONE SEASON DAY:

	Davis County	Salt Lake County	Ozone NAA
VOC	18.88	84.08	102.96
NOx	12.77	46.96	59.73
CO	133.57	600.58	734.15

Expressed as TONS DURING 1990 CALENDAR YEAR:

	Davis County	Salt Lake County	Ozone NAA
VOC	5,713.92	25,979.59	31,308.86
NOx	5,053.58	18,531.94	23,585.52
CO	49,912.72	223,813.30	272,451.43

SL AND DAVIS COUNTIES The purpose of these tables is to arrive at the model year registration (MYR) matrix for input to MOBILE5a

Tables A and B are comprised of data taken directly from FAX XLS July 9, 1992.

TABLE A: SALT LAKE COUNTY: veh registration counts by model year and veh type

	MY 1992	MY 1991	MY 1990	MY 1989	MY 1988	MY 1987	MY 1986	MY 1985	MY 1984	MY 1983	MY 1982	MY 1981	MY 1980	MY 1979	MY 1978	MY 1977	MY 1976	MY 1975	MY 1974	MY 1973	MY 1972	MY 1971	MY 1970	MY 1969	1968 & -	Total
LDGV	14635	24050	23992	26118	27153	25141	26476	24540	24104	15755	13829	12904	13530	14257	12334	8900	6111	3686	3969	3437	2732	1814	1591	1470	11956	344484
LDGT1	3295	6556	5550	6429	5877	6582	6744	5600	5297	2796	2411	2186	2172	1980	1524	800	1009	672	662	405	342	450	230	269	2329	72162
LDGT2	1677	2981	3875	4003	3398	2462	3845	3937	3655	2213	1918	1999	1766	4793	5580	4886	3947	2445	2503	3178	2926	1561	1542	1459	3796	76340
HDGV	314	202	268	205	181	166	235	203	200	145	155	161	271	471	377	285	225	213	206	231	188	110	89	105	403	5609
LDDV	6	18	15	7	7	36	104	307	663	597	1038	1201	392	406	101	75	49	29	18	10	9	6	5	10	3	5112
LDDT	265	424	779	477	256	251	557	576	809	600	784	296	95	94	62	64	40	8	4	6	7	3	1	2	6	6466
HDDV	606	557	975	576	600	666	493	688	968	291	299	332	238	250	154	134	78	70	82	57	53	29	19	15	44	7876
MC	207	327	264	317	315	326	598	677	594	820	1358	1021	970	602	546	204	231	259	155	163	146	87	81	53	158	10459
total vehs	21007	35115	35718	38133	37782	35630	39052	36523	35890	23217	21772	20100	19434	22853	20678	15348	11690	7382	7599	7487	6403	4060	3558	3383	18695	528508

TABLE B: DAVIS COUNTY: vehicle registration counts by model year and vehicle type:

	MY 1992	MY 1991	MY 1990	MY 1989	MY 1988	MY 1987	MY 1986	MY 1985	MY 1984	MY 1983	MY 1982	MY 1981	MY 1980	MY 1979	MY 1978	MY 1977	MY 1976	MY 1975	MY 1974	MY 1973	MY 1972	MY 1971	MY 1970	MY 1969	1968 & -	Total
LDGV	1825	5811	6468	7328	7522	6671	7099	6198	5791	3756	3146	2798	2780	2810	2397	1640	1118	690	687	602	522	330	316	283	2772	81340
LDGT1	646	1398	1290	1646	1488	1650	1818	1482	1302	711	661	468	488	449	338	210	246	125	160	104	81	106	67	62	670	17666
LDGT2	303	605	847	979	882	595	1016	1043	884	528	501	456	401	1206	1331	1195	918	652	517	800	773	425	426	354	956	18593
HDGV	34	29	63	76	36	27	38	36	51	23	35	31	46	91	85	79	68	54	54	65	54	44	37	26	128	1310
LDDV	0	3	3	5	2	6	41	110	201	162	318	267	97	118	21	6	5	8	2	1	1	0	0	3	1	1361
LDDT	49	81	65	68	84	62	157	195	287	170	221	71	32	18	11	2	4	4	1	3	2	0	1	0	0	1566
HDDV	63	132	115	100	100	74	81	62	69	35	30	43	34	36	27	26	8	14	20	13	6	7	5	7	19	1106
MC	35	96	84	107	104	115	216	196	226	306	469	336	326	184	196	87	86	99	48	47	53	32	19	11	36	3534
total vehs	2975	8155	8935	10309	10198	9200	10446	9320	8811	5671	5381	4470	4204	4912	4406	3245	2453	1646	1489	1635	1492	944	871	746	4582	126496

TABLE C: COMBINED SL AND DV COUNTIES vehicle registration counts Sum of vehicles in tables A and B.

	MY 1992	MY 1991	MY 1990	MY 1989	MY 1988	MY 1987	MY 1986	MY 1985	MY 1984	MY 1983	MY 1982	MY 1981	MY 1980	MY 1979	MY 1978	MY 1977	MY 1976	MY 1975	MY 1974	MY 1973	MY 1972	MY 1971	MY 1970	MY 1969	1968 & -	Total
LDGV	16460	29861	30460	33446	34675	31812	33575	30738	29895	19491	16975	15702	16310	17067	14731	10540	7229	4376	4656	4039	3254	2144	1907	1753	14728	425824
LDGT1	3941	7954	6840	8075	7360	8237	8562	7082	6599	3507	3072	2654	2660	2429	1862	1010	1255	797	822	509	423	556	297	331	2999	89828
LDGT2	1980	3586	4722	4982	4280	3057	4861	4975	4539	2741	2419	2455	2167	5999	6911	6081	4865	3097	3020	3978	3699	1986	1968	1813	4752	94933
HDGV	348	231	331	281	217	193	273	239	251	168	190	192	317	562	462	364	293	267	260	296	242	154	126	131	531	6919
LDDV	6	21	18	12	9	42	145	417	864	759	1356	1468	489	524	122	81	54	37	20	11	10	6	5	13	4	6493
LDDT	314	505	844	545	320	313	714	769	1096	770	1005	367	127	112	73	66	44	12	5	9	9	3	2	2	6	8032
HDDV	671	689	1090	676	700	740	554	750	637	326	329	375	272	286	181	160	86	84	102	70	59	36	24	22	63	8982
MC	262	423	348	424	419	441	814	873	820	1126	1807	1357	1296	786	742	291	317	358	203	210	199	119	100	64	194	13993
total vehs	23982	43270	44653	48441	47980	44830	49498	45843	44701	28888	27153	24570	23638	27765	25084	18593	14143	9028	9088	9122	7895	5004	4429	4129	23277	655004

TABLE D: vehicle counts by model year.

MOBILE5a requires LDDT and LDGT1 to be combine Same with LDGV and LDDV. See manual Section 2.2.3.4. paragraph 4. (page 2-25)

	MY 1992	MY 1991	MY 1990	MY 1989	MY 1988	MY 1987	MY 1986	MY 1985	MY 1984	MY 1983	MY 1982	MY 1981	MY 1980	MY 1979	MY 1978	MY 1977	MY 1976	MY 1975	MY 1974	MY 1973	MY 1972	MY 1971	MY 1970	MY 1969	1968 & -	Total
LDGV.DV	16466	29882	30478	33458	34684	31854	33720	31155	30759	20250	18331	17170	16799	17591	14853	10621	7283	4413	4676	4050	3264	2150	1912	1766	14732	432317
LDGT1.DT	4255	8459	7684	8620	7680	8545	9276	7851	7695	4277	4077	3021	2787	2541	1935	1076	1299	809	827	518	432	559	299	333	3005	97860
LDGT2	1980	3586	4722	4982	4280	3057	4861	4975	4539	2741	2419	2455	2167	5999	6911	6081	4865	3097	3020	3978	3699	1986	1968	1813	4752	94933
HDGV	348	231	331	281	217	193	273	239	251	168	190	192	317	562	462	364	293	267	260	296	242	154	126	131	531	6919
LDDV.GV	16466	29882	30478	33458	34684	31854	33720	31155	30759	20250	18331	17170	16799	17591	14853	10621	7283	4413	4676	4050	3264	2150	1912	1766	14732	432317
LDDT.GT1	4255	8459	7684	8620	7680	8545	9276	7851	7695	4277	4077	3021	2787	2541	1935	1076	1299	809	827	518	432	559	299	333	3005	97860
HDDV	671	689	1090	676	700	740	554	750	637	326	329	375	272	286	181	160	86	84	102	70	59	36	24	22	63	8982
MC	262	423	348	424	419	441	814	873	820	1126	1807	1357	1296	786	742	291	317	358	203	210	199	119	100	64	194	13993
total vehs	23982	43270	44653	48441	47980	44830	49498	45843	44701	28888	27153	24570	23638	27765	25084	18593	14143	9028	9088	9122	7895	5004	4429	4129	23277	655004

TABLE E : fraction split by model year. (Values set equal to 1.000 within each vehicle type.)

	MY 1992	MY 1991	MY 1990	MY 1989	MY 1988	MY 1987	MY 1986	MY 1985	MY 1984	MY 1983	MY 1982	MY 1981	MY 1980	MY 1979	MY 1978	MY 1977	MY 1976	MY 1975	MY 1974	MY 1973	MY 1972	MY 1971	MY 1970	MY 1969	1968 & -	Total
LDGV,DV	0.03809	0.06912	0.0705	0.07739	0.08023	0.07368	0.078	0.07207	0.07115	0.04684	0.0474	0.03972	0.03886	0.04069	0.03436	0.02457	0.01685	0.01021	0.01082	0.00937	0.00755	0.00497	0.00442	0.00408	0.03408	1.00
LDG11,D1	0.04348	0.08644	0.07852	0.08809	0.07848	0.08732	0.09479	0.08023	0.07863	0.04371	0.04166	0.03087	0.02848	0.02597	0.01977	0.011	0.01327	0.00827	0.00845	0.00529	0.00441	0.00571	0.00306	0.0034	0.03071	1.00
LDG12	0.02086	0.03777	0.04974	0.05248	0.04508	0.0322	0.0512	0.05241	0.04781	0.02687	0.02548	0.02586	0.02283	0.06319	0.0728	0.06406	0.05125	0.03262	0.03181	0.0419	0.03896	0.02092	0.02073	0.0191	0.05006	1.00
HDGV	0.0503	0.03339	0.04784	0.04061	0.03136	0.02789	0.03946	0.03454	0.03628	0.02428	0.02746	0.02775	0.04582	0.08123	0.06677	0.05261	0.04235	0.03859	0.03758	0.04278	0.03498	0.02226	0.01821	0.01893	0.07675	1.00
LDDV,GV	0.03809	0.06912	0.0705	0.07739	0.08023	0.07368	0.078	0.07207	0.07115	0.04684	0.0474	0.03972	0.03886	0.04069	0.03436	0.02457	0.01685	0.01021	0.01082	0.00937	0.00755	0.00497	0.00442	0.00408	0.03408	1.00
LDD1,G11	0.04348	0.08644	0.07852	0.08809	0.07848	0.08732	0.09479	0.08023	0.07863	0.04371	0.04166	0.03087	0.02848	0.02597	0.01977	0.011	0.01327	0.00827	0.00845	0.00529	0.00441	0.00571	0.00306	0.0034	0.03071	1.00
HDDV	0.0747	0.07671	0.12135	0.07526	0.07793	0.08239	0.06168	0.0835	0.07092	0.03629	0.03663	0.04175	0.03028	0.03184	0.02015	0.01781	0.00957	0.00935	0.01136	0.00779	0.00657	0.00401	0.00267	0.00245	0.00701	1.00
MC	0.01872	0.03023	0.02481	0.0303	0.02994	0.03152	0.05817	0.06239	0.0586	0.08047	0.12914	0.09998	0.09262	0.05617	0.05303	0.0208	0.02265	0.02558	0.01451	0.01501	0.01422	0.0085	0.00715	0.00457	0.01386	1.00
Fiac by yr	0.03661	0.06606	0.06817	0.07396	0.07329	0.06844	0.07557	0.06999	0.06825	0.0441	0.04145	0.03751	0.03609	0.04219	0.0383	0.02839	0.02159	0.01378	0.01387	0.01393	0.01206	0.00764	0.00676	0.0063	0.03554	1.00
MC(1-12)	0.65133																									

TABLE F : Same as Table E except MC reduced to 12 years old and newer. MC 13-25 were redistributed over MC 1-12. Weighted redistribution. See manual Section 2.2.3.4, paragraph 2 (page 2-25)

	MY 1992	MY 1991	MY 1990	MY 1989	MY 1988	MY 1987	MY 1986	MY 1985	MY 1984	MY 1983	MY 1982	MY 1981	MY 1980	MY 1979	MY 1978	MY 1977	MY 1976	MY 1975	MY 1974	MY 1973	MY 1972	MY 1971	MY 1970	MY 1969	1968 & -	Total
LDGV,DV	0.03809	0.06912	0.0705	0.07739	0.08023	0.07368	0.078	0.07207	0.07115	0.04684	0.0474	0.03972	0.03886	0.04069	0.03436	0.02457	0.01685	0.01021	0.01082	0.00937	0.00755	0.00497	0.00442	0.00408	0.03408	1.00
LDG11,D1	0.04348	0.08644	0.07852	0.08809	0.07848	0.08732	0.09479	0.08023	0.07863	0.04371	0.04166	0.03087	0.02848	0.02597	0.01977	0.011	0.01327	0.00827	0.00845	0.00529	0.00441	0.00571	0.00306	0.0034	0.03071	1.00
LDG12	0.02086	0.03777	0.04974	0.05248	0.04508	0.0322	0.0512	0.05241	0.04781	0.02687	0.02548	0.02586	0.02283	0.06319	0.0728	0.06406	0.05125	0.03262	0.03181	0.0419	0.03896	0.02092	0.02073	0.0191	0.05006	1.00
HDGV	0.0503	0.03339	0.04784	0.04061	0.03136	0.02789	0.03946	0.03454	0.03628	0.02428	0.02746	0.02775	0.04582	0.08123	0.06677	0.05261	0.04235	0.03859	0.03758	0.04278	0.03498	0.02226	0.01821	0.01893	0.07675	1.00
LDDV,GV	0.03809	0.06912	0.0705	0.07739	0.08023	0.07368	0.078	0.07207	0.07115	0.04684	0.0474	0.03972	0.03886	0.04069	0.03436	0.02457	0.01685	0.01021	0.01082	0.00937	0.00755	0.00497	0.00442	0.00408	0.03408	1.00
LDD1,G11	0.04348	0.08644	0.07852	0.08809	0.07848	0.08732	0.09479	0.08023	0.07863	0.04371	0.04166	0.03087	0.02848	0.02597	0.01977	0.011	0.01327	0.00827	0.00845	0.00529	0.00441	0.00571	0.00306	0.0034	0.03071	1.00
HDDV	0.0747	0.07671	0.12135	0.07526	0.07793	0.08239	0.06168	0.0835	0.07092	0.03629	0.03663	0.04175	0.03028	0.03184	0.02015	0.01781	0.00957	0.00935	0.01136	0.00779	0.00657	0.00401	0.00267	0.00245	0.00701	1.00
MC	0.02875	0.04641	0.03818	0.04652	0.04597	0.04839	0.08931	0.09579	0.08997	0.12355	0.19827	0.14889	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00