Establishment of Corrections to Reactivity Adjustment Factors for Low-Emission Vehicles Operating on Compressed Natural Gas and Liquified Petroleum Gas

Airshed Modeling Protocol and Final Results

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I. Summary

This report presents the complete protocol (or calculation methodology) and results for airshed modeling performed at Carnegie Mellon University to establish corrections to reactivity adjustment factors (RAFs) for Low-Emission Vehicles (LEVs) operating on compressed natural gas (CNG) and liquified petroleum gas (LPG). Although the maximum incremental reactivity (MIR) approach used to calculate the RAFs has been validated by airshed modeling results for individual organic gases (McNair et al. 1992; ARB 1992), and has been supported by the National Research Council (1991), RAF corrections are sometimes necessary because of differences in spatial and temporal patterns of emissions between motor vehicle fleets (ARB 1992; McNair et al. 1994). The following sections describe the details of the airshed model, the processing of the motor vehicle test data, and the construction of the emission inventories. When this information is combined with pre-existing documents describing other model inputs, the reader will have complete information to evaluate and, if desired, reproduce the airshed modeling results. The airshed modeling protocol is the same as that employed in the ARB (1993) study of LEVs operated on Phase 2 reformulated gasoline (RFG), which found no need for a RAF adjustment. Because of enhancements to the airshed model chemistry mechanism and vertical transport scheme, and the addition of a third ozone episode, the RFG-fueled LEVs were re-run for comparison with previous results (ARB 1993).

The aim of the airshed modeling protocol is to provide a rigorous test of the RAFs. The model inputs were selected to represent upper and lower bounds, rather than a best estimate, of current and future conditions. Reactivity adjustment factors of 0.43 and 0.51 are recommended for LEVs operating on CNG and LPG, respectively. The RAF for LPG-fueled LEVs includes a 10 percent increase based on the airshed modeling results. The airshed modeling indicates that there is no need for a correction to the RAF for LEVs operating on CNG, and confirms previous results (ARB 1993) that no RAF adjustment is necessary for RFG-fueled LEVs.

II. Airshed Model

The CIT airshed model is a three-dimensional, photochemical grid model, based on numerically solving the advection-diffusion equation. The model employs the Lurmann, Coyner, and Carter (LCC) lumped molecule chemical mechanism. This family of chemical schemes is now referred to as the SAPRC mechanisms, as Carter is affiliated with the Statewide Air Pollution Research Center at the University of California at Riverside. The LCC mechanism is a predecessor of the SAPRC90 mechanism employed in determining the MIR scale. There are three versions of the LCC mechanism, each using various degrees of lumping to condense the hundreds of organic gases into a manageable number of species for model calculations. The CIT airshed model uses the most condensed version of the LCC, which has been shown previously (ARB 1992; McNair et al. 1994) to produce the same RAFs as the SAPRC90 mechanism. The LCC mechanism was extended to include the explicit chemical mechanisms for ethane and propane, normally lumped with other alkanes in the LCC mechanism, because of the large fractions of these species found in the exhaust of CNG- and LPG-fueled vehicles. In addition to this enhancement to the chemical mechanism, there was an update to the vertical transport scheme. In order to have results for all LEV fuels on a consistent basis, the LEVs operated on industry-average gasoline (RF-A) and RFG were re-run for comparison with previous results (ARB 1993).

The CIT airshed model was used to simulate three ozone episodes in the South Coast Air Basin (SoCAB). All three periods are conducive to high ozone formation, although each had different meteorological characteristics, and peak ozone concentrations occurred in different parts of the Basin during each episode. The August 30 to September 1, 1982 episode had very stagnant meteorological conditions leading to one of the highest one-hour ozone concentrations (0.35 ppm) recorded in the United States in 1982. The June 24 to 25, 1987 episode was an intensive measurement period during the Southern California Air Quality Study (SCAQS) with a one-hour peak ozone concentration of 0.24 ppm. The August 27 to 29, 1987 episode, with the highest one-hour peak ozone concentration (0.29 ppm) recorded during the SCAQS, has been modeled extensively by many groups. The CIT airshed model has been evaluated and peer-reviewed for all three periods (Russell et al. 1990; Harley et al. 1993; McNair et al. 1995). Initial and boundary conditions were derived from measurements, and were unchanged for all calculations. The initial conditions largely influence the model predictions for the first day or two. After that, emissions and boundary conditions predominate. The ideal situation for investigating the effects of different emission inventories is to minimize the influence of initial conditions. As a consequence, only the last day of the model simulation is reported. Boundary conditions have a minimal influence on model predictions as determined by sensitivity tests (Russell et al. 1990; Harley et al. 1993; McNair et al. 1995).

Emissions of nitrous acid (HONO), an important source of radicals that initiate ozone formation in the morning, were not added to the episodes as was done in the derivation of the MIR scale (ARB 1992). The CIT airshed model includes night-time reactions that create HONO concentrations similar to those observed during SCAQS.

III. Motor Vehicle Test Data

A comprehensive database of speciated nonmethane organic gas (NMOG) exhaust emissions from both conventionally- and alternatively fueled vehicles that met the LEV emission standards was processed. The test data for the LEVs operated on RF-A and RFG have been described previously (ARB 1993). Speciated NMOG data from testing programs conducted by the ARB (1995) on LEVs operated on CNG and LPG were assigned organic gas identifications (OGIDs) corresponding to the list of species in the MIR scale adopted in the 1991 RAF regulation (ARB 1992). (See Appendix A for the OGID assignments and Appendix B for the reactivities.) The vehicle test data were renormalized in terms of weight fractions, and then the weight fractions for each species for all the tests on an individual vehicle were averaged. The composite profiles for each vehicle were averaged to create composite profiles for each fuel. Separate composite profiles were calculated for each bag of the U. S. Environmental Protection Agency's 1975 Federal Test Procedure (FTP). The composite speciated NMOG profiles for the LEVs are given in Appendix C.

As with the 1991 study (ARB 1992; McNair et al. 1994), a more realistic distribution of exhaust emissions between the cold start, running, and hot start modes was used. The emission inventories developed for the SoCAB with EMFAC7E (the ARB's motor vehicle emission factor model, version 7E) have the three phases of the FTP cycle combined according to local information on traffic patterns. Furthermore, different definitions of cold start and hot start emissions are used in the SoCAB inventory and the FTP. In EMFAC7E, the cold and hot starts are represented as an emissions increment due to the actual start. In the FTP, the Bag 1 and Bag 3 measurements reflect the start emissions increment as well as emissions accrued at the cold and hot stabilized rates, respectively. Thus, the Bag 2 result (which represents both cold and hot stabilized emissions) must be subtracted from the Bag 1 and Bag 3 results:

$$\text{Cold Start} = 3.59 \times (\text{BAG1} - \text{SCF26} \times \text{BAG2}) \qquad (1)$$

where Cold Start is the EMFAC7E cold start emissions increment in grams/start, BAG1 is the FTP cold transient emissions in grams/mile, BAG2 is the FTP cold stabilized emissions in grams/mile, 3.59 is the mileage for the FTP cold transient test in miles/start, and SCF26 is the EMFAC7E speed correction factor (0.615 for current vehicles) to adjust the Bag 2 average speed (16 mph) to the Bag 1 average speed (26 mph).

The calculation is performed for each NMOG species in a composite profile, with any negative emissions increments set to zero. The emissions for all species are summed to get the total cold start emissions increment. The calculation of the EMFAC7E hot start emissions increment is done in a similar manner with the substitution of the Bag 3 result for the Bag 1 result in Equation 1. The Bag 2 mass emission rate and speciation results are used directly by EMFAC7E to represent the running exhaust emissions.

The three EMFAC7E exhaust emission modes are weighted according to activity data estimated by transportation models. Activity data for the SoCAB for 1987 and 2010 are given in Table I, with the resulting motor vehicle mass distributions given in Table II. However, it is not known how the mass distributions for the alternatively fueled vehicles change as a function of temperature or speed.

The emission inventories for each fuel were multiplied by the reciprocal of their RAF. Table III contains the RAFs defined for the SAPRC90 chemical mechanism and MIR conditions, as well as RAFs calculated under maximum ozone incremental reactivity (MOIR) conditions. For these fuels, the RAF is higher under MOIR conditions. Airshed modeling conducted by McNair et al. (1992, 1994) found better

agreement with the MIR scale than the MOIR scale. While the airshed model uses the LCC chemical mechanism, previous work (ARB 1992; McNair et al. 1994) showed that this mechanism gives virtually the same RAFs as the SAPRC90 mechanism used to calculate the MIR scale.

IV. Emission Inventories

The aim of the airshed modeling protocol is to provide a rigorous test of the RAFs. The model inputs were selected to represent upper and lower bounds, rather than a best estimate, of future conditions. Both the 1982 and the two 1987 episodes were simulated with the same two emission inventories: 1) a 1987 inventory, representing an average summer weekday with day-specific stationary source emissions for the August 27 to 29 SCAQS episode, with a doubling of NMOG and carbon monoxide (CO) emissions from all sources; and 2) a 2010 inventory projected from the 1987 inventory, without a doubling of NMOG and CO emissions. Using the same two inventories for all three episodes allows a direct comparison of the effect of meteorological conditions on reactivity. The doubling of the 1987 NMOG and CO emissions responds to evidence (Fujita et al. 1992) that organic gas emissions from motor vehicles are underestimated by about a factor of two with EMFAC7E, and to concerns that a higher NMOG to oxides of nitrogen (NO_X) ratio (8.4) is needed to provide a stringent test of the MIR scale, which defines reactivity where hydrocarbon control is most important, i.e., at high NO_X concentrations. The 2010 time frame is a realistic expectation of when motor vehicles that meet the requirements of the California Low-Emission Vehicles and Clean Fuels regulations will dominate the fleet, but the NMOG and emissions were not doubled in order to provide a lower bound of the NMOG to NO_X ratio (3.9), and for comparison with the 1991 study (ARB 1992; McNair et al. 1994) where the 2010 inventory gave the highest null test result.

Five 1987 and five 2010 inventories were constructed by adjusting the on-road catalyst motor vehicle exhaust emissions to account for changing fuels: a null inventory (NULL) for the case of no catalyst exhaust emissions of NMOG; a conventional fuel inventory for LEVs operated on RF-A; and separate alternative fuel inventories for CNG-, LPG- and RFG-fueled LEVs with NMOG exhaust emissions multiplied by the reciprocal of the RAF. For both the 1987 and 2010 inventories, the LEV speciation profiles of NMOG exhaust were applied to the entire on-road catalyst motor vehicle fleet. This corresponds to 8 and 22 percent (higher for the RAF-adjusted cases) of the total NMOG emission inventory in 1987 and 2010, respectively. This assumption of complete conversion of the fleet to LEVs is not realistic, but does provide the most stringent test of the RAF approach. Evaporative emission rates and speciation profiles were unchanged from the base motor vehicle fleet. Again, this assumption is not realistic, but the objective of the study was to test the way the reactivity scale is being applied in the ARB regulations, assuming that all fuels just meet the reactivity-adjusted standards. Stationary source, off-road mobile emissions, diesel exhaust, and non-catalyst motor vehicle emissions were also unchanged, as was NO_X.

V. Results and Discussion

The CIT airshed model was used to simulate the air quality for three ozone episodes (June 1987, August 1987, and August 1982) in the SoCAB, two emission inventories (1987 and 2010) were used for each episode, and, in addition to the conventional fuel (RF-A), three alternative fuels (CNG, LPG, and RFG) and a zero motor vehicle NMOG emission case (NULL) were studied. The ozone predictions for the thirty model simulations are summarized in Table IV. Four metrics are presented: 1) peak, one-hour average ozone basinwide; 2) spatial ozone exposure showing the number of hours and grids where ozone concentrations are greater than a prescribed value (e.g., the 0.09 ppm California and 0.12 ppm national ambient air quality standards); 3) concentration-weighted spatial ozone dosage; and 4) population- and concentration-weighted ozone dosage. The NULL calculation gives results distinctly different than the RF-A and the alternative fuel simulations for each ozone metric other than the peak. If this were not the case, it would be very difficult to assess the impact of the change in organic gas composition and additional emissions of the alternative fuels.

A useful statistic for judging how closely the RAF leads to an equal ozone impact is the "null test" (perhaps better stated as the "level playing field test"), defined as the concentration increment due to the alternative fuel, normalized relative to that of the conventional fuel:

$$\text{Null test result} = \frac{C_{AFV} - C_{NULL}}{C_{RF\text{-}A} - C_{NULL}} \qquad (2)$$

where C_{AFV} is the concentration (or other metric) for an alternatively fueled vehicle (AFV) simulation, and $C_{RF\text{-}A}$ and C_{NULL} are the corresponding metrics for the conventionally fueled vehicle and NULL simulations, respectively. The closer the null test result is to one, the closer the RAF comes to producing the desired result. If the value found from the multi-day airshed modeling is greater or less than one, the exhaust is greater or less reactive, respectively, than the RAF would imply. The null test results are shown in Table V.

In general, the null test results for the ozone exposure and dosage metrics are within ±10 percent of the equal ozone impacts required by the regulation, with much closer agreement in most cases. However, the null test results for some of the ozone peak predictions are up to 33 percent above the desired result. In these cases, the ozone peak is found in a location that is less sensitive to NMOG emissions than much of the urban area, as reflected by the small differences (about 0.02 ppm) between the peak predictions in the RF-A and NULL simulations. Thus, small differences in peak concentrations between the conventionally- and alternatively fueled vehicles are magnified in the normalization specified for the null test result in Equation 2. In the two cases where there is a large difference between the peak ozone predictions for the RF-A and NULL simulations, about 0.12 and 0.05 ppm for the 1982 meteorology with the 1987 and 2010 emission inventories, respectively, the null test results are the most reasonable.

These results suggest that the RAFs derived with the MIR scale give results close to those desired for CNG and RFG-fueled LEVs, that is, they lead to similar ozone levels as LEVs operated on RF-A. This confirms previous results (ARB 1993) that no RAF adjustment is necessary for RFG-fueled LEVs. However, the LPG exhaust emissions are more reactive than the RF-A case for most of the ozone metrics calculated for the three ozone episodes. If the goal is to assure that the reactivity adjustment procedure does not lead to higher ozone for the alternative fuels during a wide range of meteorological conditions,

these results indicate that the RAF for LPG should be increased by about 10 percent. Thus, RAFs of 0.43 and 0.51 are recommended for LEVs operating on CNG and LPG, respectively.

VI. References

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Table I. *Activity data[a] for the South Coast Air Basin.*

Baseline Year	*Miles per Start*	*Cold Start Fraction*	*Hot Start Fraction*
1987	*8.3*	*0.58*	*0.42*
2010	*9.8*	*0.60*	*0.40*

[a]*Based on BURDEN model.*

Table II. *Exhaust emissions distribution for test data for LEVs.*

Vehicle Type	*Percent of Mass in Each Exhaust Mode*					
	1987 Activity Data			*2010 Activity Data*		
	Cold	*Run*	*Hot*	*Cold*	*Run*	*Hot*
LEV RF-A	*81.0*	*13.9*	*5.1*	*79.9*	*15.5*	*4.6*
LEV CNG	*56.1*	*30.9*	*13.0*	*54.5*	*34.0*	*11.5*
LEV LPG	*77.9*	*11.8*	*10.3*	*77.4*	*13.3*	*9.3*
LEV RFG	*79.9*	*15.7*	*4.4*	*78.6*	*17.5*	*3.9*

Table III. *RAFs for the MIR and MOIR scales.*

Vehicle Type	*Reactivity Adjustment Factors*		
	MIR[a]	*MOIR*	*Difference (%)*
LEV RF-A	*1.00*	*1.00*	*na*
LEV CNG	*0.43*	*0.49*	*14*
LEV LPG	*0.47*	*0.57*	*21*
LEV RFG	*0.94*	*0.97*	*3*

[a]*Proposed for adoption by the Air Resources Board; used in the airshed modeling.*

Table IVa. *CIT airshed model predictions[a] for June 24 to 25, 1987 meteorology and 1987[b] inventory.*

Ozone Statistic	*Ozone Results*				
	RF-A	*CNG*	*LPG*	*RFG*	*NULL*
basin peak (ppm)	*0.2618*	*0.2649*	*0.2679*	*0.2621*	*0.2423*
grid-hours[c] > 0.09 ppm	*3112*	*3118*	*3133*	*3110*	*2851*
grid-hours[c] > 0.12 ppm	*1638*	*1639*	*1657*	*1635*	*1394*
ppm-grid-hours[d] > 0.09 ppm	*397.25*	*398.34*	*401.96*	*396.8*	*350.81*
ppm-grid-hours[d] > 0.12 ppm	*244.40*	*245.09*	*248.94*	*243.9*	*200.29*
person-ppm-hours[e] > 0.09 ppm	*5688908*	*5640873*	*5723198*	*5681609*	*4451938*
person-ppm-hours[e] > 0.12 ppm	*3061556*	*3037421*	*3096146*	*3050833*	*2145799*

Table IVb. *CIT airshed model predictions[a] for June 24 to 25, 1987 meteorology and 2010 inventory.*

Ozone Statistic	*Ozone Results*				
	RF-A	*CNG*	*LPG*	*RFG*	*NULL*
basin peak (ppm)	*0.1663*	*0.1687*	*0.1720*	*0.1667*	*0.1461*
grid-hours[c] > 0.09 ppm	*3025*	*3025*	*3079*	*3018*	*2342*
grid-hours[c] > 0.12 ppm	*1587*	*1616*	*1686*	*1578*	*845*
ppm-grid-hours[d] > 0.09 ppm	*368.39*	*371.95*	*381.30*	*367.74*	*265.44*
ppm-grid-hours[d] > 0.12 ppm	*218.52*	*225.02*	*236.31*	*217.63*	*108.81*
person-ppm-hours[e] > 0.09 ppm	*4768896*	*4717448*	*4873522*	*4738921*	*2718966*
person-ppm-hours[e] > 0.12 ppm	*1961331*	*1964265*	*2161659*	*1941246*	*479892*

[a]Results for last day of model simulation.
[b]With NMOG and CO emissions doubled.
[c]Summation of the number of grids × hours that any modeling grid experienced an ozone concentration greater than the prescribed value.
[d]Summation of the concentration × grids × hours that any modeling grid experienced an ozone concentration greater than the prescribed value.
[e]Summation of the population × concentration × hours for any modeling grid that experienced an ozone concentration greater than the prescribed value.

Table IVc. *CIT airshed model predictions[a] for August 27 to 29, 1987 meteorology and 1987[b] inventory.*

Ozone Statistic	*Ozone Results*				
	RF-A	*CNG*	*LPG*	*RFG*	*NULL*
basin peak (ppm)	*0.2359*	*0.2385*	*0.2415*	*0.2362*	*0.2188*
grid-hours[c] > 0.09 ppm	*2936*	*2919*	*2943*	*2931*	*2515*
grid-hours[c] > 0.12 ppm	*1353*	*1355*	*1373*	*1348*	*1059*
ppm-grid-hours[d] > 0.09 ppm	*367.53*	*365.32*	*370.35*	*366.52*	*304.02*
ppm-grid-hours[d] > 0.12 ppm	*204.79*	*204.79*	*208.86*	*203.90*	*154.09*
person-ppm-hours[e] > 0.09 ppm	*4578465*	*4426430*	*4527634*	*4533615*	*266476*
person-ppm-hours[e] > 0.12 ppm	*1990038*	*1963432*	*2003371*	*1965220*	*896431*

Table IVd. *CIT airshed model predictions[a] for August 27 to 29, 1987 meteorology and 2010 inventory.*

Ozone Statistic	*Ozone Results*				
	RF-A	*CNG*	*LPG*	*RFG*	*NULL*
basin peak (ppm)	*0.1667*	*0.1698*	*0.1735*	*0.1672*	*0.1405*
grid-hours[c] > 0.09 ppm	*2805*	*2765*	*2866*	*2787*	*1689*
grid-hours[c] > 0.12 ppm	*1184*	*1214*	*1290*	*1181*	*191*
ppm-grid-hours[d] > 0.09 ppm	*328.14*	*326.15*	*340.29*	*326.26*	*179.23*
ppm-grid-hours[d] > 0.12 ppm	*159.24*	*164.82*	*176.45*	*158.95*	*23.98*
person-ppm-hours[e] > 0.09 ppm	*3669747*	*3402547*	*3757597*	*3603949*	*1018205*
person-ppm-hours[e] > 0.12 ppm	*916852*	*904811*	*1003000*	*894708*	*19408*

[a]Results for last day of model simulation.
[b]With NMOG and CO emissions doubled.
[c]Summation of the number of grids × hours that any modeling grid experienced an ozone concentration greater than the prescribed value.
[d]Summation of the concentration × grids × hours that any modeling grid experienced an ozone concentration greater than the prescribed value.
[e]Summation of the population × concentration × hours for any modeling grid that experienced an ozone concentration greater than the prescribed value.

Table IVe. *CIT airshed model predictions[a] for August 30 to September 1, 1982 meteorology and 1987[b] inventory.*

Ozone Statistic	*Ozone Results*				
	RF-A	*CNG*	*LPG*	*RFG*	*NULL*
basin peak (ppm)	*0.5577*	*0.5578*	*0.5641*	*0.5552*	*0.4325*
grid-hours[c] > 0.09 ppm	*6375*	*6317*	*6380*	*6319*	*5779*
grid-hours[c] > 0.12 ppm	*5005*	*4996*	*5055*	*4982*	*4455*
ppm-grid-hours[d] > 0.09 ppm	*1263*	*1258.33*	*1277.09*	*1248.96*	*1079.77*
ppm-grid-hours[d] > 0.12 ppm	*1120*	*1120.83*	*1139.46*	*1109.71*	*941.62*
person-ppm-hours[e] > 0.09 ppm	*18726638*	*18169862*	*18574754*	*18319600*	*13664936*
person-ppm-hours[e] > 0.12 ppm	*16317209*	*15936952*	*16238386*	*15984877*	*11647123*

Table IVf. *CIT airshed model predictions[a] for August 30 to September 1, 1982 meteorology and 2010 inventory.*

Ozone Statistic	*Ozone Results*				
	RF-A	*CNG*	*LPG*	*RFG*	*NULL*
basin peak (ppm)	*0.2698*	*0.2723*	*0.2785*	*0.2697*	*0.2131*
grid-hours[c] > 0.09 ppm	*4437*	*4463*	*4565*	*4432*	*3263*
grid-hours[c] > 0.12 ppm	*2516*	*2533*	*2609*	*2514*	*1692*
ppm-grid-hours[d] > 0.09 ppm	*611.53*	*620.25*	*641.12*	*611.76*	*410.29*
ppm-grid-hours[d] > 0.12 ppm	*413.27*	*420.64*	*438.11*	*413.62*	*249.38*
person-ppm-hours[e] > 0.09 ppm	*8629588*	*8433216*	*8875683*	*8573390*	*4166391*
person-ppm-hours[e] > 0.12 ppm	*6380613*	*6284022*	*6621666*	*6353209*	*2830224*

[a]Results for last day of model simulation.
[b]With NMOG and CO emissions doubled.
[c]Summation of the number of grids × hours that any modeling grid experienced an ozone concentration greater than the prescribed value.
[d]Summation of the concentration × grids × hours that any modeling grid experienced an ozone concentration greater than the prescribed value.
[e]Summation of the population × concentration × hours for any modeling grid that experienced an ozone concentration greater than the prescribed value.

Table Va. *Null test results for CIT airshed model simulations of June 24 to 25, 1987 meteorology.*

Ozone Statistic	*Null Test Result*					
	1987 Inventory[a]			*2010 Inventory*		
	CNG	*LPG*	*RFG*	*CNG*	*LPG*	*RFG*
basin peak[b]	*1.16*	*1.31*	*1.02*	*1.12*	*1.28*	*1.02*
grid-hours > 0.09 ppm	*1.02*	*1.08*	*0.99*	*1.00*	*1.08*	*0.99*
grid-hours > 0.12 ppm	*1.00*	*1.08*	*0.99*	*1.04*	*1.13*	*0.99*
ppm-grid-hours > 0.09 ppm	*1.02*	*1.10*	*0.99*	*1.03*	*1.13*	*0.99*
ppm-grid-hours > 0.12 ppm	*1.02*	*1.10*	*0.99*	*1.06*	*1.16*	*0.99*
person-ppm-hours > 0.09 ppm	*0.96*	*1.03*	*0.99*	*0.97*	*1.05*	*0.99*
person-ppm-hours > 0.12 ppm	*0.97*	*1.04*	*0.99*	*1.00*	*1.14*	*0.99*

Table Vb. *Null test results for CIT airshed model simulations of August 27 to 29, 1987 meteorology.*

Ozone Statistic	*Null Test Result*					
	1987 Inventory[a]			*2010 Inventory*		
	CNG	*LPG*	*RFG*	*CNG*	*LPG*	*RFG*
basin peak[b]	*1.15*	*1.33*	*1.02*	*1.12*	*1.26*	*1.02*
grid-hours > 0.09 ppm	*0.96*	*1.02*	*0.99*	*0.96*	*1.05*	*0.98*
grid-hours > 0.12 ppm	*1.01*	*1.07*	*0.98*	*1.03*	*1.11*	*1.00*
ppm-grid-hours > 0.09 ppm	*0.97*	*1.04*	*0.98*	*0.99*	*1.08*	*0.99*
ppm-grid-hours > 0.12 ppm	*1.00*	*1.08*	*0.98*	*1.04*	*1.13*	*1.00*
person-ppm-hours > 0.09 ppm	*1.01*	*1.00*	*1.00*	*0.90*	*1.03*	*0.98*
person-ppm-hours > 0.12 ppm	*1.00*	*1.00*	*1.00*	*0.99*	*1.10*	*0.98*

[a]*With NMOG and CO emissions doubled.*
[b]*Far downwind ozone peak. Peak relatively insensitive to NMOG emission changes, so ratio of two small numbers.*

Table Vc. *Null test results for CIT airshed model simulations of August 30 to September 1, 1982 meteorology.*

Ozone Statistic	*Null Test Result*					
	1987 Inventory[a]			*2010 Inventory*		
	CNG	*LPG*	*RFG*	*CNG*	*LPG*	*RFG*
basin peak	*1.00*	*1.05*	*0.98*	*1.04*	*1.15*	*1.00*
grid-hours > 0.09 ppm	*0.90*	*1.01*	*0.91*	*1.02*	*1.11*	*1.00*
grid-hours > 0.12 ppm	*0.98*	*1.09*	*0.96*	*1.02*	*1.11*	*1.00*
ppm-grid-hours > 0.09 ppm	*0.97*	*1.07*	*0.92*	*1.04*	*1.15*	*1.00*
ppm-grid-hours > 0.12 ppm	*1.00*	*1.10*	*0.94*	*1.04*	*1.15*	*1.00*
person-ppm-hours > 0.09 ppm	*0.89*	*0.97*	*0.92*	*0.96*	*1.06*	*0.99*
person-ppm-hours > 0.12 ppm	*0.92*	*0.98*	*0.93*	*0.97*	*1.07*	*0.99*

[a]*With NMOG and CO emissions doubled.*

Appendix A

Organic Gas Names and OGID Assignments

ARB92B Organic Gas Names and ID Assignments - 5/1/95

Frac	OGID1	Frac	OGID2	Frac	OGID3	Organic Gas Name	
1.00	ETHANE	0.00		0.00		Ethane	
1.00	ETHENE	0.00		0.00		Ethene	
1.00	PROPANE	0.00		0.00		Propane	
1.00	ETHYNE	0.00		0.00		Ethyne	
1.00	2MC3	0.00		0.00		Methylpropane	
1.00	BUTANE	0.00		0.00		Butane	
1.00	PROPENE	0.00		0.00		Propene	
1.00	2MC4	0.00		0.00		Methylbutane	
1.00	PENTANE	0.00		0.00		Pentane	
1.00	1C4=	0.00		0.00		1-Butene	
1.00	2MC3=	0.00		0.00		2-Methylpropene	
1.00	T-2C4=	0.00		0.00		t-2-Butene	
1.00	1BUTYNE	0.00		0.00		1-Butyne	
1.00	C-2C4=	0.00		0.00		c-2-Butene	
1.00	3M1C4=	0.00		0.00		3-Methyl-1-butene	
1.00	1C5=	0.00		0.00		1-Pentene	
1.00	2M1C4=	0.00		0.00		2-Methyl-1-butene	
1.00	13C4==	0.00		0.00		1,3-butadiene	
1.00	ISOPRENE	0.00		0.00		2-Methyl-1,3-butadiene	
1.00	C5OLE2	0.00		0.00		t-2-Pentene	
1.00	C6OLE1	0.00		0.00		3,3-dimethyl-1-butene	
1.00	C5OLE2	0.00		0.00		c-2-Pentene	
1.00	2M2C4=	0.00		0.00		2-Methyl-2-butene	
1.00	22DMC4	0.00		0.00		2,2-Dimethylbutane	
1.00	CYC5=	0.00		0.00		Cyclopentene	
1.00	C6OLE1	0.00		0.00		4-Methyl-1-pentene	
1.00	CYC5	0.00		0.00		Cyclopentane	
1.00	23DMC4	0.00		0.00		2,3-Dimethylbutane	
1.00	C6OLE2	0.00		0.00		4-methyl-cis-2-pentene	
1.00	2MC5	0.00		0.00		2-Methylpentane	
1.00	C6OLE2	0.00		0.00		4-methyl-trans-2-pentene	
1.00	3MC5	0.00		0.00		3-Methylpentane	
1.00	1C6=	0.00		0.00		1-hexene	
1.00	HEXANE	0.00		0.00		n-Hexane	
1.00	C6OLE2	0.00		0.00		trans-3-hexene	
1.00	C6OLE2	0.00		0.00		trans-2-Hexene	
1.00	CYC5=	0.00		0.00		3-methylcyclopentene	Assume similar to cyclopentene

1.00	C6OLE2	0.00		0.00	c-2-Hexene	
1.00	C6OLE2	0.00		0.00	3-methyl-trans-2-pentene	
1.00	MCYC5	0.00		0.00	Methylcyclopentane	
1.00	C6OLE2	0.00		0.00	3-methyl-cis-2-pentene	
1.00	24DMC5	0.00		0.00	2,4-Dimethylpentane	
1.00	223TMC4	0.00		0.00	2,2,3-trimethylbutane	
1.00	BENZENE	0.00		0.00	Benzene	
1.00	C7OLE1	0.00		0.00	3-Methyl-1-hexene	
1.00	CYC6	0.00		0.00	Cyclohexane	
1.00	C7OLE2	0.00		0.00	2-Methyl-3-hexene	
1.00	C7OLE2	0.00		0.00	4-methyl-trans-2-hexene	
1.00	23DMC5	0.00		0.00	2,3-dimethylpentane	
1.00	CYC6=	0.00		0.00	cyclohexene	
1.00	3MC6	0.00		0.00	3-Methylhexane	
1.00	C7OLE1	0.00		0.00	1-heptene	
1.00	CYC7PAR	0.00		0.00	trans-1,3-dimethylcyclopentane	
1.00	224TMC5	0.00		0.00	2,2,4-trimethylpentane	
1.00	HEPTANE	0.00		0.00	n-Heptane	
1.00	CYC5=	0.00		0.00	2,3-Dimethylcyclopentene	Assume similar to cyclopentene
1.00	MCYC6	0.00		0.00	Methylcyclohexane	
1.00	CYC8PAR	0.00		0.00	1,1,3-Trimethylcyclopentane	
1.00	24DMC6	0.00		0.00	2,4-Dimethylhexane	
1.00	BRC8PAR	0.00		0.00	3,3-dimethylhexane	
1.00	CYC8PAR	0.00		0.00	1-cis,2-trans,3-trimethylcyclopentane	
1.00	234TMC5	0.00		0.00	2,3,4-Trimethylpentane	
1.00	TOLUENE	0.00		0.00	Toluene	
1.00	23DMC6	0.00		0.00	2,3-Dimethylhexane	
1.00	2MC7	0.00		0.00	2-methylheptane	
1.00	3MC7	0.00		0.00	3-methylheptane	
1.00	CYC8PAR	0.00		0.00	trans-1,4-dimethylcyclohexane	
1.00	225TMC6	0.00		0.00	2,2,5-Trimethylhexane	
1.00	CYC8PAR	0.00		0.00	1-Ethyl-2-Methylcyclopentane	
1.00	OCTANE	0.00		0.00	n-Octane	
1.00	CYC8PAR	0.00		0.00	trans-1,3-dimethylcyclohexane	
1.00	BRC9PAR	0.00		0.00	2,3,5-Trimethylhexane	
1.00	UNID	0.00		0.00	NNDime-acetamide	Unknown reactivity
1.00	CYC6=	0.00		0.00	C8H14? Cycloalkene	Assume similar to cyclohexene
1.00	24DMC7	0.00		0.00	2,4-dimethylheptane	
1.00	MCYC6	0.00		0.00	methylcyclohexane	
1.00	EBEN	0.00		0.00	Ethylbenzene	
1.00	CYC9PAR	0.00		0.00	1,2,4-Trimethylcyclohexane	
0.50	M-XYL	0.50	P-XYL	0.00	m & p-Xylenes	Average of m & p-xylenes
1.00	BRC9PAR	0.00		0.00	4-methyloctane	
1.00	STYRENE	0.00		0.00	Styrene	
1.00	BRC10PAR	0.00		0.00	Trimethylheptane	
1.00	O-XYL	0.00		0.00	o-Xylene	
1.00	BRC9PAR	0.00		0.00	Branched C6 Alkane	Assume branched C9 alkane
1.00	CYC9PAR	0.00		0.00	1-Methyl-2-n-propylcyclopentane	
1.00	NONANE	0.00		0.00	n-Nonane	

1.00	CYC9PAR	0.00		0.00		1-methyl-4-ethylcyclohexane		
1.00	I-PBEN	0.00		0.00		(1-methylethyl)benzene		
1.00	BRC10PAR	0.00		0.00		2,2-Dimethyloctane		
1.00	BRC10PAR	0.00		0.00		2,5-dimethyloctane		
1.00	N-PBEN	0.00		0.00		n-Propylbenzene		
1.00	C9BEN2	0.00		0.00		1-methyl-3-ethylbenzene		
1.00	C9BEN2	0.00		0.00		1-methyl-4-ethylbenzene		
1.00	135TMBEN	0.00		0.00		1,3,5-Trimethylbenzene		
1.00	BRC10PAR	0.00		0.00		2-Methyl-nonane		
1.00	C9BEN2	0.00		0.00		1-methyl-2-ethylbenzene		
1.00	BRC10PAR	0.00		0.00		C10H22 Alkane 4		Assume branched C10 alkane
1.00	124TMBEN	0.00		0.00		1,2,4-Trimethylbenzene		
1.00	124TMBEN	0.00		0.00		1,2,4-trimethylbenzene		
1.00	DECANE	0.00		0.00		n-Decane		
1.00	UNDECANE	0.00		0.00		n-Undecane		
0.50	C10BEN1	0.35	C10BEN2	0.15	C10BEN3	C10H14 Aromatic		Assume 50% C10 monoalkyl, 35% dialkyl and 15% trialkyl benzenes
1.00	METHANOL	0.00		0.00		Methanol		
1.00	ETHANOL	0.00		0.00		Ethanol		
1.00	FORMALD	0.00		0.00		Formaldehyde		
1.00	ACETALD	0.00		0.00		Acetaldehyde		
1.00	ACROLEIN	0.00		0.00		Acrolein		
1.00	ACETONE	0.00		0.00		Acetone		
1.00	PROPALD	0.00		0.00		Propionaldehyde		
1.00	C4ALD	0.00		0.00		Butylaldehyde		
1.00	BENZALD	0.00		0.00		Benzaldehyde		
1.00	C6ALD	0.00		0.00		Hexanal		

ARB93 Organic Gas Names and ID Assignments - 5/1/95

Frac	OGID1	Frac	OGID2	Frac	OGID3	Organic Gas Name	
1.00	ETHANE	0.00		0.00		ethane	
1.00	ETHENE	0.00		0.00		ethene	
1.00	PROPANE	0.00		0.00		propane	
1.00	PROPENE	0.00		0.00		propene	
1.00	2MC3	0.00		0.00		methylpropane	
1.00	ETHYNE	0.00		0.00		ethyne	
1.00	BUTANE	0.00		0.00		n-butane	
1.00	13C4==	0.00		0.00		propadiene	Assume similar to 1,3-butadiene
1.00	T-2C4=	0.00		0.00		trans-2-butene	
1.00	1C4=	0.00		0.00		1-butene	
1.00	2MC3=	0.00		0.00		2-methylpropene	
1.00	C-2C4=	0.00		0.00		cis-2-butene	
1.00	22DMC3	0.00		0.00		2,2-dimethylpropane	
1.00	2MC4	0.00		0.00		methylbutane	
1.00	PROPYNE	0.00		0.00		1-propyne	
1.00	PENTANE	0.00		0.00		n-pentane	

1.00	13C4==	0.00	0.00	1,3-butadiene	
1.00	3M1C4=	0.00	0.00	3-methyl-1-butene	
1.00	CYC5=	0.00	0.00	cyclopentene	
1.00	C5OLE2	0.00	0.00	trans-2-pentene	
1.00	2M2C4=	0.00	0.00	2-methyl-2-butene	
1.00	1C5=	0.00	0.00	1-pentene	
1.00	2M1C4=	0.00	0.00	2-methyl-1-butene	
1.00	C5OLE2	0.00	0.00	cis-2-pentene	
1.00	1BUTYNE	0.00	0.00	1-buten-3-yne	Assume similar to 1-butyne
1.00	1BUTYNE	0.00	0.00	2-butyne	Assume similar to 1-butyne
1.00	1BUTYNE	0.00	0.00	1-butyne	
1.00	ISOPRENE	0.00	0.00	2-methyl-1,3-butadiene	
1.00	C6OLE1	0.00	0.00	3,3-dimethyl-1-butene	
1.00	ISOPRENE	0.00	0.00	1,3-pentadiene	Assume similar to isoprene
1.00	CYC5=	0.00	0.00	cyclopentadiene	Assume similar to cyclopentene
1.00	22DMC4	0.00	0.00	2,2-dimethylbutane	
1.00	C6OLE1	0.00	0.00	3-methyl-1-pentene	
1.00	CYC5	0.00	0.00	cyclopentane	
1.00	23DMC4	0.00	0.00	2,3-dimethylbutane	
1.00	MTBE	0.00	0.00	1-methyl-tert-butyl-ether	
1.00	2MC5	0.00	0.00	2-methylpentane	
1.00	C6OLE2	0.00	0.00	4-methyl-cis-2-pentene	
1.00	3MC5	0.00	0.00	3-methylpentane	
1.00	C6OLE1	0.00	0.00	2-methyl-1-pentene	
1.00	HEXANE	0.00	0.00	n-hexane	
1.00	C6OLE2	0.00	0.00	trans-3-hexene	
1.00	C6OLE2	0.00	0.00	trans-2-hexene	
1.00	C6OLE2	0.00	0.00	2-methyl-2-pentene	
1.00	CYC5=	0.00	0.00	3-methylcyclopentene	Assume similar to cyclopentene
1.00	C6OLE2	0.00	0.00	cis-2-hexene	
1.00	C6OLE2	0.00	0.00	3-methyl-cis-2-pentene	
1.00	BRC7PAR	0.00	0.00	2,2-dimethylpentane	
1.00	MCYC5	0.00	0.00	methylcyclopentane	
1.00	24DMC5	0.00	0.00	2,4-dimethylpentane	
1.00	223TMC4	0.00	0.00	2,2,3-trimethylbutane	
1.00	C7OLE1	0.00	0.00	3,4-dimethyl-1-pentene	
1.00	CYC5=	0.00	0.00	1-methylcyclopentene	Assume similar to cyclopentene
1.00	BENZENE	0.00	0.00	benzene	
1.00	C7OLE1	0.00	0.00	3-methyl-1-hexene	
1.00	33DMC5	0.00	0.00	3,3-dimethylpentane	
1.00	CYC6	0.00	0.00	cyclohexane	
1.00	C7OLE2	0.00	0.00	4-methyl-trans-2-hexene	
1.00	2MC6	0.00	0.00	2-methylhexane	
1.00	23DMC5	0.00	0.00	2,3-dimethylpentane	
1.00	CYC6=	0.00	0.00	cyclohexene	
1.00	3MC6	0.00	0.00	3-methylhexane	
1.00	C7OLE1	0.00	0.00	1-heptene	
1.00	13DMCYC5	0.00	0.00	trans-1,3-dimethylcyclopentane	
1.00	13DMCYC5	0.00	0.00	cis-1,3-dimethylcyclopentane	

1.00	BRC7PAR	0.00		0.00	3-ethylpentane	
1.00	224TMC5	0.00		0.00	2,2,4-trimethylpentane	
1.00	C7OLE2	0.00		0.00	3-methyl-trans-3-hexene	
1.00	HEPTANE	0.00		0.00	n-heptane	
1.00	C7OLE2	0.00		0.00	2-methyl-trans-2-hexene	
1.00	C7OLE2	0.00		0.00	trans-2-heptene	
1.00	C7OLE2	0.00		0.00	2-methyl-cis-2-hexene	
1.00	C7OLE2	0.00		0.00	cis-2-heptene	
1.00	C7OLE2	0.00		0.00	2,4-dimethyl-2-pentene	
1.00	MCYC6	0.00		0.00	methylcyclohexane	
1.00	BRC8PAR	0.00		0.00	2,2-dimethylhexane	
1.00	C8OLE2	0.00		0.00	2,4,4-trimethyl-2-pentene	
1.00	25DMC6	0.00		0.00	2,5-dimethylhexane	
1.00	24DMC6	0.00		0.00	2,4-dimethylhexane	
1.00	BRC8PAR	0.00		0.00	3,3-dimethylhexane	
1.00	234TMC5	0.00		0.00	2,3,4-trimethylpentane	
1.00	TOLUENE	0.00		0.00	toluene	
1.00	BRC8PAR	0.00		0.00	2,3,3-trimethylpentane	
1.00	23DMC6	0.00		0.00	2,3-dimethylhexane	
1.00	2MC7	0.00		0.00	2-methylheptane	
1.00	3MC7	0.00		0.00	3-methylheptane	
1.00	225TMC6	0.00		0.00	2,2,5-trimethylhexane	
1.00	CYC8PAR	0.00		0.00	1-methyl-trans-3-ethylcyclopentane	
0.50	C8OLE1	0.50	C8OLE2	0.00	octenes	Average of terminal and internal C8 alkenes
1.00	OCTANE	0.00		0.00	n-octane	
1.00	C8OLE2	0.00		0.00	trans-2-octene	
1.00	CYC8PAR	0.00		0.00	trans-1,3-dimethylcyclohexane	
1.00	C8OLE2	0.00		0.00	cis-2-octene	
1.00	BRC9PAR	0.00		0.00	2,3,5-trimethylhexane	
1.00	24DMC7	0.00		0.00	2,4-dimethylheptane	
1.00	BRC9PAR	0.00		0.00	2,6-dimethylheptane	
1.00	BRC9PAR	0.00		0.00	3,5-dimethylheptane	
1.00	EBEN	0.00		0.00	ethylbenzene	
1.00	BRC9PAR	0.00		0.00	2,3-dimethylheptane	
0.50	M-XYL	0.50	P-XYL	0.00	m- & p-xylene	Average of m & p-xylenes
1.00	BRC9PAR	0.00		0.00	4-methyloctane	
1.00	BRC9PAR	0.00		0.00	3-methyloctane	
1.00	STYRENE	0.00		0.00	styrene (ethenylbenzene)	
1.00	O-XYL	0.00		0.00	o-xylene	
1.00	BRC10PAR	0.00		0.00	2,2,4-trimethylheptane	
1.00	CYC9PAR	0.00		0.00	1-methyl-4-ethylcyclohexane	
1.00	NONANE	0.00		0.00	n-nonane	
1.00	I-PBEN	0.00		0.00	(1-methylethyl)benzene	
1.00	BRC10PAR	0.00		0.00	2,2-dimethyloctane	
1.00	BRC10PAR	0.00		0.00	2,5-dimethyloctane	
1.00	BRC10PAR	0.00		0.00	2,4-dimethyloctane	
1.00	BRC10PAR	0.00		0.00	2,6-dimethyloctane	
1.00	N-PBEN	0.00		0.00	n-propylbenzene	
1.00	C9BEN2	0.00		0.00	1-methyl-3-ethylbenzene	

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1.00 C9BEN2   0.00          0.00          1-methyl-4-ethylbenzene
1.00 135TMBEN 0.00          0.00          1,3,5-trimethylbenzene
1.00 C9BEN2   0.00          0.00          1-methyl-2-ethylbenzene
1.00 124TMBEN 0.00          0.00          1,2,4-trimethylbenzene
1.00 DECANE   0.00          0.00          n-decane
1.00 C10BEN1  0.00          0.00          (2-methylpropyl)benzene
1.00 S-BBEN   0.00          0.00          (1-methylpropyl)benzene
1.00 C10BEN2  0.00          0.00          1-methyl-3-(1-methylethyl)benzene
1.00 123TMBEN 0.00          0.00          1,2,3-trimethylbenzene
1.00 C10BEN2  0.00          0.00          1-methyl-4-(1-methylethyl)benzene
1.00 INDAN    0.00          0.00          2,3-dihydroindene (indan)
1.00 C10BEN2  0.00          0.00          1,3-diethylbenzene
1.00 C10BEN2  0.00          0.00          1-methyl-2-(1-methylethyl)benzene
1.00 C10BEN2  0.00          0.00          1,4-diethylbenzene
1.00 C10BEN2  0.00          0.00          1-methyl-3-n-propylbenzene
1.00 C10BEN1  0.00          0.00          (1,1-dimethylethyl)benzene
1.00 C10BEN2  0.00          0.00          1-methyl-2-n-propylbenzene
1.00 C10BEN3  0.00          0.00          1,4-dimethyl-2-ethylbenzene
1.00 C10BEN3  0.00          0.00          1,3-dimethyl-4-ethylbenzene
1.00 C10BEN3  0.00          0.00          1,2-dimethyl-4-ethylbenzene
1.00 C10BEN3  0.00          0.00          1,3-dimethyl-2-ethylbenzene
1.00 UNDECANE 0.00          0.00          n-undecane (hendecane)
1.00 C10BEN3  0.00          0.00          1,2-dimethyl-3-ethylbenzene
1.00 C10BEN4  0.00          0.00          1,2,4,5-tetramethylbenzene
1.00 C10BEN4  0.00          0.00          1,2,3,5-tetramethylbenzene
0.50 C11BEN1  0.35 C11BEN2  0.15 C11BEN3  C11 aromatic                        Assume 50% C10 monoalkyl, 35% dialkyl and 15% trialkyl
benzenes
1.00 C11BEN2  0.00          0.00          1-methyl-2-n-butylbenzene
1.00 C11BEN1  0.00          0.00          n-pentylbenzene
1.00 C12BEN3  0.00          0.00          1-(1,1-dimethylethyl)-3,5-DMbenzene
1.00 NAPHTHAL 0.00          0.00          naphthalene
1.00 DODECANE 0.00          0.00          n-dodecane
1.00 ETBE     0.00          0.00          1-ethyl-tert-butyl-ether
1.00 C6OLE2   0.00          0.00          4-methyl-t-2-pentene
1.00 C6OLE1   0.00          0.00          4-methyl-1-pentene
1.00 C6OLE1   0.00          0.00          1-hexene
1.00 C6OLE2   0.00          0.00          cis-3-hexene
1.00 C6OLE2   0.00          0.00          3-methyl-t-2-pentene
1.00 C7OLE2   0.00          0.00          trans-3-heptene
1.00 C7OLE2   0.00          0.00          3-ethyl-c-2-pentene
1.00 C7OLE2   0.00          0.00          2,3-dimethyl-2-pentene
1.00 C8OLE1   0.00          0.00          2,4,4-trimethyl-1-pentene
1.00 4MC7     0.00          0.00          4-methylheptane
1.00 CYC8PAR  0.00          0.00          1-cis,2-trans,3-trimethylcyclopentane
1.00 CYC8PAR  0.00          0.00          cis-1,3-dimethylcyclohexane
1.00 CYC8PAR  0.00          0.00          trans-1,4-dimethylcyclohexane
1.00 C8OLE1   0.00          0.00          1-octene
1.00 C8OLE2   0.00          0.00          trans-4-octene
1.00 CYC8PAR  0.00          0.00          cis-1,2-dimethylcyclohexane
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1.00	ECYC6	0.00	0.00	ethylcyclohexane	
1.00	C9OLE1	0.00	0.00	1-nonene	
1.00	C10BEN2	0.00	0.00	1-methyl-4-n-propylbenzene	
1.00	C10BEN2	0.00	0.00	1,2-diethylbenzene	
1.00	C11BEN2	0.00	0.00	1-(1,1-dimethylethyl)-2-methylbenzene	
1.00	C10BEN4	0.00	0.00	1,2,3,4-tetramethylbenzene	
1.00	CYC7PAR	0.00	0.00	trans-1,2-dimethylcyclopentane	
1.00	METHANOL	0.00	0.00	Methanol	
1.00	ETHANOL	0.00	0.00	Ethanol	
1.00	FORMALD	0.00	0.00	Formaldehyde	
1.00	ACETALD	0.00	0.00	Acetaldehyde	
1.00	ACROLEIN	0.00	0.00	Acrolein (Propenal)	
1.00	ACETONE	0.00	0.00	Acetone (2-Propanone)	
1.00	PROPALD	0.00	0.00	Propionaldehyde (Propanal)	
1.00	C4ALD	0.00	0.00	Butyraldehyde (Butanal)	
1.00	C4KET	0.00	0.00	Methyl Ethyl Ketone	
1.00	ACROLEIN	0.00	0.00	Methacrolein	Assume similar to acrolein
1.00	BENZALD	0.00	0.00	Benzaldehyde	
1.00	CROTALD	0.00	0.00	Crotonaldehdye	
1.00	C5ALD	0.00	0.00	Valeraldehyde	
1.00	BENZALD	0.00	0.00	m-Tolualdehyde	Assume similar to benzaldehyde
1.00	C6ALD	0.00	0.00	Hexanal	

Appendix B

OGIDs and Reactivity Assignments

California Air Resources Board Reactivity Scales and Uncertainties - November 14, 1991

All kinetic (KR), mechanistic (MR), incremental (IR) and Carbon Bond IV (CB4) reactivities in grams ozone/gram

Average (Avg), Least Squares Error (LSE) and Minimum Substitution Error (MSE) reactivities relative to base ROG mixture on gram basis

Molecular weights (Mwt) in grams/gram-mole

Hydroxyl radical rate constants (kOH) in 1/ppm-min and KR uncertainties based on Atkinson review, but KR calculated by Carter

All standard deviations (SD) in percent * denotes assigned CB4 reactivity

							Maximum Incremental Reactivity (MIR)							Maximum Ozone Reactivity (MOR)							Base Case			CB4 Base Case			September 1990		SAI CB4 9/21/90			
OGID	CarterID	Saroad	Class	#C	Mwt	kOH	SD	KR	SD	MR	SD	IR	SD	CB4	KR	SD	MR	SD	IR	SD	CB4	Avg	LSE	MSE	Avg	LSE	MSE	MIR	MOR	MIR	MOR	Organic Gas	Name
CO	CO	42101	CO	1	28.01	3.52E+02	25	0.0350	29	1.559	15	0.054	33	0.054 *	0.0553	30	0.689	20	0.038	36	0.038 *	0.033	0.026	0.029	0.033 *	0.026 *	0.029 *	0.041	0.034	0.041*	0.034*	Carbon Monox	ide
METHANE	METHANE	43201	ALKA	1	16.04	1.28E+01	10	0.0013	19	11.464	20	0.0148	28	0.0148*	0.0021	20	4.450	20	0.0092	29	0.0092*	0.0079	0.0066	0.0070	0.0079*	0.0066*	0.0070*	0.0102	0.0074	0.005	0.003	Methane	
ETHANE	ETHANE	43202	ALKA	2	30.07	4.02E+02	10	0.0398	18	6.190	20	0.25	27	0.22	0.0629	20	2.624	20	0.17	28	0.13	0.147	0.122	0.135	0.118	0.089	0.101	0.147	0.097	0.11	0.07	Ethane	
PROPANE	PROPANE	43204	ALKA	3	44.10	1.71E+03	15	0.1580	20	3.043	20	0.48	28	0.56	0.2391	20	1.303	20	0.31	28	0.33	0.26	0.22	0.23	0.30	0.23	0.26	0.33	0.23	0.29	0.17	Propane	
BUTANE	N-C4	43212	ALKA	4	58.12	3.76E+03	10	0.3117	15	3.287	20	1.02	25	1.14	0.4442	15	1.490	20	0.66	25	0.66	0.55	0.47	0.51	0.62	0.47	0.53	0.64	0.42	0.59	0.35	n-Butane	
PENTANE	N-C5	43220	ALKA	5	72.15	6.03E+03	13	0.4462	15	2.322	20	1.04	25	1.15	0.5999	13	1.131	20	0.68	24	0.67	0.55	0.47	0.50	0.62	0.47	0.53	0.64	0.46	0.60	0.36	n-Pentane	
HEXANE	N-C6	43231	ALKA	6	86.18	8.27E+03	13	0.5505	13	1.785	20	0.98	24	1.15	0.7053	10	0.916	20	0.65	23	0.67	0.51	0.44	0.48	0.62	0.47	0.53	0.61	0.44	0.60	0.36	n-Hexane	
HEPTANE	N-C7	43232	ALKA	7	100.21	1.06E+04	13	0.6350	11	1.281	20	0.81	23	1.15	0.7799	8	0.681	20	0.53	22	0.67	0.40	0.35	0.38	0.63	0.47	0.53	0.48	0.34	0.60	0.36	n-Heptane	
OCTANE	N-C8	43233	ALKA	8	114.23	1.29E+04	10	0.6993	9	0.877	24	0.61	26	1.16	0.8306	6	0.491	20	0.41	21	0.67	0.28	0.26	0.29	0.63	0.47	0.54	0.41	0.28	0.61	0.36	n-Octane	
NONANE	N-C9	43235	ALKA	9	128.26	1.50E+04	13	0.7472	9	0.724	26	0.54	27	1.16	0.8587	5	0.418	22	0.36	23	0.68	0.24	0.22	0.26	0.63	0.47	0.54	0.29	0.21	0.61	0.36	n-Nonane	
DECANE	N-C10	43238	ALKA	10	142.29	1.71E+04	13	0.7846	8	0.597	28	0.47	29	1.16	0.8812	4	0.351	24	0.31	24	0.68	0.20	0.19	0.23	0.63	0.48	0.54	0.25	0.17	0.61	0.36	n-Decane	
UNDECANE	N-C11	43241	ALKA	11	156.31	1.95E+04	13	0.8188	6	0.517	30	0.42	30	1.16	0.9004	3	0.311	25	0.28	25	0.68	0.18	0.17	0.21	0.63	0.48	0.54	0.21	0.15	0.61	0.36	n-Undecane	
DODECANE	N-C12	43255	ALKA	12	170.34	2.09E+04	13	0.8366	6	0.453	31	0.38	32	1.16	0.9100	3	0.277	25	0.25	25	0.68	0.15	0.15	0.19	0.63	0.48	0.54	0.19	0.13	0.61	0.36	n-Dodecane	
C13	N-C13	43258	ALKA	13	184.37	2.36E+04	13	0.8634	5	0.406	32	0.35	32	1.17	0.9242	2	0.254	26	0.24	26	0.68	0.14	0.14	0.18	0.63	0.48	0.54	0.17	0.12	0.61	0.36	n-Tridecane	
C14	N-C14	43259	ALKA	14	198.39	2.45E+04	25	0.8713	7	0.369	33	0.32	33	1.17	0.9283	2	0.234	26	0.22	26	0.68	0.13	0.13	0.17	0.63	0.48	0.54	0.16	0.11	0.61	0.36	n-Tetradecan	e
C15	N-C15	43260	ALKA	15	212.42	2.66E+04	25	0.8888	6	0.332	34	0.29	35	1.17	0.9414	2	0.220	26	0.21	26	0.68	0.12	0.12	0.16	0.63	0.48	0.54	0.14	0.10	0.61	0.36	n-Pentadecan	e
2MC3	ISO-C4	43214	ALKA	4	58.12	3.46E+03	13	0.2910	17	4.149	20	1.21	26	1.14	0.4183	16	1.744	20	0.73	26	0.66	0.62	0.53	0.56	0.62	0.47	0.53	0.85	0.57	0.59	0.35	2-Methylprop	ane
2MC4	ISO-C5	98132	ALKA	5	72.15	5.79E+03	20	0.4336	19	3.183	20	1.38	27	1.15	0.5862	16	1.480	20	0.87	26	0.67	0.72	0.61	0.66	0.62	0.47	0.53	0.88	0.59	0.60	0.36	2-Methylbuta	ne
22DMC3	NEO-C5	43122	ALKA	5	72.15	1.27E+03	10	0.1197	18	3.077	20	0.37	27	1.15 *	0.1838	18	1.184	20	0.22	27	0.67 *	0.17	0.15	0.16	0.62 *	0.47 *	0.53 *	0.19	0.10	0.60	0.36	2,2-Dimethyl	propane
BRC5PAR	BR-C5	43122	ALKA	5	72.15	5.79E+03	25	0.4336	22	3.183	20	1.38	30	1.15	0.5862	19	1.480	20	0.87	27	0.67	0.72	0.61	0.66	0.62	0.47	0.53	0.88	0.59	0.60	0.36	Branched C5	Alkanes
2MC5	2-ME-C5	43229	ALKA	6	86.18	8.31E+03	15	0.5520	14	2.774	20	1.53	24	1.15	0.7068	11	1.270	20	0.90	23	0.67	0.73	0.63	0.68	0.62	0.47	0.53	0.91	0.55	0.60	0.36	2-Methylpent	ane
3MC5	3-ME-C5	43230	ALKA	6	86.18	8.46E+03	15	0.5583	14	2.727	20	1.52	24	1.15	0.7127	11	1.323	20	0.94	23	0.67	0.78	0.67	0.72	0.62	0.47	0.53	0.95	0.63	0.60	0.36	3-Methylpent	ane
22DMC4	22-DMB	43291	ALKA	6	86.18	3.46E+03	15	0.2912	18	2.821	20	0.82	27	1.15	0.4185	17	1.213	20	0.51	27	0.67	0.41	0.36	0.38	0.62	0.47	0.53	0.41	0.27	0.60	0.36	2,2-Dimethyl	butane
23DMC4	23-DMB	98001	ALKA	6	86.18	8.08E+03	13	0.5426	13	1.975	20	1.07	24	1.15	0.6978	11	0.962	20	0.67	23	0.67	0.56	0.47	0.50	0.62	0.47	0.53	0.74	0.54	0.61	0.36	2,3-Dimethyl	butane
BRC6PAR	BR-C6	43105	ALKA	6	86.18	8.31E+03	25	0.5520	19	2.774	20	1.53	28	1.15	0.7068	15	1.270	20	0.90	25	0.67	0.73	0.63	0.68	0.62	0.47	0.53	0.91	0.55	0.60	0.36	Branched C6	Alkanes
2MC6	2-ME-C6	43275	ALKA	7	100.21	1.01E+04	25	0.6188	17	1.740	20	1.08	26	1.15 *	0.7670	12	0.889	20	0.68	23	0.67 *	0.54	0.47	0.50	0.63 *	0.47 *	0.53 *	0.85 *	0.53 *	0.60	0.36	2-Methylhexa	ne
3MC6	3-ME-C6	43295	ALKA	7	100.21	1.06E+04	25	0.6361	17	2.200	20	1.40	26	1.15	0.7808	12	1.060	20	0.83	23	0.67	0.66	0.58	0.62	0.63	0.47	0.53	0.85	0.53	0.60	0.36	3-Methylhexa	ne
23DMC5	23-DM-C5	43274	ALKA	7	100.21	1.07E+04	25	0.6385	16	2.371	20	1.51	26	1.15	0.7827	11	1.153	20	0.90	23	0.67	0.74	0.64	0.68	0.63	0.47	0.53	0.96	0.63	0.60	0.36	2,3-Dimethyl	pentane
24DMC5	24-DM-C5	43271	ALKA	7	100.21	1.02E+04	25	0.6213	17	2.870	20	1.78	26	1.15	0.7690	12	1.291	20	0.99	23	0.67	0.80	0.71	0.75	0.63	0.47	0.53	1.07	0.61	0.60	0.36	2,4-Dimethyl	pentane
33DMC5	33-DM-C5	43106	ALKA	7	100.21	4.63E+03	25	0.3669	23	1.935	20	0.71	31	1.15 *	0.5107	21	0.895	20	0.46	29	0.67 *	0.36	0.31	0.34	0.63 *	0.47 *	0.53 *	0.85 *	0.53 *	0.60	0.36	3,3-Dimethyl	pentane
223TMC4	223TM-C4	43106	ALKA	7	100.21	6.22E+03	15	0.4561	16	2.894	20	1.32	25	1.15 *	0.6104	14	1.288	20	0.79	24	0.67 *	0.66	0.56	0.59	0.63 *	0.47 *	0.53 *	0.85 *	0.53 *	0.60	0.36	2,2,3-Trimet	hylbutane
BRC7PAR	BR-C7	43106	ALKA	7	100.21	1.06E+04	25	0.6361	17	2.200	20	1.40	26	1.15	0.7808	12	1.060	20	0.83	23	0.67	0.66	0.58	0.62	0.63	0.47	0.53	0.85	0.53	0.60	0.36	Branched C7	Alkanes
2MC7	2-ME-C7	98140	ALKA	8	114.23	1.22E+04	25	0.6806	15	1.415	20	0.96	25	1.15 *	0.8141	10	0.733	20	0.60	22	0.67 *	0.45	0.40	0.43	0.63 *	0.47 *	0.54 *	0.72 *	0.43 *	0.61	0.36	2-Methylhept	ane
3MC7	3-ME-C7	43298	ALKA	8	114.23	1.27E+04	25	0.6946	15	1.432	20	0.99	25	1.15 *	0.8240	9	0.753	20	0.62	22	0.67 *	0.48	0.42	0.45	0.63 *	0.47 *	0.54 *	0.72 *	0.43 *	0.61	0.36	3-Methylhept	ane
4MC7	4-ME-C7	43297	ALKA	8	114.23	1.27E+04	25	0.6946	15	1.735	20	1.20	25	1.15 *	0.8240	9	0.847	20	0.70	22	0.67 *	0.54	0.48	0.51	0.63 *	0.47 *	0.54 *	0.72	0.43	0.61	0.36	4-Methylhept	ane
23DMC6	23-DM-C6	98139	ALKA	8	114.23	1.28E+04	25	0.6963	14	1.889	20	1.32	25	1.15 *	0.8252	9	0.948	20	0.78	22	0.67 *	0.63	0.55	0.59	0.63 *	0.47 *	0.54 *	0.72 *	0.43 *	0.61	0.36	2,3-Dimethyl	hexane
24DMC6	24-DM-C6	43277	ALKA	8	114.23	1.28E+04	25	0.6963	14	2.158	20	1.50	25	1.15 *	0.8252	9	1.042	20	0.86	22	0.67 *	0.69	0.61	0.65	0.63 *	0.47 *	0.54 *	0.72 *	0.43 *	0.61	0.36	2,4-Dimethyl	hexane
25DMC6	25-DM-C6	43278	ALKA	8	114.23	1.22E+04	25	0.6823	15	2.390	20	1.63	25	1.15 *	0.8154	10	1.136	20	0.93	22	0.67 *	0.76	0.66	0.69	0.63 *	0.47 *	0.54 *	0.72 *	0.43 *	0.61	0.36	2,5-Dimethyl	hexane
224TMC5	ISO-C8	43276	ALKA	8	114.23	5.46E+03	10	0.4151	14	2.235	20	0.93	24	1.16	0.5658	13	0.958	20	0.54	24	0.67	0.39	0.36	0.38	0.63	0.47	0.54	0.70	0.40	0.61	0.36	2,2,4-Trimet	hylpentane
234TMC5	234TM-C5	43279	ALKA	8	114.23	1.28E+04	25	0.6977	14	2.299	20	1.60	25	1.15 *	0.8262	9	1.113	20	0.92	22	0.67 *	0.75	0.66	0.69	0.63 *	0.47 *	0.54 *	0.72 *	0.43 *	0.61	0.36	2,3,4-Trimet	hylpentane
BRC8PAR	BR-C8	43107	ALKA	8	114.23	1.27E+04	25	0.6946	15	1.735	20	1.20	25	1.16	0.8240	9	0.847	20	0.70	22	0.67	0.54	0.48	0.51	0.63	0.47	0.54	0.72	0.43	0.61	0.36	Branched C8	Alkanes
4EC7	4-ET-C7	43108	ALKA	9	128.26	1.56E+04	25	0.7581	12	1.499	12	1.14	17	1.15 *	0.8654	7	0.741	13	0.64	14	0.67 *	0.48	0.44	0.47	0.63 *	0.47 *	0.54 *	0.68	0.39	0.61	0.36	4-Ethylhepta	ne
24DMC7	24-DM-C7	98142	ALKA	9	128.26	1.48E+04	25	0.7430	13	1.799	10	1.34	16	1.15 *	0.8561	7	0.872	11	0.75	13	0.67 *	0.59	0.53	0.56	0.63 *	0.47 *	0.54 *	0.68 *	0.39 *	0.61	0.36	2,4-Dimethyl	heptane
225TMC6	225TM-C6	98033	ALKA	9	128.26	9.04E+03	25	0.5810	18	1.671	11	0.97	21	1.15 *	0.7336	14	0.788	12	0.58	18	0.67 *	0.44	0.39	0.42	0.63 *	0.47 *	0.54 *	0.68 *	0.39 *	0.61	0.36	2,2,5-Trimet	hylhexane
BRC9PAR	BR-C9	43108	ALKA	9	128.26	1.56E+04	25	0.7581	12	1.499	12	1.14	17	1.16	0.8654	7	0.741	13	0.64	14	0.68	0.48	0.44	0.47	0.63	0.47	0.54	0.68	0.39	0.61	0.36	Branched C9	Alkanes
4PC7	4-PR-C7	43109	ALKA	10	142.29	1.77E+04	25	0.7934	11	1.275	13	1.01	17	1.15 *	0.8862	5	0.634	13	0.56	14	0.67 *	0.42	0.38	0.41	0.63 *	0.48 *	0.54 *	0.60	0.34	0.61	0.36	4-Propylhept	ane
BRC10PAR	BR-C10	43109	ALKA	10	142.29	1.77E+04	25	0.7934	11	1.275	13	1.01	17	1.16	0.8862	5	0.634	13	0.56	14	0.68	0.42	0.38	0.41	0.63	0.48	0.54	0.60	0.34	0.61	0.36	Branched C10	Alkanes
BRC11PAR	BR-C11	43110	ALKA	11	156.31	2.12E+04	25	0.8397	8	1.395	11	1.17	14	1.16	0.9116	4	0.743	10	0.68	11	0.68	0.54	0.48	0.50	0.63	0.48	0.54	0.72	0.45	0.61	0.36	Branched C11	Alkanes
BRC12PAR	BR-C12	43111	ALKA	12	170.34	2.33E+04	25	0.8606	7	1.430	10	1.23	12	1.16	0.9227	3	0.747	9	0.69	10	0.68	0.55	0.49	0.52	0.63	0.48	0.54	0.75	0.45	0.61	0.36	Branched C12	Alkanes
BRC13PAR	BR-C13	43112	ALKA	13	184.37	2.54E+04	25	0.8784	6	1.097	12	0.96	13	1.17	0.9320	2	0.592	11	0.55	11	0.68	0.42	0.38	0.40	0.63	0.48	0.54	0.57	0.35	0.61	0.36	Branched C13	Alkanes
BRC14PAR	BR-C14	43113	ALKA	14	198.39	2.74E+04	25	0.8934	5	0.847	14	0.76	15	1.17	0.9400	2	0.478	13	0.45	13	0.68	0.34	0.30	0.33	0.63	0.48	0.54	0.44	0.29	0.61	0.36	Branched C14	Alkanes
BRC15PAR	BR-C15	43114	ALKA	15	212.42	2.95E+04	25	0.9061	5	0.769	15	0.70	15	1.17	0.9469	1	0.437	13	0.41	13	0.68	0.31	0.28	0.30	0.63	0.48	0.54	0.41	0.26	0.61	0.36	Branched C15	Alkanes
CYC5	CYCC5	43242	CLKA	5	70.14	7.62E+03	10	0.5228	12	4.547	9	2.38	15	1.18	0.6786	10	2.077	10	1.41	14	0.69	1.16	1.01	1.07	0.64	0.48	0.54	1.60	1.00	0.62	0.37	Cyclopentane	
CYC6	CYCC6	43248	CLKA	6	84.16	1.11E+04	13	0.6498	11	1.971	17	1.28	21	1.18	0.7914	8	0.934	18	0.74	20	0.69	0.57	0.51	0.54	0.64	0.48	0.54	0.84	0.49	0.62	0.37	Cyclohexane	
MCYC5	ME-CYCC5	43262	CLKA	6	84.16	1.19E+04	25	0.6733	15	4.189	8	2.82	17	1.18	0.8089	10	1.916	9	1.55	13	0.69	1.28	1.12	1.17	0.64	0.48	0.54	1.70	1.08	0.62	0.37	Methylcyclop	entane
CYC6PAR	CYC-C6	43248	CLKA	6	84.16	1.11E+04	25	0.6498	16	1.971	17	1.28	24	1.18	0.7914	11	0.934	18	0.74	21	0.69	0.57	0.51	0.54	0.64	0.48	0.54	0.84	0.49	0.62	0.37	C6 Cycloalka	nes
MCYC6	ME-CYCC6	43261	CLKA	7	98.19	1.51E+04	25	0.7488	13	2.464	12	1.85	17	1.18	0.8597	7	1.163	13	1.00	14	0.69	0.79	0.71	0.74	0.64	0.48	0.54	1.17	0.67	0.62	0.37	Methylcycloh	exane
ECYC5	ET-CYCC5	98057	CLKA	7	98.19	1.32E+04	25	0.7060	14	3.271	9	2.31	17	1.15 *	0.8319	9	1.560	9	1.30	13	0.67 *	1.06	0.92	0.97	0.64 *	0.48 *	0.54 *	1.17 *	0.67 *	0.62	0.37	Ethylcyclope	ntane
13DMCYC5	13DMCYC5	90064	CLKA	7	98.19	1.27E+04	25	0.6950	15	3.665	8	2.55	17	1.15 *	0.8243	9	1.680	9	1.39	13	0.67 *	1.14	1.01	1.05	0.64 *	0.48 *	0.54 *	1.17 *	0.67 *	0.62	0.37	1,3-Dimethyl	cyclopentane
CYC7PAR	CYC-C7	43115	CLKA	7	98.19	1.51E+04	25	0.7488	13	2.464	12	1.85	17	1.18	0.8597	7	1.163	13	1.00	14	0.69	0.79	0.71	0.74	0.64	0.48	0.54	1.17	0.67	0.62	0.37	C7 Cycloalka	nes
ECYC6	ET-CYCC6	43288	CLKA	8	112.22	1.81E+04	25	0.7989	10	2.433	11	1.94	15	1.18	0.8893	5	1.146	11	1.02	12	0.69	0.81	0.72	0.76	0.64	0.48	0.54	1.36	0.76	0.62	0.37	Ethylcyclohe	xane
CYC8PAR	CYC-C8	43116	CLKA	8	112.22	1.81E+04	25	0.7989	10	2.433	11	1.94	15	1.18	0.8893	5	1.146	11	1.02	12	0.69	0.81	0.72	0.76	0.64	0.48	0.54	1.36	0.76	0.62	0.37	C8 Cycloalka	nes
CYC9PAR	CYC-C9	43117	CLKA	9	126.24	2.07E+04	25	0.8339	9	2.755	8	2.30	12	1.18	0.9086	4	1.294	9	1.18	10	0.69	0.94	0.86	0.89	0.64	0.48	0.54	1.60	0.89	0.62	0.37	C9 Cycloalka	nes
CYC10PAR	CYC-C10	98066	CLKA	10	140.27	2.36E+04	25	0.8639	7	2.067	10	1.78	12	1.18	0.9244	3	1.009	10	0.93	11	0.69	0.74	0.67	0.69	0.64	0.48	0.54	1.31	0.74	0.62	0.37	C10 Cycloalk	anes
CYC11PAR	CYC-C11	98067	CLKA	11	154.30	2.63E+04	25	0.8854	6	2.156	9	1.91	10	1.18	0.9357	2	1.064	9	1.00	9	0.69	0.81	0.72	0.74	0.64	0.48	0.54	1.23	0.70	0.62	0.37	C11 Cycloalk	anes
CYC12PAR	CYC-C12	98072	CLKA	12	168.32	2.92E+04	25	0.9045	5	1.862	9	1.68	10	1.18	0.9460	1	0.924	9	0.87	9	0.69	0.70	0.63	0.65	0.64	0.48	0.54	1.20	0.68	0.62	0.37	C12 Cycloalk	anes
CYC13PAR	CYC-C13	98072	CLKA	13	182.35	3.13E+04	25	0.9138	4	1.557	10	1.42	11	1.18	0.9499	1	0.777	10	0.74	10	0.69	0.59	0.53	0.56	0.64	0.48	0.54	0.94	0.52	0.62	0.37	C13 Cycloalk	anes
CYC14PAR	CYC-C14	98072	CLKA	14	196.38	3.34E+04	25	0.9201	4	1.328	11	1.22	12	1.18	0.9517	1	0.664	11	0.63	11	0.69	0.50	0.46	0.48	0.64	0.48	0.54	0.88	0.47	0.62	0.37	C14 Cycloalk	anes

CYC15PAR	CYC-C15	98072	CLKA	15	210.41	3.55E+04	25	0.9254	3	1.153	12	1.07	12	1.18	0.9529	1	0.578	12	0.55	12	0.69	0.44	0.40	0.42	0.64	0.48	0.54	0.85	0.44	0.62	0.37	C15 Cycloalk	anes
ETHENE	ETHENE	43203	ALKE	2	28.05	1.24E+04	8	0.7182	9	10.151	20	7.29	22	8.17	0.8412	6	3.751	20	3.16	21	3.22	2.62	2.52	2.52	3.67	2.83	2.83	5.30	2.60	5.48	2.64	Ethene	
PROPENE	PROPENE	43205	ALKE	3	42.08	3.82E+04	8	0.9419	1	9.979	25	9.40	25	11.68	0.9688	0	3.894	25	3.77	25	4.21	3.14	3.04	3.04	4.82	3.77	3.88	6.60	2.80	7.28	2.88	Propene	
1C4=	1-BUTENE	43213	ALKE	4	56.11	4.56E+04	10	0.9586	1	9.294	30	8.91	30	9.05	0.9783	0	3.590	30	3.51	30	3.33	2.93	2.83	2.83	3.77	2.93	3.04	6.10	2.40	5.61	2.25	1-Butene	
2MC3=	ISOBUTEN	43215	ALKE	4	56.11	7.46E+04	10	0.9796	0	5.417	30	5.31	30	9.05	0.9879	0	1.957	30	1.93	30	3.33	1.57	1.57	1.57	3.77	2.93	3.04	4.20	1.70	5.61	2.25	2-Methylprop	ene
1C5=	1-PENTEN	43224	ALKE	5	70.14	4.56E+04	10	0.9586	1	6.494	40	6.22	40	7.47	0.9782	0	2.515	50	2.46	50	2.80	1.99	1.99	1.99	3.14	2.41	2.51	4.20	1.60	4.61	1.88	1-Pentene	
2M1C4=	2M-1-BUT	43225	ALKE	5	70.14	8.80E+04	25	0.9796	0	5.003	40	4.90	40	7.47	0.9859	0	1.930	50	1.90	50	2.80	1.57	1.53	1.54	3.14	2.41	2.51	3.70	1.50	3.57	1.39	2-Methyl-1-B	utene
3M1C4=	3M-1-BUT	43223	ALKE	5	70.14	4.61E+04	10	0.9586	1	6.494	40	6.22	40	7.47	0.9782	0	2.515	50	2.46	50	2.80	1.99	1.99	1.99	3.14	2.41	2.51	4.20	1.70	4.61	1.88	3-Methyl-1-B	utene
1C6=	1-HEXENE	43245	ALKE	6	84.16	5.37E+04	25	0.9692	1	4.565	40	4.42	40	6.42	0.9838	0	1.773	50	1.74	50	2.45	1.38	1.36	1.37	2.72	2.10	2.20	3.00	1.16	3.95	1.62	1-Hexene	
C6OLE1	C6-OLE1	43245	ALKE	6	84.16	5.37E+04	25	0.9692	1	4.565	40	4.42	40	6.42	0.9838	0	1.773	50	1.74	50	2.45	1.38	1.36	1.37	2.72	2.10	2.20	3.00	1.16	3.95	1.62	C6 Terminal	Alkenes
C7OLE1	C7-OLE1	98005	ALKE	7	98.19	5.37E+04	25	0.9692	1	3.593	40	3.48	40	5.67	0.9838	0	1.400	50	1.38	50	2.20	1.08	1.07	1.08	2.41	1.89	1.89	2.40	0.88	3.47	1.44	C7 Terminal	Alkenes
C8OLE1	C8-OLE1	43265	ALKE	8	112.22	5.37E+04	25	0.9692	1	2.775	40	2.69	40	5.11	0.9838	0	1.085	50	1.07	50	2.01	0.82	0.82	0.84	2.20	1.68	1.78	1.90	0.68	3.11	1.31	C8 Terminal	Alkenes
C9OLE1	C9-OLE1	43267	ALKE	9	126.24	5.37E+04	25	0.9692	1	2.303	40	2.23	40	4.67	0.9838	0	0.903	50	0.89	50	1.86	0.67	0.67	0.69	1.99	1.57	1.57	1.60	0.56	2.84	1.20	C9 Terminal	Alkenes
C10OLE1	C10-OLE1	43268	ALKE	10	140.27	5.37E+04	25	0.9692	1	1.974	40	1.91	40	4.32	0.9838	0	0.773	50	0.76	50	1.74	0.58	0.58	0.60	1.89	1.47	1.51	1.32	0.47	2.61	1.12	C10 Terminal	Alkenes
C11OLE1	C11-OLE1	43269	ALKE	11	154.30	5.37E+04	25	0.9693	1	1.728	40	1.67	40	4.04	0.9838	0	0.678	50	0.67	50	1.65	0.50	0.50	0.52	1.78	1.38	1.41	1.15	0.41	2.43	1.05	C11 Terminal	Alkenes
C12OLE1	C12-OLE1	43147	ALKE	12	168.32	5.37E+04	25	0.9692	1	1.564	40	1.52	40	3.80	0.9839	0	0.613	50	0.60	50	1.57	0.45	0.45	0.47	1.68	1.30	1.34	1.03	0.36	2.28	1.00	C12 Terminal	Alkenes
C13OLE1	C13-OLE1	43147	ALKE	13	182.35	5.37E+04	25	0.9692	1	1.403	40	1.36	40	3.60	0.9838	0	0.554	50	0.55	50	1.50	0.40	0.41	0.42	1.57	1.24	1.28	0.93	0.33	2.28	1.00	C13 Terminal	Alkenes
C-2C4=	C-2-BUTE	43217	ALKE	4	56.11	8.19E+04	10	0.9786	0	10.159	30	9.94	30	10.13	0.9842	0	3.815	30	3.76	30	3.67	3.14	3.14	3.14	4.51	3.25	3.35	7.30	2.80	6.12	2.29	cis-2-Butene	
T-2C4=	T-2-BUTE	43216	ALKE	4	56.11	9.24E+04	10	0.9786	0	10.159	30	9.94	30	10.13	0.9842	0	3.815	30	3.76	30	3.67	3.14	3.14	3.14	4.51	3.25	3.35	7.30	2.80	6.16	2.29	trans-2-Bute	ne
2M2C4=	2M-2-BUT	43228	ALKE	5	70.14	1.26E+05	10	0.9860	0	6.498	40	6.41	40	4.75	0.9885	0	2.327	50	2.30	50	1.88	1.89	1.99	1.99	2.20	1.57	1.68	5.00	1.80	4.61	1.88	2-Methyl-2-B	utene
C5OLE2	C5-OLE2	43226	ALKE	5	70.14	9.62E+04	25	0.9773	0	9.009	40	8.80	40	8.34	0.9821	0	3.357	50	3.30	50	3.07	2.72	2.72	2.72	3.67	2.72	2.83	6.20	2.30	5.05	1.91	C5 Internal	Alkenes
C6OLE2	C6-OLE2	43246	ALKE	6	84.16	9.62E+04	25	0.9773	0	6.841	40	6.69	40	7.14	0.9821	0	2.546	50	2.50	50	2.67	2.10	2.10	2.10	3.25	2.31	2.41	5.30	1.90	3.95 *	1.62 *	C6 Internal	Alkenes
C7OLE2	C7-OLE2	98041	ALKE	7	98.19	9.62E+04	25	0.9773	0	5.656	40	5.53	40	6.29	0.9821	0	2.108	50	2.07	50	2.39	1.68	1.68	1.68	2.83	2.10	2.20	4.40	1.60	3.47	1.44	C7 Internal	Alkenes
C8OLE2	C8-OLE2	43266	ALKE	8	112.22	9.62E+04	25	0.9773	0	5.410	40	5.29	40	5.65	0.9821	0	2.029	50	1.99	50	2.17	1.57	1.57	1.68	2.52	1.89	1.99	3.60	1.30	3.11 *	1.31 *	C8 Internal	Alkenes
C9OLE2	C9-OLE2	98042	ALKE	9	126.24	9.62E+04	25	0.9772	0	4.685	40	4.58	40	5.15	0.9821	0	1.759	50	1.73	50	2.01	1.39	1.40	1.41	2.31	1.68	1.78	3.20	1.13	2.84	1.20	C9 Internal	Alkenes
C10OLE2	C10-OLE2	98039	ALKE	10	140.27	9.62E+04	25	0.9773	0	4.144	40	4.05	40	4.75	0.9821	0	1.557	50	1.53	50	1.88	1.23	1.25	1.25	2.20	1.57	1.68	2.80	0.99	2.61	1.12	C10 Internal	Alkenes
C11OLE2	C11-OLE2	43146	ALKE	11	154.30	9.62E+04	25	0.9773	0	3.716	40	3.63	40	4.43	0.9821	0	1.393	50	1.37	50	1.77	1.11	1.12	1.12	1.99	1.48	1.56	2.50	0.89	2.43	1.05	C11 Internal	Alkenes
C12OLE2	C12-OLE2	43147	ALKE	12	168.32	9.62E+04	25	0.9773	0	3.391	40	3.32	40	4.16	0.9821	0	1.273	50	1.25	50	1.68	1.01	1.02	1.03	1.89	1.39	1.48	2.30	0.81	2.28	1.00	C12 Internal	Alkenes
C13OLE2	C13-OLE2	98083	ALKE	13	182.35	9.62E+04	25	0.9773	0	3.104	40	3.03	40	3.93	0.9821	0	1.163	50	1.14	50	1.60	0.92	0.93	0.94	1.78	1.33	1.40	2.10	0.74	2.15	0.95	C13 Internal	Alkenes
13C4==	13-BUTDE	43218	DLKE	4	54.09	9.67E+04	10	0.9771	0	11.146	50	10.89	50	14.49	0.9818	0	4.238	50	4.16	50	4.71	3.48	3.37	3.37	5.11	4.46	4.46	7.70	3.00	11.00	4.30	1,3-Butadien	e
ISOPRENE	ISOPRENE	43243	DLKE	5	68.12	1.46E+05	13	0.9899	0	9.171	50	9.08	50	16.22	0.9918	0	3.439	50	3.41	50	5.12	2.81	2.81	2.81	5.39	4.86	4.86	6.50	2.50	10.92	4.02	2-Methyl-1,3	-Butadiene
CYC5=	CYC-PNTE	43292	CLKE	5	68.12	9.74E+04	25	0.9768	0	7.846	50	7.66	50	7.69	0.9814	0	2.836	50	2.78	50	2.88	2.27	2.37	2.37	3.24	2.48	2.59	4.00	1.41	5.20	1.96	Cyclopentene	
CYC6=	CYC-HEXE	43273	CLKE	6	82.15	9.82E+04	13	0.9764	0	5.802	50	5.67	50	6.58	0.9808	0	2.240	50	2.20	50	2.51	1.83	1.83	1.83	2.79	2.15	2.25	3.30	1.27	4.42	1.69	Cyclohexene	
A-PINENE	A-PINENE	98025	CLKE	10	136.24	7.80E+04	13	0.9800	0	3.347	50	3.28	50	4.45	0.9878	0	1.297	50	1.28	50	1.80	1.07	1.04	1.04	1.94	1.51	1.55	1.90	0.74	3.38	1.36	a-Pinene	
B-PINENE	B-PINENE	98026	CLKE	10	136.24	1.15E+05	13	0.9824	0	4.485	50	4.41	50	4.41 *	0.9854	0	1.691	50	1.67	50	1.67 *	1.39	1.35	1.36	1.39 *	1.35 *	1.36 *	1.90	0.74	2.69	1.15	b-Pinene	
ETHYNE	ACETYLEN	43206	ALKY	2	26.04	1.15E+03	25	0.1091	28	4.627	50	0.50	57	0.64	0.1682	28	1.954	50	0.33	57	0.37	0.29	0.24	0.26	0.34	0.26	0.29	0.37	0.27	0.33	0.20	Ethyne	
PROPYNE	ME-ACTYL	43209	ALKY	3	40.07	8.90E+03	20	0.5756	16	7.123	50	4.10	52	4.10 *	0.7287	12	2.976	50	2.17	51	2.17 *	1.76	1.58	1.65	1.76 *	1.58 *	1.65 *	0.24 *	0.17 *	0.43	0.26	Propyne	
1BUTYNE	ET-ACTYL	43219	ALKY	4	54.09	4.56E+04	15	0.9586	1	9.641	50	9.24	50	9.24 *	0.9783	0	3.724	50	3.64	50	3.64 *	3.04	2.94	2.94	3.04 *	2.94 *	2.94 *	0.18 *	0.13 *	0.48	0.28	1-Butyne	
BENZENE	BENZENE	45201	AROM	6	78.11	1.89E+03	15	0.1724	20	2.463	30	0.42	36	0.21	0.2595	20	0.527	245	0.14	245	0.12	0.09	0.11	0.12	0.11	0.09	0.10	0.28	0.09	0.11	0.07	Benzene	
TOLUENE	TOLUENE	45202	AROM	7	92.14	8.67E+03	13	0.5667	13	4.817	30	2.73	33	1.95	0.7207	10	0.875	146	0.63	146	-0.28	0.31	0.56	0.71	-1.66	-0.08	-9.83	1.90	0.41	1.28	-0.29	Toluene	
EBEN	C2-BENZ	45203	AROM	8	106.17	1.04E+04	18	0.6299	13	4.279	30	2.70	33	1.85	0.7764	10	0.807	157	0.63	157	-0.15	0.40	0.62	0.73	-1.36	-0.00	-170.6	1.80	0.39	1.19	-0.20	Ethylbenzene	
N-PBEN	N-C3-BEN	45209	AROM	9	120.20	8.81E+03	15	0.5722	14	3.698	30	2.12	33	1.77	0.7257	11	0.672	187	0.49	187	-0.05	0.31	0.48	0.57	-1.12	0.05	7.48	1.44	0.31	1.12	-0.14	n-Propylbenz	ene
I-PBEN	I-C3-BEN	98043	AROM	9	120.20	9.54E+03	18	0.5998	14	3.734	30	2.24	33	1.77	0.7506	10	0.694	181	0.52	182	-0.05	0.33	0.52	0.61	-1.12	0.05	7.48	1.50	0.33	1.12	-0.14	Isopropylben	zene
S-BBEN	S-C4-BEN	45216	AROM	10	134.22	8.81E+03	25	0.5722	18	3.308	30	1.89	35	1.71	0.7257	14	0.604	207	0.44	208	0.02	0.27	0.44	0.51	-0.94	0.10	3.18	1.29	0.28	1.07	-0.09	s-Butylbenze	ne
C10BEN1	C10-BEN1	45105	AROM	10	134.22	8.67E+03	25	0.5667	19	3.308	30	1.87	35	1.71	0.7207	14	0.601	208	0.43	209	0.02	0.22	0.38	0.49	-0.94	0.10	3.18	1.28	0.28	1.07	-0.09	C10 Monoalky	l Benzenes
C11BEN1	C11-BEN1	45245	AROM	11	148.25	8.67E+03	25	0.5667	19	2.995	30	1.70	35	1.66	0.7207	14	0.541	230	0.39	230	0.08	0.20	0.35	0.44	-0.80	0.13	1.85	1.16	0.25	1.03	-0.04	C11 Monoalky	l Benzenes
C12BEN1	C12-BEN1	45247	AROM	12	162.28	8.67E+03	25	0.5667	19	2.737	30	1.55	35	1.62	0.7207	14	0.497	250	0.36	251	0.14	0.17	0.32	0.40	-0.67	0.16	1.30	1.06	0.23	0.99	-0.01	C12 Monoalky	l Benzenes
M-XYL	M-XYLENE	45205	AROM	8	106.17	3.46E+04	13	0.9302	2	8.767	30	8.16	30	9.10	0.9618	0	2.550	50	2.45	50	2.39	1.88	2.10	2.22	1.66	2.33	2.44	6.00	1.90	6.15	1.81	m-Xylene	
O-XYL	O-XYLENE	45204	AROM	8	106.17	2.01E+04	13	0.8288	6	7.794	30	6.46	31	9.10	0.9132	3	2.134	59	1.95	59	2.39	1.48	1.66	1.77	1.66	2.33	2.44	5.20	1.70	6.15	1.81	o-Xylene	
P-XYL	P-XYLENE	45206	AROM	8	106.17	2.10E+04	20	0.8393	7	7.863	30	6.60	31	9.10	0.9186	3	2.166	58	1.99	59	2.39	1.51	1.77	1.77	1.66	2.33	2.44	5.20	1.80	6.15	1.81	p-Xylene	
C9BEN2	C9-BEN2	45104	AROM	9	120.20	3.46E+04	25	0.9302	3	7.745	30	7.20	30	8.17	0.9618	1	2.250	56	2.16	56	2.19	1.63	1.87	1.98	1.57	2.09	2.20	5.30	1.60	5.50	1.64	C9 Dialkyl B	enzenes
C10BEN2	C10-BEN2	45106	AROM	10	134.22	3.46E+04	25	0.9302	3	6.934	30	6.45	30	7.44	0.9618	1	2.017	62	1.94	62	2.03	1.47	1.64	1.75	1.48	1.97	2.08	4.80	1.47	4.99	1.51	C10 Dialkyl	Benzenes
C11BEN2	C11-BEN2	45245	AROM	11	148.25	3.46E+04	25	0.9302	3	6.279	30	5.84	30	6.84	0.9618	1	1.824	68	1.76	68	1.90	1.32	1.52	1.57	1.40	1.85	1.85	4.30	1.33	1.03	-0.04	C11 Dialkyl	Benzenes
C12BEN2	C12-BEN2	45247	AROM	12	162.28	3.46E+04	25	0.9302	3	5.736	30	5.34	30	6.35	0.9618	1	1.668	74	1.60	75	1.80	1.21	1.39	1.43	1.33	1.74	1.74	3.90	1.22	0.99	-0.01	C12 Dialkyl	Benzenes
123TMBEN	123-TMB	45225	AROM	9	120.20	4.80E+04	18	0.9624	1	9.190	30	8.85	30	8.17	0.9803	0	2.728	46	2.67	46	2.19	1.98	2.20	2.20	1.57	2.09	2.20	7.40	2.40	5.50	1.64	1,2,3-Trimet	hylbenzene
124TMBEN	124-TMB	45208	AROM	9	120.20	4.77E+04	18	0.9620	1	9.179	30	8.83	30	8.17	0.9801	0	2.721	46	2.67	46	2.19	1.98	2.20	2.20	1.57	2.09	2.20	7.40	2.40	5.50	1.64	1,2,4-Trimet	hylbenzene
135TMBEN	135-TMB	45207	AROM	9	120.20	8.44E+04	18	0.9800	0	10.329	30	10.12	30	8.17	0.9868	0	3.094	41	3.05	41	2.19	2.42	2.64	2.75	1.57	2.09	2.20	7.50	2.40	5.50	1.64	1,3,5-Trimet	hylbenzene
C10BEN3	C10-BEN3	45103	AROM	10	134.22	8.44E+04	25	0.9800	0	9.252	30	9.07	30	7.68	0.9868	0	2.772	45	2.73	45	2.18	2.08	2.41	2.52	1.61	2.08	2.08	6.70	2.10	4.99	1.51	C10 Trialkyl	Benzenes
C11BEN3	C11-BEN3	45245	AROM	11	148.25	8.44E+04	25	0.9800	0	8.377	30	8.21	30	6.84	0.9868	0	2.507	50	2.48	50	1.90	1.96	2.18	2.18	1.40	1.85	1.85	6.10	1.90	1.03	-0.04	C11 Trialkyl	Benzenes
C12BEN3	C12-BEN3	45247	AROM	12	162.28	8.44E+04	25	0.9800	0	7.653	30	7.50	30	6.35	0.9868	0	2.293	54	2.26	54	1.80	1.74	1.96	2.07	1.33	1.74	1.74	5.60	1.80	0.99	-0.01	C12 Trialkyl	Benzenes
C10BEN4	C10-BEN4	45232	AROM	10	134.22	8.44E+04	25	0.9800	0	9.252	30	9.07	30	7.44	0.9868	0	2.772	45	2.73	45	2.03	2.08	2.41	2.52	1.48	1.97	2.08	6.70 *	2.10 *	4.99	1.51	C10 Tetraalk	yl Benzenes
STYRENE	STYRENE	45220	AROM	8	104.15	8.41E+04	13	0.9800	0	2.260	50	2.22	50	4.55	0.9869	0	-0.299	247	-0.30	247	0.51	-0.81	-0.15	-4.29	-0.77	0.71	1.92	2.67 *	1.13 *	2.56	0.30	Styrene	
INDAN	INDAN	98044	AROM	9	118.18	5.03E+04	25	0.9655	1	1.104	30	1.06	30	1.06 *	0.9818	0	0.146	875	0.14	875	0.14 *	-0.02	0.13	0.35	-0.02 *	0.13 *	0.35 *	0.73 *	0.11 *	5.60	1.67	Indan	
TETRALIN	TETRALIN	45111	AROM	10	132.21	5.03E+04	25	0.9655	1	0.984	30	0.95	30	7.55	0.9818	0	0.131	972	0.13	971	2.06	-0.02	0.12	0.31	1.50	2.00	2.11	0.73	0.11	5.07	1.53	Tetralin	
NAPHTHAL	NAPHTHAL	98046	AROM	10	128.17	3.17E+04	15	0.9177	3	1.285	30	1.18	30	7.79	0.9540	1	0.094	1400	0.09	1380	2.13	-0.10	0.11	0.58	1.55	2.06	2.18	0.87	0.04	5.23	1.58	Naphthalene	
MNAP	ME-NAPH	98010	AROM	11	142.20	7.63E+04	25	0.9798	0	3.338	30	3.27	30	7.13	0.9879	0	0.772	168	0.76	168	1.99	0.44	0.65	0.76	1.46	1.93	1.93	2.40	0.54	4.77	1.46	Methyl Napht	halenes
23DMNAP	23-DMN	98012	AROM	12	156.23	1.13E+05	25	0.9818	0	5.228	30	5.13	30	6.60	0.9848	0	1.379	94	1.36	94	1.87	0.97	1.21	1.30	1.38	1.81	1.81	3.70	1.00	4.40	1.36	2,3-Dimethyl	naphthalene
PHENOL	PHENOL	45300	AROM	6	94.11	3.86E+04	15	1.0000	2	1.132	30	1.13	30	1.13 *	1.0000	0	-0.471	227	-0.47	227	-0.47 *	-0.81	-0.28	-1.50	-0.81 *	-0.28 *	-1.50 *	0.79	-0.54	0.09	0.05	Phenol	
CRESOLS	CRESOL	98021	AROM	7	108.14	6.17E+04	25	1.0000	0	2.312	30	2.31	30	3.05	1.0000	0	-0.572	190	-0.57	190	0.16	-1.16	-0.29	-3.52	-1.29	0.33	2.66	1.60	-0.72	1.09	-0.25	Cresols	
METHANOL	MEOH	43301	OXY	1	32.04	1.38E+03	13	0.1298	19	4.333	20	0.56	27	0.59	0.1985	19	1.395	20	0.28	28	0.25	0.22	0.21	0.21	0.30	0.21	0.22	0.40	0.22	0.40	0.24	Methanol	
ETHANOL	ETOH	43302	OXY	2	46.07	4.81E+03	10	0.3777	15	3.538	20	1.34	25	1.40 *	0.5235	14	1.386	20	0.73	24	0.70 *	0.59	0.53	0.56	0.82 *	0.55 *	0.64 *	0.79	0.40	0.77	0.33	Ethanol	
N-C3OH	N-C3-OH	43303	OXY	3	60.10	7.84E+03	20	0.5323	17	4.241	50	2.26	53	2.26 *	0.6879	13	1.639	50	1.13	52	1.13 *	0.91	0.84	0.87	0.91 *	0.84 *	0.87 *	1.33	0.60	0.22	0.13	n-Propyl Alc	ohol
I-C3OH	I-C3-OH	43304	OXY	3	60.10	7.64E+03	20	0.5236	17	1.025	50	0.54	53	0.54 *	0.6794	14	0.465	50	0.31	52	0.31 *	0.27	0.23	0.24	0.27 *	0.23 *	0.24 *	0.37	0.25	0.22	0.13	Isopropyl Al	cohol
N-C4OH	N-C4-OH	43305	OXY	4	74.12	1.22E+04	25	0.6812	15	3.943	50	2.69	52	2.69 *	0.8146	10	1.591	50	1.30	51	1.30 *	1.06	0.97	1.01	1.06 *	0.97 *	1.01 *	1.60	0.75	0.47	0.28	n-Butyl Alco	hol
I-C4OH	I-C4-OH	43306	OXY	4	74.12	9.47E+03	25	0.5971	18	3.217	50	1.92	53	1.92 *	0.7481	13	1.262	50	0.94	52	0.94 *	0.77	0.71	0.73	0.77 *	0.71 *	0.73 *	0.72	0.41	0.47	0.28	Isobutyl Alc	ohol
T-C4OH	T-C4-OH	43309	OXY	4	74.12	1.66E+03	20	0.1534	23	2.720	50	0.42	55	0.42 *	0.2325	23	1.062	50	0.25	55	0.25 *	0.21	0.18	0.19	0.21 *	0.18 *	0.19 *	0.29	0.20	0.47	0.28	t-Butyl Alco	hol
FORMALD	FORMALD	43502	OXY	1	30.03	1.43E+04	15	0.9299	10	7.690	40	7.15	41	9.78	0.9595	6	2.164	30	2.08	31	2.60	1.66	1.86	1.96	2.45	2.69	2.89	6.20	2.00	7.19	2.56	Formaldehyde	
ACETALD	ACETALD	43503	OXY	2	44.05	2.30E+04	10	0.8664	5	6.375	40	5.52	40	6.45	0.9282	2	2.336	30	2.17	30	2.34	1.87	1.74	1.74	2.87	2.07	2.14	3.80	1.50	3.92	1.46	Acetaldehyde	
PROPALD	PROPALD	43504	OXY	3	58.08	2.89E+04	13	0.9203	3	7.101	40	6.53	40	5.17	0.9501	1	2.626	30	2.49	30	1.93	2.13	1.97	2.05	2.35	1.67	1.75	4.60	1.60	3.12	1.20	Propionaldeh	yde
C4ALD	C4-RCHO	43510	OXY	4	72.11	2.89E+04	25	0.9203	5	5.719	50	5.26	50	4.40	0.9501	1	2.114	50	2.01	50	1.69	1.71	1.63	1.63	1.96	1.47	1.55	3.70 *	1.29 *	2.64	1.03	C4 Aldehydes	
C5ALD	C5-RCHO	43512	OXY	5	86.14	2.89E+04	25	0.9203	5	4.787	50	4.41	50	3.87	0.9501	1	1.769	50	1.68	50	1.53	1.45	1.37	1.37	1.79	1.28	1.37	3.20 *	1.10 *	2.35 *	0.94 *	C5 Aldehydes	
C6ALD	C6-RCHO	98095	OXY	6	100.16	2.89E+04	25	0.9203	5	4.118	50	3.79	50	3.49	0.9501	1	1.521	50	1.45	50	1.41	1.22	1.16	1.18	1.59	1.17	1.24	2.67 *	0.93 *	2.07	0.85	C6 Aldehydes	
C7ALD	C7-RCHO	98158	OXY	7	114.19	2.89E+04	25	0.9203	5	3.610	50	3.32	50	3.32 *	0.9501	1	1.336	50	1.27	50	1.27 *	1.07	1.02	1.04	1.07 *	1.02 *	1.04 *	-0.47 *	-0.82 *	2.88	1.07	C7 Aldehydes	
CROTALD	CROTALD	98156	OXY	4	70.09	2.89E+04	15	0.9203	4	5.884	50	5.42	50	5.42 *	0.9501	1	2.175	50	2.07	50	2.07 *	1.76	1.68	1.68	1.76 *	1.68 *	1.68 *	3.70 *	1.29 *	6.71	2.57	Crotonaldehy	de
BENZALD	BENZALD	98157	OXY	7	106.13	1.89E+04	13	0.8949	7	-0.617	50	-0.55	50	0.00	0.9795	3	-1.260	50	-1.23	50	0.00	-1.55	-0.94	-1.45	0.00 *	0.00 *	0.00 *	-0.54	-0.93	1.63	0.61	Benzaldehyde	
MTBE	MTBE	.	OXY	5	88.15	4.17E+03	18	0.3383	19	1.832	20	0.62	28	0.62 *	0.4767	18	0.852	30	0.41	35	0.41 *	0.35	0.29	0.31	0.35 *	0.29 *	0.31 *	0.47	0.32	0.29	0.17	Methyl t-But	yl Ether
ETBE	ETBE	.	OXY	6	102.18	1.10E+04	25	0.6480	16	3.061	40	1.98	43	1.98 *	0.7900	11	1.302	30	1.03	32	1.03 *	0.87	0.77	0.79	0.87 *	0.77 *	0.79 *	1.33	0.81	2.03	0.83	Ethyl t-Buty	l Ether
ACETONE	ACETONE	43551	OXY	3	58.08	3.39E+02	18	0.0505	23	11.063	40	0.56	46	0.57	0.0700	24	2.893	30	0.20	39	0.33	0.16	0.16	0.17	0.30	0.23	0.26	0.39	0.14	0.45	0.27	Acetone	
C4KET	MEK	43552	OXY	4	72.11	1.70E+03	13	0.1856	18	6.364	50	1.18	53	0.69	0.2630	19	2.085	50	0.55	53	0.40	0.45	0.42	0.42	0.37	0.28	0.32	0.76	0.31	0.48	0.28	C4 Ketones	
ACROLEIN	ACROLEIN	43505	OXY	3	56.07	2.89E+04	15	0.9203	4	7.355	50	6.77	50	13.55	0.9501	1	2.720	50	2.58	50	4.83	2.20	2.04	2.12	5.74	4.33	4.48	4.60 *	1.60 *	9.16	3.44	Acrolein	
MNITRITE	ME-NITRT	.	NIT	1	61.04	0.00E+00	.	1.0000	.	9.421	50	9.42	.	.	.	.	.	50	.	.	.	.	.	.	.	.	.	9.20 *	4.00 *	.	.	Methyl Nitri	te

Appendix C

Low Emitting Vehicle Profiles

California Air Resources Board Low Emitting Vehicle (LEV) Profiles - May 3, 1995

Federal Test Procedure (FTP) weight fractions and mass in grams/mile

All standard deviations (SD) in percent

		--- U. S. National Average Gasoline (RF-A) ---								-------- Compressed Natural Gas (CNG) --------								-------- Liquified Petroleum Gas (LPG) -------								--------- Phase 2 Gasoline (Phase 2) ---------							
OGID	SAROAD	Bag 1	SD	Bag 2	SD	Bag 3	SD	Comp	SD	Bag 1	SD	Bag 2	SD	Bag 3	SD	Comp	SD	Bag 1	SD	Bag 2	SD	Bag 3	SD	Comp	SD	Bag 1	SD	Bag 2	SD	Bag 3	SD	Comp	SD
MASS		0.2274	8	0.0095	16	0.0250	19	0.0589	5	0.0826	23	0.0105	21	0.0306	22	0.0310	21	0.3178	3	0.0118	23	0.0630	18	0.0893	5	0.2113	8	0.0101	23	0.0214	19	0.0549	8
ETHANE	43202	0.0333	11	0.1363	19	0.1490	18	0.0519	13	0.5044	3	0.6397	5	0.7172	2	0.5852	3	0.0222	9	0.0806	14	0.0621	11	0.0329	10	0.0333	13	0.0540	22	0.1442	25	0.0419	11
PROPANE	43204	0.0020	15	0.0119	26	0.0095	81	0.0034	20	0.2185	4	0.0924	27	0.1990	6	0.1915	6	0.7587	2	0.5299	14	0.8763	2	0.7750	2	0.0051	94	0.0329	62	0.0110	68	0.0066	69
BUTANE	43212	0.0464	8	0.0712	11	0.0786	15	0.0513	7	0.0111	41	0.0136	39	0.0108	39	0.0115	36	0.0024	25	0.0184	70	0.0016	53	0.0028	28	0.0105	17	0.0411	28	0.0314	33	0.0158	15
PENTANE	43220	0.0292	8	0.0396	13	0.0354	14	0.0304	7	0.0058	21	0.0183	33	0.0055	27	0.0081	22	0.0028	26	0.0260	58	0.0032	61	0.0035	24	0.0111	9	0.0207	31	0.0124	25	0.0125	12
HEXANE	43231	0.0258	7	0.0220	60	0.0209	22	0.0253	7	0.0004	67	0.0003	106	0.0001	104	0.0004	67	0.0013	33	0.0057	57	0.0003	88	0.0014	35	0.0111	17	0.0054	65	0.0090	45	0.0107	21
HEPTANE	43232	0.0144	4	0.0071	41	0.0110	18	0.0138	5	0.0003	84	0.0000	122	0.0000	122	0.0002	88	0.0001	83	0.0005	108	0.0000	127	0.0001	66	0.0106	10	0.0059	40	0.0063	26	0.0100	11
OCTANE	43233	0.0076	6	0.0011	150	0.0056	27	0.0071	7	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	124	0.0009	127	0.0000	0	0.0000	88	0.0051	8	0.0003	139	0.0016	47	0.0044	10
NONANE	43235	0.0029	14	0.0026	150	0.0001	150	0.0025	17	0.0001	140	0.0000	0	0.0000	0	0.0000	140	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0013	26	0.0023	115	0.0002	101	0.0015	40
DECANE	43238	0.0009	26	0.0000	0	0.0009	145	0.0008	29	0.0003	97	0.0020	140	0.0004	140	0.0006	120	0.0001	82	0.0020	84	0.0003	100	0.0002	75	0.0027	102	0.0037	107	0.0001	109	0.0024	92
UNDECANE	43241	0.0009	20	0.0052	138	0.0000	0	0.0015	81	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0005	65	0.0001	139	0.0000	0	0.0004	63
DODECANE	43255	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0002	184	0.0012	184	0.0003	184	0.0004	184	0.0000	229	0.0005	229	0.0000	0	0.0001	229	0.0000	0	0.0000	0	0.0000	0	0.0000	0
2MC3	43214	0.0012	9	0.0025	40	0.0018	23	0.0014	10	0.0048	32	0.0004	109	0.0037	75	0.0038	40	0.0178	3	0.0060	65	0.0156	10	0.0169	4	0.0013	27	0.0075	35	0.0047	41	0.0023	24
2MC4	98132	0.0444	7	0.0934	22	0.0652	17	0.0493	7	0.0193	34	0.0482	29	0.0170	29	0.0247	27	0.0068	33	0.0494	75	0.0063	66	0.0075	29	0.0769	8	0.1065	22	0.1082	17	0.0851	6
22DMC3	43122	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0001	127	0.0000	0	0.0000	0	0.0000	127	0.0000	0	0.0000	0	0.0000	0	0.0000	0
2MC5	43229	0.0518	7	0.0313	33	0.0474	16	0.0509	5	0.0029	34	0.0031	57	0.0009	86	0.0026	32	0.0023	36	0.0155	54	0.0014	55	0.0032	40	0.0331	8	0.0227	38	0.0260	22	0.0328	9
3MC5	43230	0.0250	7	0.0164	37	0.0271	14	0.0250	6	0.0016	36	0.0010	62	0.0003	70	0.0012	33	0.0017	32	0.0138	48	0.0006	61	0.0023	33	0.0164	8	0.0112	50	0.0155	26	0.0161	9
22DMC4	43291	0.0094	25	0.0077	52	0.0119	33	0.0097	24	0.0002	83	0.0011	140	0.0003	140	0.0004	122	0.0001	86	0.0001	127	0.0000	0	0.0000	84	0.0056	30	0.0022	81	0.0067	53	0.0053	29
23DMC4	98001	0.0181	10	0.0107	37	0.0172	20	0.0178	8	0.0004	74	0.0007	103	0.0002	106	0.0005	81	0.0019	56	0.0077	50	0.0002	100	0.0020	41	0.0115	12	0.0063	29	0.0071	39	0.0108	12
2MC6	43275	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0006	85	0.0000	0	0.0001	116	0.0004	85	0.0008	52	0.0000	0	0.0000	0	0.0005	53	0.0011	100	0.0000	0	0.0003	160	0.0008	101
3MC6	43295	0.0155	7	0.0066	42	0.0148	18	0.0150	6	0.0003	74	0.0002	103	0.0000	108	0.0002	73	0.0007	36	0.0014	101	0.0000	103	0.0006	29	0.0150	7	0.0060	43	0.0106	21	0.0142	8
23DMC5	43274	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0002	100	0.0001	105	0.0000	106	0.0001	101	0.0004	88	0.0025	101	0.0001	109	0.0004	66	0.0028	100	0.0015	160	0.0040	101	0.0029	100
24DMC5	43271	0.0002	119	0.0000	0	0.0000	0	0.0001	119	0.0002	115	0.0000	0	0.0000	0	0.0001	118	0.0002	77	0.0000	0	0.0000	0	0.0002	76	0.0018	98	0.0000	0	0.0024	105	0.0017	99
223TMC4	43106	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0002	102	0.0000	122	0.0000	122	0.0001	100	0.0001	82	0.0015	112	0.0000	110	0.0001	73	0.0000	0	0.0000	0	0.0000	0	0.0000	0
BRC7PAR	43106	0.0420	5	0.0183	42	0.0418	17	0.0411	5	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0683	13	0.0363	28	0.0591	22	0.0660	13
2MC7	98140	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	82	0.0000	0	0.0000	0	0.0000	90	0.0004	106	0.0000	0	0.0000	0	0.0003	106
3MC7	43298	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0007	101	0.0000	0	0.0000	0	0.0005	102
23DMC6	98139	0.0056	7	0.0007	150	0.0032	41	0.0051	9	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	92	0.0019	127	0.0000	0	0.0001	117	0.0082	6	0.0003	139	0.0052	35	0.0073	9
24DMC6	43277	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0002	56	0.0000	0	0.0002	112	0.0002	58	0.0012	100	0.0000	0	0.0003	160	0.0009	101
25DMC6	43278	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0009	100	0.0000	0	0.0000	0	0.0006	100
224TMC5	43276	0.0411	5	0.0330	31	0.0504	19	0.0419	6	0.0016	66	0.0001	122	0.0000	0	0.0011	71	0.0009	36	0.0024	72	0.0000	108	0.0008	32	0.0959	5	0.0745	26	0.1047	13	0.0971	5
234TMC5	43279	0.0059	32	0.0016	92	0.0062	39	0.0057	33	0.0001	122	0.0003	122	0.0000	0	0.0001	122	0.0000	107	0.0001	127	0.0000	0	0.0000	82	0.0118	30	0.0050	75	0.0110	32	0.0113	29
BRC8PAR	43107	0.0263	5	0.0206	66	0.0252	14	0.0267	10	0.0000	0	0.0000	0	0.0001	140	0.0000	140	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0259	15	0.0074	69	0.0191	27	0.0242	15
24DMC7	98142	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0001	140	0.0105	82	0.0007	119	0.0019	83	0.0000	229	0.0039	111	0.0002	127	0.0003	109	0.0000	0	0.0000	0	0.0000	0	0.0000	0
225TMC6	98033	0.0057	7	0.0023	150	0.0048	33	0.0056	11	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	74	0.0000	0	0.0000	127	0.0000	82	0.0095	6	0.0010	108	0.0072	30	0.0086	9
BRC9PAR	43108	0.0073	14	0.0004	150	0.0045	35	0.0065	15	0.0000	140	0.0023	109	0.0007	136	0.0005	80	0.0003	65	0.0010	76	0.0002	74	0.0003	56	0.0042	15	0.0049	60	0.0038	48	0.0044	17
BRC10PAR	43109	0.0004	93	0.0012	127	0.0002	127	0.0004	94	0.0003	78	0.0000	0	0.0004	105	0.0003	64	0.0001	68	0.0005	149	0.0001	101	0.0001	67	0.0004	55	0.0000	0	0.0006	73	0.0004	57
CYC5	43242	0.0002	108	0.0000	0	0.0000	0	0.0001	108	0.0003	116	0.0000	0	0.0000	0	0.0002	116	0.0000	229	0.0000	0	0.0000	0	0.0000	229	0.0000	0	0.0000	0	0.0000	0	0.0000	0
CYC6	43248	0.0022	11	0.0001	100	0.0010	83	0.0019	12	0.0001	106	0.0001	122	0.0000	122	0.0001	108	0.0001	83	0.0005	109	0.0000	107	0.0001	68	0.0007	23	0.0035	94	0.0001	139	0.0009	41
MCYC5	43262	0.0097	5	0.0062	40	0.0080	23	0.0094	6	0.0014	51	0.0046	69	0.0012	80	0.0020	61	0.0014	33	0.0070	51	0.0005	61	0.0017	37	0.0051	14	0.0034	37	0.0024	47	0.0048	12
MCYC6	43261	0.0064	5	0.0030	140	0.0032	34	0.0061	12	0.0000	122	0.0000	122	0.0000	122	0.0000	122	0.0003	52	0.0009	106	0.0000	107	0.0003	41	0.0038	17	0.0018	86	0.0012	57	0.0032	12
13DMCYC5	90064	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0001	160	0.0000	0	0.0000	0	0.0001	160
CYC7PAR	43115	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0001	149	0.0000	149	0.0004	91	0.0000	0	0.0000	0	0.0003	91
CYC8PAR	43116	0.0086	20	0.0051	50	0.0116	15	0.0090	17	0.0000	122	0.0000	0	0.0001	122	0.0000	122	0.0000	109	0.0002	127	0.0000	0	0.0000	79	0.0042	25	0.0014	90	0.0049	33	0.0042	22
ETHENE	43203	0.0587	10	0.0334	26	0.0281	25	0.0527	9	0.1080	3	0.0084	64	0.0042	54	0.0618	4	0.0700	12	0.0073	52	0.0052	47	0.0522	10	0.0620	13	0.0246	19	0.0278	26	0.0544	11
PROPENE	43205	0.0284	8	0.0129	18	0.0121	26	0.0252	6	0.0152	9	0.0005	58	0.0005	60	0.0086	10	0.0537	7	0.0112	55	0.0059	49	0.0411	7	0.0387	12	0.0176	21	0.0155	26	0.0337	10
1C4=	43213	0.0047	10	0.0016	53	0.0015	29	0.0041	9	0.0007	68	0.0001	106	0.0000	122	0.0004	66	0.0022	16	0.0002	108	0.0000	0	0.0017	14	0.0042	23	0.0037	34	0.0016	25	0.0038	20
2MC3=	43215	0.0122	13	0.0079	22	0.0085	27	0.0115	13	0.0006	92	0.0003	106	0.0003	100	0.0005	93	0.0024	9	0.0028	91	0.0002	74	0.0020	11	0.0421	12	0.0336	29	0.0265	20	0.0396	11
1C5=	43224	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0003	66	0.0000	0	0.0000	0	0.0002	65	0.0000	0	0.0000	0	0.0000	0	0.0000	0
2M1C4=	43225	0.0002	120	0.0000	0	0.0000	0	0.0002	121	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	167	0.0000	0	0.0000	0	0.0000	167	0.0005	91	0.0000	0	0.0001	139	0.0003	89
C6OLE1	43245	0.0038	31	0.0000	0	0.0013	98	0.0032	33	0.0004	101	0.0000	0	0.0000	0	0.0002	101	0.0003	49	0.0006	127	0.0000	0	0.0002	51	0.0026	17	0.0016	98	0.0000	0	0.0023	20
C7OLE1	98005	0.0012	126	0.0002	102	0.0005	120	0.0009	111	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0002	39	0.0055	99	0.0001	139	0.0005	53

C9OLE1	43267 0.0009	18 0.0005	150 0.0001	150 0.0008	23 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0006	21 0.0002	139 0.0000	139 0.0006	20
C-2C4=	43217 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0006	100 0.0000	0 0.0000	0 0.0004	100 0.0004	69 0.0000	0 0.0000	0 0.0002	69 0.0007	100 0.0000	0 0.0000	0 0.0005	100
T-2C4=	43216 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0003	100 0.0000	0 0.0000	0 0.0002	100 0.0000	167 0.0000	0 0.0000	0 0.0000	167 0.0005	106 0.0000	0 0.0000	0 0.0003	106
2M2C4=	43228 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0003	122 0.0000	0 0.0000	0 0.0002	122 0.0007	46 0.0000	0 0.0000	0 0.0005	47 0.0007	101 0.0000	0 0.0000	0 0.0004	101
C5OLE2	43226 0.0009	92 0.0000	0 0.0028	150 0.0009	94 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0003	54 0.0000	0 0.0000	0 0.0002	55 0.0000	0 0.0006	139 0.0001	139 0.0001	139
C6OLE2	43246 0.0064	20 0.0000	0 0.0013	98 0.0053	21 0.0003	105 0.0000	0 0.0000	0 0.0002	96 0.0002	98 0.0021	127 0.0000	0 0.0003	77 0.0038	16 0.0010	139 0.0000	0 0.0032	17
C7OLE2	98041 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	229 0.0000	0 0.0000	0 0.0000	229 0.0000	0 0.0000	0 0.0000	0 0.0000	0
C9OLE2	98042 0.0009	18 0.0005	150 0.0001	150 0.0008	23 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0006	21 0.0002	139 0.0000	139 0.0006	20
13C4==	43218 0.0033	8 0.0017	45 0.0010	52 0.0029	7 0.0003	100 0.0001	107 0.0000	0 0.0002	100 0.0011	24 0.0003	93 0.0000	127 0.0008	22 0.0035	20 0.0027	37 0.0014	54 0.0031	17
ISOPRENE	43243 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0005	100 0.0000	0 0.0000	0 0.0003	100
CYC5=	43292 0.0001	150 0.0000	0 0.0017	119 0.0002	133 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0001	75 0.0019	127 0.0000	0 0.0002	91 0.0001	96 0.0011	139 0.0000	0 0.0001	79
ETHYNE	43206 0.0227	39 0.0112	43 0.0008	54 0.0194	42 0.0146	29 0.0015	61 0.0002	130 0.0081	27 0.0123	26 0.0022	72 0.0000	127 0.0089	25 0.0243	20 0.0157	29 0.0029	55 0.0213	21
1BUTYNE	43219 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0001	140 0.0000	0 0.0000	0 0.0001	140 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0
BENZENE	45201 0.0534	7 0.0586	33 0.0693	30 0.0578	8 0.0025	32 0.0028	115 0.0010	80 0.0022	44 0.0021	24 0.0039	71 0.0016	46 0.0021	28 0.0378	10 0.0518	42 0.0514	27 0.0433	13
TOLUENE	45202 0.0779	3 0.0396	24 0.0497	33 0.0722	5 0.0047	32 0.0020	115 0.0002	98 0.0032	36 0.0021	28 0.0103	55 0.0012	79 0.0023	32 0.0875	4 0.0540	43 0.0518	26 0.0828	7
EBEN	45203 0.0299	7 0.0166	40 0.0131	32 0.0270	8 0.0002	101 0.0002	122 0.0000	106 0.0001	104 0.0003	81 0.0025	87 0.0002	101 0.0004	75 0.0245	5 0.0400	35 0.0142	38 0.0241	8
N-PBEN	45209 0.0055	24 0.0010	150 0.0016	80 0.0048	25 0.0000	122 0.0000	0 0.0000	0 0.0000	122 0.0001	97 0.0002	127 0.0000	0 0.0001	86 0.0039	22 0.0076	92 0.0041	110 0.0041	27
I-PBEN	98043 0.0018	24 0.0000	0 0.0000	0 0.0014	20 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0014	18 0.0000	0 0.0001	139 0.0012	18
S-BBEN	45216 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	127 0.0000	0 0.0000	0 0.0000	127 0.0000	0 0.0000	0 0.0000	0 0.0000	0
C10BEN1	45105 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	140 0.0055	99 0.0007	123 0.0011	107 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0003	127 0.0000	0 0.0023	160 0.0006	147
C11BEN1	45245 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0001	108 0.0011	184 0.0002	184 0.0003	141 0.0000	127 0.0000	0 0.0000	0 0.0000	127 0.0000	0 0.0000	0 0.0000	0 0.0000	0
M-XYL	45205 0.0367	6 0.0268	26 0.0183	25 0.0338	7 0.0008	60 0.0004	108 0.0000	100 0.0005	64 0.0006	31 0.0046	66 0.0003	69 0.0008	40 0.0259	4 0.0163	28 0.0124	29 0.0237	5
O-XYL	45204 0.0291	9 0.0227	37 0.0140	22 0.0268	10 0.0013	44 0.0005	102 0.0007	133 0.0009	47 0.0005	38 0.0057	77 0.0004	74 0.0007	47 0.0196	4 0.0141	35 0.0090	30 0.0180	7
P-XYL	45206 0.0367	6 0.0268	26 0.0183	25 0.0338	7 0.0008	60 0.0004	108 0.0000	100 0.0005	64 0.0006	31 0.0046	66 0.0003	69 0.0008	40 0.0259	4 0.0163	28 0.0124	29 0.0237	5
C9BEN2	45104 0.0383	17 0.0393	47 0.0234	44 0.0364	19 0.0007	82 0.0062	121 0.0002	113 0.0024	112 0.0002	74 0.0170	105 0.0010	136 0.0017	106 0.0202	13 0.0535	36 0.0227	48 0.0232	12
C10BEN2	45106 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0001	146 0.0002	229 0.0000	229 0.0001	153 0.0000	0 0.0000	0 0.0000	0 0.0000	0
C11BEN2	45245 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0001	108 0.0008	184 0.0001	184 0.0002	141 0.0000	127 0.0000	0 0.0000	0 0.0000	127 0.0000	0 0.0000	0 0.0000	0 0.0000	0
123TMBEN	45225 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0002	109 0.0020	184 0.0002	184 0.0005	157 0.0002	89 0.0087	108 0.0012	109 0.0010	105 0.0001	160 0.0000	0 0.0000	0 0.0001	160
124TMBEN	45208 0.0275	19 0.0410	32 0.0136	28 0.0267	18 0.0010	64 0.0017	111 0.0005	115 0.0010	63 0.0005	35 0.0063	99 0.0002	74 0.0007	46 0.0101	14 0.0181	41 0.0054	45 0.0099	15
135TMBEN	45207 0.0105	14 0.0128	53 0.0129	78 0.0104	18 0.0005	106 0.0000	0 0.0001	122 0.0003	107 0.0001	72 0.0009	149 0.0001	109 0.0002	85 0.0059	8 0.0059	49 0.0041	65 0.0057	12
C10BEN3	45103 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0013	184 0.0006	140 0.0004	125 0.0001	127 0.0000	0 0.0000	0 0.0000	127 0.0000	0 0.0000	0 0.0000	0 0.0000	0
C11BEN3	45245 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	108 0.0003	184 0.0001	184 0.0001	141 0.0000	127 0.0000	0 0.0000	0 0.0000	127 0.0000	0 0.0000	0 0.0000	0 0.0000	0
C12BEN3	45247 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0003	140 0.0027	140 0.0000	0 0.0007	134 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0
C10BEN4	45232 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0001	184 0.0000	0 0.0000	0 0.0001	184 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0002	128 0.0000	0 0.0000	0 0.0001	129
STYRENE	45220 0.0065	15 0.0017	107 0.0028	54 0.0058	16 0.0002	107 0.0000	0 0.0002	122 0.0001	110 0.0002	73 0.0005	127 0.0002	108 0.0002	71 0.0052	13 0.0025	69 0.0053	32 0.0050	16
NAPHTHAL	98046 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0008	184 0.0003	184 0.0002	184 0.0002	85 0.0120	79 0.0009	90 0.0013	74 0.0000	0 0.0000	0 0.0000	0 0.0000	0
FORMALD	43502 0.0065	20 0.0512	39 0.0346	69 0.0107	22 0.0556	11 0.0731	27 0.0160	36 0.0476	16 0.0140	15 0.0690	42 0.0065	28 0.0146	12 0.0110	17 0.0808	35 0.0795	48 0.0191	20
ACETALD	43503 0.0035	9 0.0285	28 0.0074	35 0.0059	18 0.0065	9 0.0211	21 0.0050	21 0.0081	12 0.0052	13 0.0270	28 0.0027	19 0.0055	8 0.0038	13 0.0292	42 0.0110	31 0.0061	19
PROPALD	43504 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0002	75 0.0001	117 0.0000	140 0.0001	75 0.0007	36 0.0004	109 0.0000	0 0.0005	35 0.0000	0 0.0000	0 0.0000	0 0.0000	0
C4ALD	43510 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	140 0.0001	140 0.0000	0 0.0000	140 0.0000	95 0.0000	0 0.0000	0 0.0000	90 0.0001	126 0.0000	0 0.0000	0 0.0001	126
BENZALD	98157 0.0002	150 0.0000	0 0.0000	0 0.0001	150 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0001	127 0.0024	127 0.0002	127 0.0002	127 0.0006	61 0.0064	119 0.0015	123 0.0012	85
MTBE	. 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0293	14 0.0175	29 0.0113	30 0.0265	14
ACETONE	43551 0.0013	16 0.0056	56 0.0048	57 0.0017	20 0.0070	27 0.0261	42 0.0094	41 0.0105	32 0.0034	24 0.0143	68 0.0019	54 0.0034	28 0.0027	13 0.0079	86 0.0040	48 0.0031	22
C4KET	43552 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	0 0.0000	205 0.0001	180 0.0000	229 0.0000	172 0.0000	0 0.0000	0 0.0000	0 0.0000	0
ACROLEIN	43505 0.0000	150 0.0000	0 0.0000	0 0.0000	150 0.0000	140 0.0000	0 0.0000	0 0.0000	140 0.0005	27 0.0000	0 0.0000	0 0.0004	29 0.0002	56 0.0000	0 0.0000	0 0.0002	57