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STUDY TO DETERMINE EVAPORATIVE EMISSION BREAKDOWN, INCLUDING PERMEATION EFFECTS AND DIURNAL EMISSIONS, USING E20 FUELS ON AGING ENHANCED EVAPORATIVE EMISSIONS CERTIFIED VEHICLES

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COORDINATING RESEARCH COUNCIL, INC.

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Final Report

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CRC E-77-2c

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Acronyms

API .....American Petroleum Institute
ARB .....California Air Resources Board
ASTM .....ASTM International – a standards organization
ATL.....Automotive Testing Laboratory, Inc.
AQIRP.....Air Quality Improvement Research Program (Auto/Oil)
CAS.....Chemical Abstract Service
CFR.....Code of Federal Regulations
CRC.....Coordinating Research Council, Inc.
CVS.....Constant Volume Sampler
DHB .....Diurnal Heat Build
DVPE .....Dry Vapor Pressure Equivalent
EPA .....(US) Environmental Protection Agency
FID .....Flame Ionization Detector
FTTP .....Fuel Tank Temperature Profile
GC .....Gas Chromatograph
HC .....Hydrocarbon
HH&A.....Harold Haskew & Associates
LA-92 .....Unified Driving Cycle
MIR .....Maximum Incremental Reactivity
MOVES.....Motor Vehicle Emissions Simulator
MTBE .....Methyl Tertiary Butyl Ether
NBR .....Nitrile Rubber or Acrylonitrile Butadiene Rubber
NREL .....National Renewable Energy Laboratories
OBD2 .....On-Board Diagnostics Level 2
ORVR .....Onboard Refueling Vapor Recovery
PFI.....Port Fuel Injection
psi.....Pounds Per Square Inch
PZEV.....Partial Zero Emission Vehicle (California)
RL SHED.....Running Loss Sealed Housing for Evaporative Determination
RVP.....Reid Vapor Pressure
SAE.....Society of Automotive Engineers
SHED .....Sealed Housing for Evaporative Determination
SwRI .....Southwest Research Institute
TEFVO.....Transient Emission Following Vehicle Operation (True Hot Soak)
THC.....Total Hydrocarbon
VOC .....Volatile Organic Compound
VT SHED.....Variable Temperature Sealed Housing for Evaporative Determination

Executive Summary

The National Renewable Energy Laboratories (NREL), in cooperation with the US Environmental Protection Agency (USEPA, or EPA), determined the need for an evaporative emissions test program to characterize real-world evaporative emission events for planning and inventory modeling purposes. This program (E-77-2c) adds testing on E20 (20 volume percent ethanol in gasoline) on additional vehicles to the E0 and E10 fuels previously evaluated in the CRC E-77 series studies, as well as additional implanted leak mechanisms.

"Permeation" refers to the loss of fuel vapor through the various components of a vehicle's fuel system. Permeation occurs continuously, but the rate depends on a number of factors, including the properties of storage container (gas tank, etc.), type of fuel hoses (material, design, shape), the amount of fuel in the container, environmental factors (including temperature) and fuel properties (including oxygenates). Diurnal emissions are those that occur daily, or over a 24-hour period of testing, and are measured while the vehicle's propulsion system is at rest.

An additional part of this program was to expand on the leak study performed in E-77-2, with additional "implanted leak" evaluations on vehicles 207 and 211. Previous evaluations were made with leaks implanted at the fuel cap. For this program, leaks were implanted at the top of the fuel tank, and separately at the canister's fuel vapor entry with 7 and 10 psi E10 fuel. This assignment was known as Task 4.7.

The fuels used to evaluate the permeation performance of the vehicles in Task 4.5 and 4.7 were 20 volume percentage ethanol mixtures, at two vapor pressures, seven (7) and nine (9) psi RVP. Task 4.5 measured the permeation performance of the two vapor pressure fuels on the selected fleet. Task 4.7 continued a previous CRC investigation into the emission effect of implanted leaks in the vapor system.

The following table summarizes the fleet as tested in the E-77-2c program. One vehicle, No. 220, a 2000 model year (MY) Chevrolet Malibu, started the test program; but was cancelled by the steering committee when it exhibited a deteriorating leak condition during the program.

E-77-2c Vehicle Test Fleet Summary

Veh No.	Year	Make	Model	Evap Standards (all are ORVR)
Task 4.5 - E20 Fuel Effect on Emissions				
221	2000	Mitsubishi	Galant	Tier 1
206	2002	Nissan	Altima	Tier 1
208	2002	Chevrolet	Trailblazer	Tier 1
209	2004	Chrysler	Stratus	Tier 1
210	2004	Chevrolet	Impala	Tier 2
213	2004	Dodge	Ram 1500	Tier 2
222	2004	Ford	Focus ZX3	Zero Evap
Task 4.7 - Implanted Leak Effect with E20 Fuel				
207	2001	Dodge	Caravan	Tier 1
211	2004	Toyota	Camry XLE	Tier 2

This assignment (E-77-2c) only involved the performance of permeation measurements on vehicles operated on two E20 fuels. The main value of the data collected is realized when the results are viewed in the context of the prior CRC work. There are three sections in the "Discussion" portion of this report:

- The permeation performance of the "Combined E-77 Fleet" on the various fuels (Task 4.5 plus prior work).
- The additional leak testing that was done in this project, combined with the prior work to overview the effect of leak location. It also points out that the later vehicles with ORVR systems had different leak effects. (Task 4.7 plus prior work)
- Description and details of the evaporative emission speciation measurements, and the methodology of the "Average Reactivity" calculations that were made.

Task 4.5 demonstrated that while the sample sizes are still too small to make comparisons with statistical significance, several trends are suggested. Referring to the data presented, and comparing the average permeation performance for various groups, the following trends and observations are offered:

- The newer Tier 2 vehicles have lower permeation than Tier 1 on all fuels.
- Permeation is higher with E10 or E20 compared to an ethanol-free (E0) fuel.

The tests performed for Task 4.7 demonstrated two findings that may have significance for air quality modelers:

- Vehicles fitted with ORVR systems may have changed the emission impact of a small leak at the fuel cap. Leaks added at the fuel cap for the two ORVR vehicles tested produced one day diurnal emissions almost an order of magnitude lower than was seen with a previously tested non-ORVR Cavalier. This change in the emissions measured is thought to be due to the addition of "check valves," or "anti-spitback valves" added to the systems to improve the fuel fill control.

  Diurnal emissions measured with leaks implanted at the top of the fuel tank, or at the entry to the carbon canister, were significantly higher than the emissions with a leak implanted at the fuel cap on the two ORVR-equipped vehicles tested. It was expected that the permeation emissions from a leak at the top of the tank might be higher than those from a leak at the fuel cap.

The E-77-2c scope of work request included gas chromatographic speciation of all the vehicle tests, including the static tests, the dynamic, and the diurnals on both fuel vapor pressures. This generated a sizable file of test results. Analysis, or comment on the content on the speciation other than the calculation of reactivity was not attempted, and is beyond the scope of this investigation. The detailed speciation summaries are presented at the end of this report in Appendix IV.

STUDY TO DETERINE EVAPORATIVE EMISSION BREAKDOWN, INCLUDING PERMEATION EFFECTS AND DIURNAL EMISSIONS USING E20 FUELS ON AGING ENHANCED EVAPORATIVE EMISSIONS CERTIFIED VEHICLES

CRC E-77-2c

Introduction

Background - The National Renewable Energy Laboratories (NREL), in cooperation with the US Environmental Protection Agency (USEPA, or EPA), determined the need for an evaporative emissions test program to characterize real-world evaporative emission events for planning and inventory modeling purposes. Coordinating Research Council's (CRC) "E-77 Pilot Study[1]" demonstrated that segregation of evaporative emission components was possible, where fuel system permeation emissions were measured separately from fuel tank and carbon canister venting emissions. Later CRC studies, E-77-2[2], and E-77-2b[3], continued these measurement techniques, and added to a data base that was created to support new concepts in air inventory modeling. This program (E-77-2c) adds testing on E20 (20 volume percent ethanol in gasoline) on additional vehicles to the E0 and E10 fuels previously evaluated in the CRC E-77 series studies.

"Permeation" refers to the loss of fuel vapor through the various components of a vehicle's fuel system. Permeation occurs continuously, but the rate depends on a number of factors, including the properties of storage container (gas tank, etc.), type of fuel hoses (material, design, shape), the amount of fuel in the container, environmental factors (including temperature) and fuel properties (including oxygenates). Diurnal emissions are those that occur daily, or over a 24-hour period of testing, and are measured while the vehicle's propulsion system is at rest.

An additional part of this program was to expand on the leak study performed in E-77-2, with additional "implanted leak" evaluations on vehicles 207 and 211. Previous evaluations were made with leaks implanted at the fuel cap. For this program, leaks were implanted at the top of the fuel tank, and separately at the canister's fuel vapor entry with 7 and 10 psi E10 fuel. This assignment was known as "Task 4.7."

Contract History and Period of Performance - Harold Haskew & Associates, Inc. (HH&A)[4] was awarded the contract for this program, and shared the testing responsibility with Automotive Testing Laboratories, Inc. (ATL)[5] in Mesa AZ. The contract was dated June 1, 2009, and the first test was conducted on August 12, 2009 (Task 4.7 leak test on Vehicle 211c with the E10 fuel). Weekly progress reports were made each Sunday, with Number 1 dated August 9, 2009, and the final, number 31, dated March 4, 2010.

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[1] Available for download at CRC's website, www.crcao.org, in the Emissions Publications section.
[2] Ibid. CRC E-77-2, "Enhanced Evaporative Emission Vehicles," March 2010
[3] Ibid, CRC E-77-2b, "Evaporative Emissions from In-Use Vehicles: Test Fleet Expansion," SwRI® Project No. 03.14936.05, June 2010
[4] Harold Haskew & Associates, Inc., 425 W Huron, Suite 230, Milford, MI, (248) 684-3410
[5] Automotive Testing Laboratories, Inc., 263 S Mulberry Street, Mesa, AZ (480) 649-7906, Greg Barton, President

This report is the fourth in a series of CRC E-77 reports, but is organized to be a stand-alone report, without excessive reference to the previous publications. Much of the documentation concerning the theory and practice of the test procedure has been placed in Appendix III, but captured within this publication.

Program Overview

Test Fuels

The fuels used to evaluate the permeation performance of the vehicles in the permeation performance task, and the implanted leak investigation were 20 volume percentage ethanol mixtures, at two vapor pressures, seven (7) and nine (9) psi RVP. The properties of the two test fuels are listed in Tables 1 and 2. Fuel properties from previous CRC E-77 studies are contained in Appendix V.

Table 1. 7 RVP E20 Fuel Properties

Haltermann products

Product: E-77-2c 7 RVP E-20 batch no: XH0721GP05 TMO No: 800357
Product Code: HF0712 tank no: 662 Analysis date: 8/17/2009

TEST	METHOD	UNITS	SPECIFICATIONS MIN		MAX	RESULTS
Distillation-IBP	ASTM D86	˚F				117
5%		˚F				136
10%		˚F				144
15%		˚F				148
20%		˚F				151
25%		˚F				154
30%		˚F				157
35%		˚F				159
40%		˚F				160
45%		˚F				162
50%		˚F	185	Target only	195	164
55%		˚F				168
60%		˚F				215
65%		˚F				245
70%		˚F				258
75%		˚F				272
80%		˚F				289
85%		˚F				305
90%		˚F	315		325	316
95%		˚F				323
Distillation-EP		˚F			437	342
Recovery		vol %		Report		98.8
Residue		vol %		Report		0.7
Loss		vol %		Report		0.5
Gravity	ASTM D4052	˚API		Report		55.4
Specific gravity	ASTM D4052			Report		0.7571
Reid Vapor Pressure		psi	6.4	6.7	7.0	6.9
Oxygen	ASTM D4815	wt %		Report		7.26
Ethanol	ASTM D4815	vol %	19.0		21.0	20.0
Sulfur	ASTM D5453	ppm wt	25		30	29
H/C ratio	ASTM D3343			Report		0.1559
C/H ratio	ASTM D3343			Report		6.4151
Composition, aromatics, corrected	ASTM D1319	vol %	21.0		25.0	22.9
Composition, olefins, corrected	ASTM D1319	vol %	7.0		11.0	7.2
Composition, saturates, corrected	ASTM D1319	vol %		Report		49.9
Benzene content	ASTM D3606	vol %	0.9		1.1	1.0
Research Octane Number	ASTM D2699		91.0		95.0	94.2
Motor Octane Number	ASTM D2700		83.0		87.0	83.3
R+M/2	D2699/2700		87.0		91.0	88.8
Net Heat of combustion	ASTM D3338	btu/lb		Report		18,474

Table 2. 9 RVP E20 Fuel Properties

Haltermann products

Product: CRC Project No. E-74b Fuel 4 batch no: XH0721GP03 TMO No: 800357
Product Code: HF0718 tank no: 661 Analysis date: 8/24/2009

TEST	METHOD	UNITS	SPECIFICATIONS MIN		MAX	RESULTS
Distillation-IBP	ASTM D86	˚F				105
5%		˚F				123
10%		˚F				131
20%		˚F				140
30%		˚F				150
40%		˚F				156
50%		˚F	185	Target only	195	161
60%		˚F				165
70%		˚F				248
80%		˚F				285
90%		˚F	315		325	315
95%		˚F				322
Distillation-EP		˚F			437	337
Recovery		vol %		Report		97.6
Residue		vol %		Report		1.0
Loss		vol %		Report		1.4
Gravity	ASTM D4052	˚API		Report		56.2
Specific gravity	ASTM D4052			Report		0.7537
Reid Vapor Pressure	ASTM D5191	psi	8.4	8.7	9.0	8.4
Oxygen	ASTM D4815	wt %		Report		7.38
Ethanol	ASTM D4815	vol %	19.0		21.0	20.1
Sulfur	ASTM D5453	ppm wt	25		30	29
H/C ratio	ASTM D3343			Report		0.1560
C/H ratio	ASTM D3343			Report		6.4102
Composition, aromatics, corrected	ASTM D1319	vol %	21.0		25.0	23.2
Composition, olefins, corrected	ASTM D1319	vol %	7.0		11.0	9.0
Composition, saturates, corrected	ASTM D1319	vol %		Report		47.7
Benzene content	ASTM D3606	vol %	0.9		1.1	1.0
Research Octane Number	ASTM D2699		91.0		95.0	94.4
Motor Octane Number	ASTM D2700		83.0		87.0	83.9
R+M/2	D2699/2700		87.0		91.0	89.1
Net Heat of combustion	ASTM D3338	btu/lb		Report		18,473

Test Procedures

A Test Method for Separating Permeation from Tank Venting and Leaks – In a previous CRC Project (E-65), the laboratory separated the canister loss from the permeation measurement by venting the losses from the carbon canister outside the SHED. For Project E-77, the canister vent losses were collected and measured in a separate "trap canister" on a scale outside the SHED, as shown in Figure 1. This vent line was capped off, i.e., sealed during the Static Test, but connected as shown in the figure for the Dynamic and the Diurnal Test. The ambient temperature in the SHED was constant during the static test, and there was no vapor created at constant temperature. This vent was closed to pressurize the system for the leak evaluations. The resulting SHED increase in HC mass was permeation[6]. The last mechanism that needed to be evaluated was leaks. Leaks can be both vapor and liquid. A liquid leak can have significant mass, currently undetected by the vehicle's on-board diagnostic system. Considerable thought and effort have gone into the creation of a simple and effective liquid leak detection methodology, without success. The techniques used in this project required the use of a SHED for measurements. The techniques were not simple, but they proved effective.

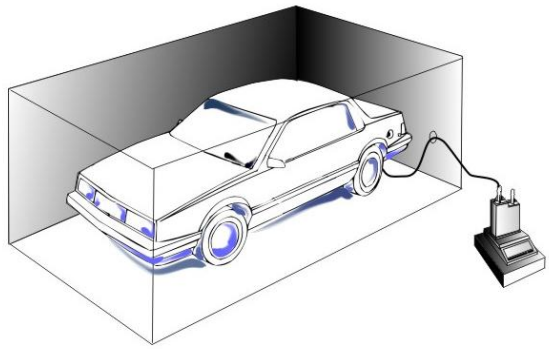


Figure 1 Trap Canister

Based on experience, a vehicle's permeation rate is expected to lie between 4 and 90 mg/hour. The presence of a static liquid leak is expected to overwhelm this value; such a leak would (or could) be apparent by inspection. Leaks from the vehicles were quantified in a three-step test process. The first step was to measure the static permeation rate of the vehicle at 86ºF. The vehicle was allowed to stabilize at 86ºF in the SHED and the permeation rate was calculated from the mass increase in the SHED. The second part of the test, looking for pressure driven leaks in the vapor system, was performed by pressurizing the vehicle's tank to 5" H_2O through a special fuel cap and tubing from outside the SHED (Figure 2). The special fuel cap, the hose and the pressurization apparatus was installed before the start of the sequence. The HC concentration in the SHED was monitored, and the increase in the mass of HC in the SHED was compared to the static permeation rate. If there was no (or insignificant) rate of increase, it was deduced that no vapor leak is present.

[6] This is a simplification. There are other HC sources present that are not fuel permeation. These include tire, paint, adhesives and vinyl emissions, and the possibility of fuel leaks from the fuel injectors. The investigators believe these to be a minor component of the emissions measured in this study.

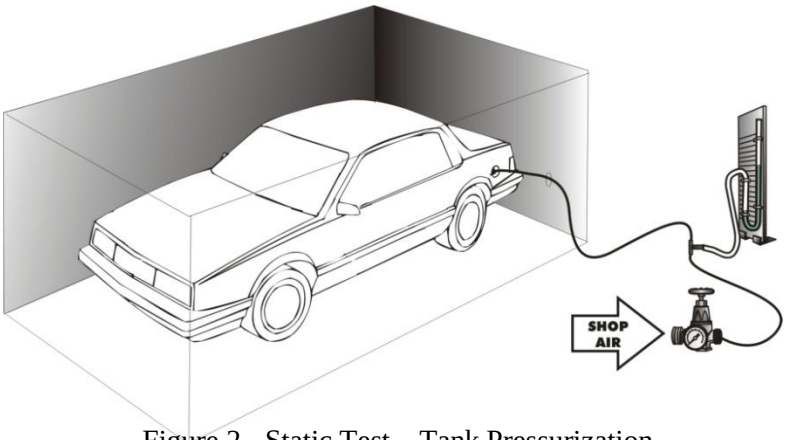


Figure 2 - Static Test – Tank Pressurization

The third and final part of the test was to energize the vehicle's fuel pump and pressurize the system up to and including the injectors (Figure 3). If there were a pressure leak in the liquid system, an increase in the SHED mass over time would be seen, i.e., the leak would be additive to the permeation rate.

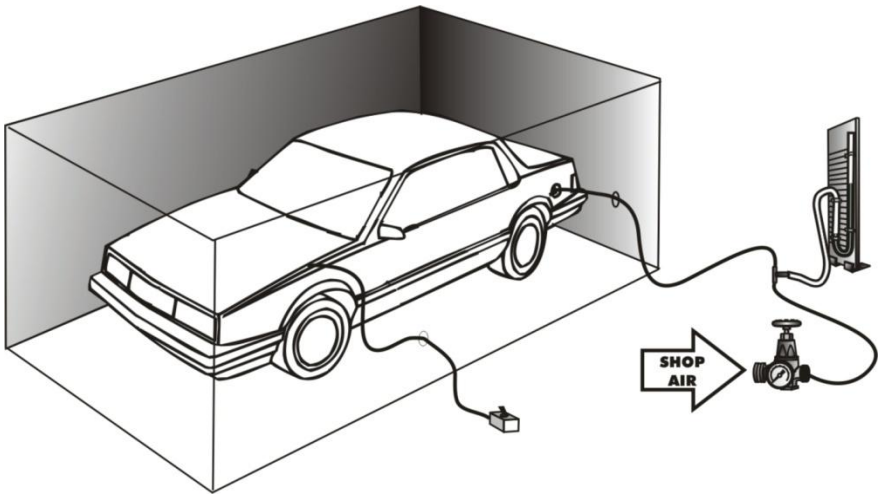
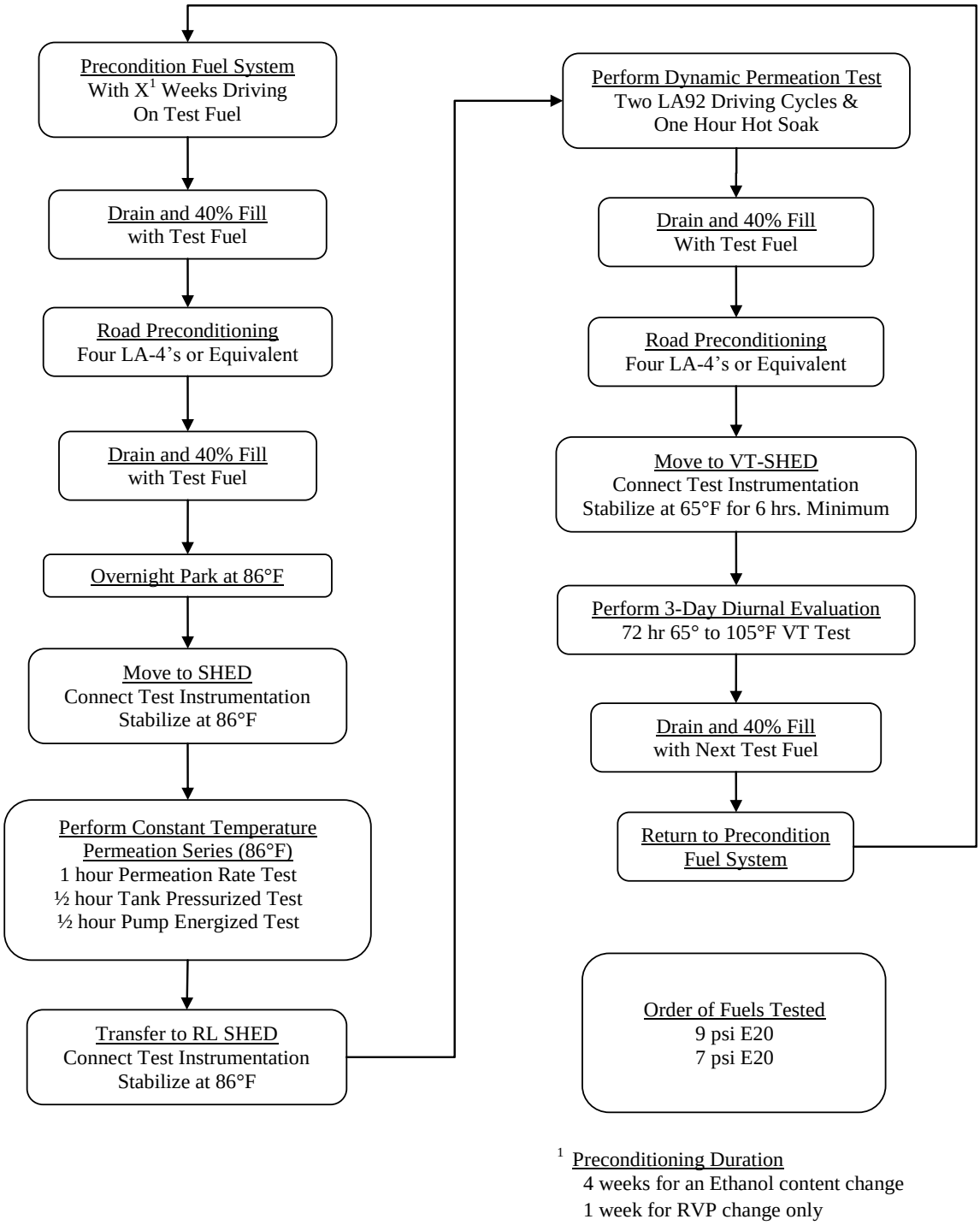


Figure 3 Static Test – Fuel Pump Energized

Other Tests (Dynamic, Hot Soak, and Diurnal) - A similar configuration is used to isolate the tank venting losses from the permeation measurements determined by other test procedures. The vehicle's canister vent is connected with a low permeation hose (Teflon™) to a bulk-head fitting in the SHED wall and then to a separate "trap canister" on a top-loading scale. Any HC emissions that escape from the vehicle's canister are captured in the trap canister, and measured at a 0.01 g (10 milligram) precision. The trap canister (a 1 Liter Ford model) is purged before each test and maintained at a "dry" condition so that it captures all of the vehicle's escaping emissions. This assumption is probably violated during high vapor pressure tests where there are 30 or more grams of daily emissions.



[1] Preconditioning Duration
4 weeks for an Ethanol content change
1 week for RVP change only

Figure 4 – Test Procedure Flow Chart

E-77-2c Vehicle Selection

The vehicle mix was specified in the CRC Request for Proposal as eight vehicles for Task 4.5, and a repeat of two vehicles previously tested in CRC programs with implanted leaks for Task 4.7. Task 4.5 vehicles included five Tier 1 vehicles, two Tier 2 vehicles, and one "Zero Evap" vehicle.

Table 3 summarizes the fleet as tested in the E-77-2c program. One vehicle, No. 220, a 2000 model year (MY) Chevrolet Malibu, (not shown in Table 3) started the test program; after exhibiting a deteriorating leak condition during the program, it was cancelled by the steering committee.

Table 3.
E-77-2c Vehicle Test Fleet Summary

Veh No.	Year	Make	Model	Evap Standards (all are ORVR)
Task 4.5 - E20 Fuel Effect on Emissions				
221	2000	Mitsubishi	Galant	Tier 1
206	2002	Nissan	Altima	Tier 1
208	2002	Chevrolet	Trailblazer	Tier 1
209	2004	Chrysler	Stratus	Tier 1
210	2004	Chevrolet	Impala	Tier 2
213	2004	Dodge	Ram 1500	Tier 2
222	2004	Ford	Focus ZX3	Zero Evap
Task 4.7 - Implanted Leak Effect with E20 Fuel				
207	2001	Dodge	Caravan	Tier 1
211	2004	Toyota	Camry XLE	Tier 2

A "Tier 1" vehicle is one that certified to the EPA's "Enhanced Evaporative Emission" standards[7]. These evaporative standards were phased in starting in Model Year 1996 (see also 40 CFR 86.096-8 (b)), with all light duty vehicles compliant by MY 1998. Vehicles certified to the evaporative emissions standards prior to the enhanced standards are referred to as "Tier 0." The enhanced standards required control of diurnal emissions for up to three days (previously a one day tank temperature rise, compressed into a one hour time requirement), as well as control the evaporative (i.e., non-tailpipe) emissions during vehicle operation (known as running losses) at high (95°F) ambient conditions, and a one-hour "high-temperature hot soak" period immediately following the drive. Tier 2 standards[8] used similar test procedures and conditions, but lowered the allowable limits to less than half the previous standards. California required that a fraction of the vehicles produced for California meet new "Zero Evaporative Emission" standards.[9] A vehicle certified to the zero evap standards had diurnal plus hot soak fuel emissions at levels less

[7] http://www.epa.gov/otaq/standards/light-duty/tier1evap.htm. See this EPA web page for a comprehensive chart showing the various standards and the implementation schedules.

[8] Tier 2 Evaporative Emission Standards; http://www.epa.gov/otaq/standards/light-duty/tier2evap.htm,; and 40 CFR 86 Subpart S.

[9] Note: several other states have adopted vehicle emissions standards identical to those of California.

than 0.0 grams per test[10]. The 0.0 gram requirement was later defined and accepted to be 0.054 grams, or 54 milligrams, to include round off of the measurement. A whole vehicle performance limit of 350 mg/test was included to allow for non-fuel test contributors (e.g., tires, adhesives, etc.) on a whole vehicle test.

Composite Vehicle Fleet

As stated previously, the Task 4.5 of the E-77-2c program added seven vehicles tested on E20 fuel to the E-77 program database. Table 4 below lists the "composite E-77 vehicle fleet," sorted by evap standard, with the 2c vehicles indicated by the "/c" notation in the vehicle number column of the light blue rows. Not all data from the composite fleet are usable for later analysis, as the use of the INNOVA analyzer for identification of methanol (probably from windshield washer fluid) and refrigerant (R-134a) leaks did not become available until the latter part of the Pilot Program. Pre INNOVA data tests that were not used in the analysis are indicated with the yellow shading.

Table 4.

E-77 Composite Fleet - All Programs

Veh No.	Yr	Make	Model	Odo.	Evap Family	Evap Standard	Tank Size	Fuel Tank Plastic Metal
003	1992	Honda	Accord	71,129	92FG	Tier 0	17.0	Metal
010	1992	Toyota	Camry	162,838	EV-E	Tier 0	18.5	Metal
009	1995	Plymouth	Neon	106,220	SCR1050AYM02	Tier 0	11.2	Metal
004	1999	Dodge	Grand Caravan SE	98,765	XCRXE0101G2A	Tier 0	20.0	Plastic
001	1996	Chevrolet	S-10	68,420	TGM1082AYMEA	Tier 1	19.0	Metal
006	1996	Chevrolet	Cavalier	112,768	TGM1089AYMEA	Tier 1	15.3	Metal
007	1996	Chevrolet	Cavalier	113,125	TGM1089AYMEA	Tier 1	15.3	Metal
008	1996	Ford	Explorer	114,822	TFM1120AYMED	Tier 1	21.0	Metal
202	1996	Ford	Taurus	86,538	TFM1115AYMEB	Tier 1	16.0	Metal
216	1996	Ford	Taurus	88,820	TFM1115AYMEB	Tier 1	16.0	Metal
204	1999	Honda	Accord	100,418	XHNXR0130AAA	Tier 1	17.1	Metal
002	2000	Toyota	Tacoma	80,557	YTYXE0095AE0	Tier 1	15.1	Metal
220b	2000	Chevrolet	Malibu	69,367	YGMXR0124919	Tier 1	14.2	Plastic
221b/c	2000	Mitsubishi	Galant ES	97,875	YDSXR0165A1F	Tier 1	16.3	Plastic
205	2001	Toyota	Corolla	92,047	1TYXR0115AK1	Tier 1	13.2	Metal
207	2001	Dodge	Caravan	92,740	1CRXR0165XAA	Tier 1	20.0	Plastic
206b/c	2002	Nissan	Altima	110,399	2NSXR0120RCB	Tier 1	20.0	Plastic
208b/c	2002	Chevrolet	Trailblazer	60,233	2GMXR0175922	Tier 1	18.6	Plastic
209b/c	2004	Chrysler	Stratus	63,778	4CRXR0130GBA	Tier 1	16.0	Plastic
210b/c	2004	Chevrolet	Impala	63,157	4GMXR0124919	Tier 2	17.0	Plastic
211	2004	Toyota	Camry LE	43,588	4TYXR0130A11	Tier 2	18.5	Plastic
213b/c	2004	Dodge	Ram 1500	99,372	4CRXR0218GDH	Tier 2	35.0	Plastic
214	2004	Ford	Escape	40,188	4FMXR0110BBE	Tier 2	16.0	Plastic
215	2004	Toyota	High Lander	88,693	4TYXR0165PZ1	Tier 2	19.1	Plastic
212	2006	Ford	Taurus	28,354	6FMXR0185GAK	Tier 2	18.0	Metal
005	2007	Ford	Taurus	6,916	7FMXR0185GAR	Tier 2	18.0	Metal
222b/c	2004	Ford	Focus ZX3	71,633	4FMXR0120GCX	Zero Evap	14.0	Metal

E77 Program - No INNOVA, data not used
E77 Program with INNOVA during diurnal testing
E77-2 Program
Prolem Vehicle - Unstable Leak, data not used
E77-2b and 2c Programs

[10] "CALIFORNIA EVAPORATIVE EMISSION STANDARDS AND TEST PROCEDURES FOR 2001 AND SUBSEQUENT MODEL MOTOR VEHICLES," California Air Resources Board, 1999, … *Vehicles demonstrating compliance with these evaporative emission standards shall also have zero (0.0) grams of fuel evaporative emissions per test for the three-day and two-day diurnal-plus-hot-soak tests…*

It seemed desirable to combine as much as possible of the previous E-77 data (E-77 Pilot Study, E-77-2, and E-77-2b) with the newly gathered data into the discussion of results. Not all of the data were comparable. The following summary is offered to explain the various choices.

- While not part of the contracted E-77 Pilot Study, the laboratory found that the vehicle tests needed to be corrected for the presence of the methanol and the refrigerant R134a. The INNOVA analyzer that the laboratory purchased and used to make these corrections was not available for testing until vehicle 006. Of the remaining vehicles tested, only 006 and 008 were Tier 1 models. (Vehicle 007 was an implanted leak test, and vehicles 009 and 010 were pre-enhanced Tier 0 models.) The Pilot Study only ran a one-day diurnal, rather than the three-day test that became the norm.

- The 105ºF static tests were first introduced in the E-77-2b test sequence to enhance the evidence that permeation is directly affected by temperature. The earlier test programs did not have that information.

Emission results are presented in later sections of the report for each of the four evaporative emission elements (static, running loss, hot soak and diurnal), with data averaged for selected and representative vehicles tested in the E-77, E-77-2 and E-77-2b programs that were operated on the four fuels used in this (2c) study.

Discussion of Test Results

While this assignment (E-77-2c) involved only permeation performance on two E20 fuels, additional value of this E-77-2c data is realized when the results are viewed in the context of the prior CRC work. There may be misleading conclusions when comparing data across fuels where a different number of vehicles contribute to the bars within a technology group. Drawing inferences in fuel effects based on these averages is inappropriate because individual vehicle effects come into play.

There are three sections in the "Discussion" portion of this report:

- The permeation performance of the "Combined E-77 Fleet" on the various fuels (Task 4.5 plus prior work).

- The additional leak testing that was done in this project, combined with the prior work to overview the effect of leak location. It also points out that the later vehicles with ORVR systems had different leak effects. (Task 4.7 plus prior work)

- Description and details of the evaporative emission speciation measurements, and the methodology of the "Average Reactivity" calculations that were made.

The actual test summaries and the plots of the results of each of the test vehicles on the two volatilities of the E20 fuel are contained in the Appendices, starting at page 38.

Task 4.5 - Permeation Performance on the E0, E10 and E20 Fuels

Static Emissions Performance – Figures 5 and 6 below present the static permeation results for the composite fleet and include the E20 results on the right side of each figure. The static performance averages gave similar fuel rankings to that which was seen with the more significant diurnal test result averages.

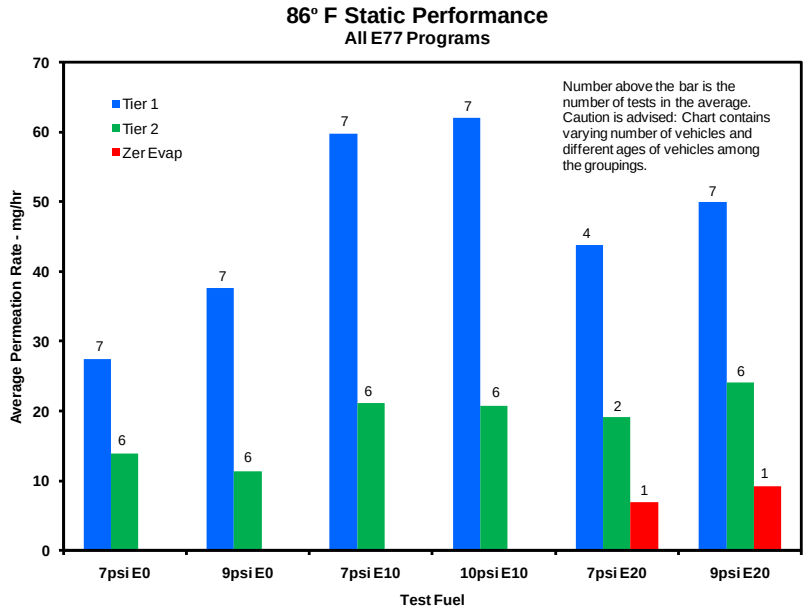


Figure 5 86º F Static Performance

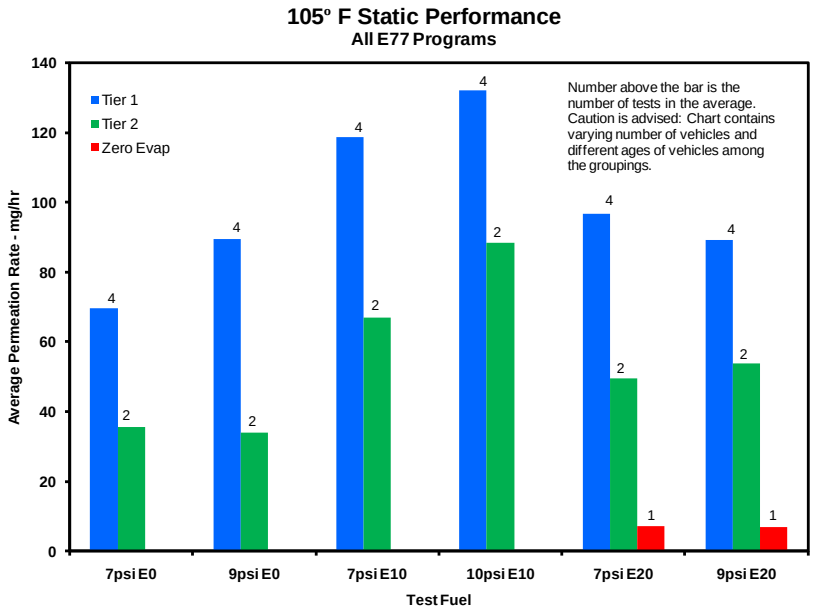


Figure 6 105º F Static Performance

Tables 5 and 6 contain the data used in Figures 7 and 8, respectively, as well as data from the pressurizing of the tank and activating the fuel pump; these features of the test were to check for leaks, and are discussed in detail in Appendix III.

Table 5. Tier 1 Vehicle Static Data

				86º F (mg/hr)			105º F (mg/hr)			
Veh. No.	Veh. Desc.	Eng./ Fuel Sys	Fuel	Static Test	Tank Pressurized	Pump On	Static Test	Tank Pressurized	Pump On	
202/216	1996 Ford Taurus	3.0L/PFI	10E10	32.4	0.0	0.0	---	---	---	
202/216	See Note 1		7E10	32.5	0.0	0.0	---	---	---	
202/216			9E0	17.8	13.6	0.0	---	---	---	
202/216			7E0	20.4	38.0	0.0	---	---	---	
202/216			9E20	20.4	0.0	0.0	---	---	---	
204	1999 Honda Accord	2.3L/PFI	10E10	84.3	0.0	0.0	---	---	---	
204			7E10	66.4	0.0	0.0	---	---	---	
204			9E0	33.8	0.0	0.0	---	---	---	
204			7E0	12.9	0.0	0.0	---	---	---	
204			9E20	55.3	0.0	0.0	---	---	---	
205	2001 Toyota Corolla	1.8L/PFI	10E10	41.6	0.0	0.0	---	---	---	E-77-2
205			7E10	59.6	0.0	0.0	---	---	---	
205			9E0	19.5	0.0	0.0	---	---	---	
205			7E0	9.9	0.0	0.0	---	---	---	
205			9E20	46.2	0.0	0.0	---	---	---	
207	2001 Dodge Caravan	3.3L/PFI	10E10	78.7	0.0	0.0	---	---	---	
207			7E10	64.4	0.0	0.0	---	---	---	
207			9E0	32.5	0.0	0.0	---	---	---	
207			7E0	40.1	0.0	0.0	---	---	---	
207			9E20	88.2	0.0	0.0	---	---	---	
207L	2001 Dodge Caravan	3.3L/PFI	10E10	97.6	---	120.9	---	---	---	
207L	See Note 2		7E10	146.8	---	0.0	---	---	---	
206b	2002 Nissan Altima	2.5L/PFI	10E10	124.9	0.0	0.0	314.1	0.0	0.0	
206b			7E10	149.3	0.0	0.0	307.9	0.0	0.0	
206b			9E0	61.1	0.0	0.0	178.8	0.0	0.0	
206b			7E0	52.0	0.0	0.0	118.1	0.0	0.0	
206c			9E20	70.2	0.0	0.0	172.9	0.0	0.0	
206c			7E20	93.8	0.0	0.0	230.7	0.0	0.0	
207c	2001 Dodge Caravan	3.3L/PFI	10E10	610.2	---	435.3	---	---	---	
207c	See Note 2		7E10	523.5	---	271.8	---	---	---	Tank Top
207c			10E10	232.5	---	1083.7	---	---	---	
207c			7E10	144.8	---	372.7	---	---	---	Can Inlet
208b	2002 Chev Trailblazer	4.2L/PFI	10E10	37.5	0.0	0.0	61.2	0.0	0.0	
208b			7E10	27.2	0.0	0.0	51.8	0.0	0.0	
208b			9E0	37.2	0.0	0.0	55.0	0.0	9.1	
208b			7E0	24.8	0.0	0.0	64.5	0.0	0.0	
208c			9E20	21.9	0.0	0.0	39.6	0.0	0.0	
208c			7E20	18.4	0.0	0.0	52.5	0.0	0.0	
209b	2004 Chry Stratus	2.4L/PFI	10E10	28.8	0.0	0.0	73.3	0.0	0.0	
209b			7E10	28.6	0.0	0.0	54.1	0.0	0.0	E-77-2b/c
209b			9E0	23.4	0.0	5.8	29.5	0.0	0.0	
209b			7E0	16.8	1.9	7.9	28.8	0.0	0.0	
209c			9E20	42.0	0.0	0.0	72.1	0.0	0.0	
209c			7E20	23.5	0.0	0.0	41.1	0.0	0.0	
220b	2000 Chevrolet Malibu	3.4L/PFI	10E10	68.1	20128	23281	214.3	33979	40776	
220b	See Note 3		7E10	50.4	9122	15724	182.0	23090	28945	
220b			9E0	102.3	23181	28272	1858.1	35298	51362	
220b			7E0	62.7	13515	16557	279.2	22736	30082	
221b	2000 Mitsubishi Galant	2.4L/PFI	10E10	38.9	1568.7	1693.9	80.2	1932.6	2147.1	
221b	See Note 4		7E10	22.7	930.7	971.0	61.4	1282.3	1408.5	
221b			9E0	55.6	1348.8	1406.0	94.8	1646.7	1788.2	
221b			7E0	35.9	988.8	961.8	66.8	1215.9	1343.8	
221c			9E20	26.5	616.5	673.4	72.3	1032.8	1097.1	
221c			7E20	39.4	531.2	506.1	63.0	746.2	780.6	

Averages

	86 Stat	Sample	105 Stat	Sample
7psi E0	27.5	7	69.6	4
9psi E0	37.6	7	89.5	4
7psi E10	59.8	7	118.8	4
10psi E10	62.1	7	132.2	4
7psi E20	43.8	4	96.8	4
9psi E20	50.0	7	89.2	4

Note 1 - Vehicle 202 was found to have fuel injector leaks, 'O' ring leaks and a fuel neck leak. Repairs were attempted, and the vehicle was renamed 216 and the test sequence was repeated. The data generated was deemed questionable and was not used in this analysis.
Note 2 - Vehicle 207 was retested as 207L with an implanted 0.020" diameter leak in the fuel cap, and was tested on the 7 and 10 psi E10 fuels. For the E77-2c program, it was tested as 207c, with implanted 0.020" leaks seperatly at the tank top and at the canister inlet. During the static tests the tank was not pressurized because of the implanted leak. This data was inappropriate for inclusion in this analysis.
Note 3 - Vehicle 220b exhibited a leak that was later determined to be a deteriorating crack in the fuel vapor vent elbow on the fuel tank sending unit. The vehicle was dropped from further testing.
Note 4 - Vehicle 221 appeared to have a leak as indicated by the high permeation when the fuel tank was pressurized and when the fuel pump was energized.

Table 6. Tier 2 Vehicle Static Data

Veh. No.	Veh. Desc.	Eng./ Fuel Sys	Fuel	86º F (mg/hr) Static Test	86º F (mg/hr) Tank Pressurized	86º F (mg/hr) Pump On	105º F (mg/hr) Static Test	105º F (mg/hr) Tank Pressurized	105º F (mg/hr) Pump On	
211	2004 Toyota Camry LE	3.0L/PFI	10E10	19.9	0.0	0.0	---	---	---	
211			7E10	9.4	26.6	0.0	---	---	---	
211			9E0	10.1	0.0	0.0	---	---	---	
211			7E0	9.1	0.0	0.0	---	---	---	
211			9E20	55.8	0.0	0.0	---	---	---	
211L	2004 Toyota Camry LE	3.0L/PFI	10E10	55.1	---	82.1	---	---	---	
211L	See Note		7E10	48.1	---	166.4	---	---	---	
212	2006 Ford Taurus	3.0L/PFI	10E10	10.6	0.0	0.0	---	---	---	E-77-2
212			7E10	21.8	0.0	0.0	---	---	---	
212			9E0	3.2	0.0	0.0	---	---	---	
212			7E0	0.9	0.0	0.0	---	---	---	
212			9E20	4.7	0.0	0.0	---	---	---	
214	2004 Ford Escape	3.0L/PFI	10E10	24.4	---	0.0	---	---	---	
214			7E10	23.9	---	0.0	---	---	---	
214			9E0	10.7	---	0.0	---	---	---	
214			7E0	25.2	---	0.0	---	---	---	
214			9E20	16.8	---	0.0	---	---	---	
215	2004 Toyota Highlander	3.3L/PFI	10E10	10.4	9.0	0.0	---	---	---	
215			7E10	12.2	0.0	0.0	---	---	---	
215			9E0	8.5	0.0	0.0	---	---	---	
215			7E0	8.7	0.0	0.0	---	---	---	
215			9E20	19.3	0.0	0.0	---	---	---	
210b	2004 Chev Impala	3.4L/PFI	10E10	19.9	0.0	0.0	70.1	0.0	34.1	
210b			7E10	29.9	0.0	0.0	51.9	0.0	23.2	
210b			9E0	21.2	0.0	4.0	33.5	0.0	4.8	
210b			7E0	18.7	0.0	0.0	35.5	0.0	0.0	
210c			9E20	18.0	0.0	0.0	32.7	0.0	4.6	
210c			7E20	15.2	0.0	0.0	34.0	0.0	0.0	
211c	2004 Toyota Camry LE	3.0L/PFI	10E10	192.5	---	860.1	---	---	---	Tank Top
211c	See Note		7E10	449.1	---	286.9	---	---	---	
211c			10E10	224.7	---	1472.7	---	---	---	Can Inlet
211c			7E10	217.0	---	789.0	---	---	---	
213b	2004 Dodge Ram 1500	4.7L/PFI	10E10	39.2	0.0	0.0	106.8	0.0	0.0	E-77-2b/c
213b			7E10	29.6	0.0	0.0	82.2	0.0	0.0	
213b			9E0	14.7	0.0	0.0	34.5	0.0	0.0	
213b			7E0	21.1	0.0	0.0	35.3	0.0	0.0	
213c			9E20	29.8	0.0	0.0	75.1	0.0	0.0	
213c			7E20	22.9	0.0	0.0	65.1	0.0	0.0	

Averages

	86 Stat	Sample	105 Stat	Sample
7psi E0	14.0	6	35.4	2
9psi E0	11.4	6	34.0	2
7psi E10	21.1	6	67.0	2
10psi E10	20.9	6	88.4	2
7psi E20	19.1	2	49.5	2
9psi E20	24.1	6	53.9	2

Note! Vehicle 211 was renamed 211L when a 0.020" diameter leak was implanted in the fuel cap. For the E77-2c program, it was tested as 211c, with implanted 0.020" leaks seperatly at the tank top and at the canister inlet. Data generated was not appropriate to be included in this analysis.

Zero Evap Vehicle Static Data

Veh. No.	Veh. Desc.	Eng./ Fuel Sys	Fuel	86º F (mg/hr) Static Test	86º F (mg/hr) Tank Pressurized	86º F (mg/hr) Pump On	105º F (mg/hr) Static Test	105º F (mg/hr) Tank Pressurized	105º F (mg/hr) Pump On	
222c	2004 Ford Focus	2.3L/PFI	9E20	9.2	0.0	0.0	6.9	0.0	0.0	
222c			7E20	6.9	0.0	0.0	7.1	0.0	0.0	E-77-2b/c

Averages

	86 Stat	Sample	105 Stat	Sample
7psi E20	6.9	1	7.1	1
9psi E20	9.2	1	6.9	1

Permeation Rate Relationships at 86º and 105ºF - The relationship between the static permeation rates measured at 86ºF and 105ºF have been previously shown to generally follow a relationship of 105ºF = 2 x 86ºF[11]. This is usually stated as the relationship that follows a doubling of the permeation rate for each 10ºC (18ºF) temperature increase. The data measured during this program is plotted in Figure 7 below, with a 2:1 reference line added.

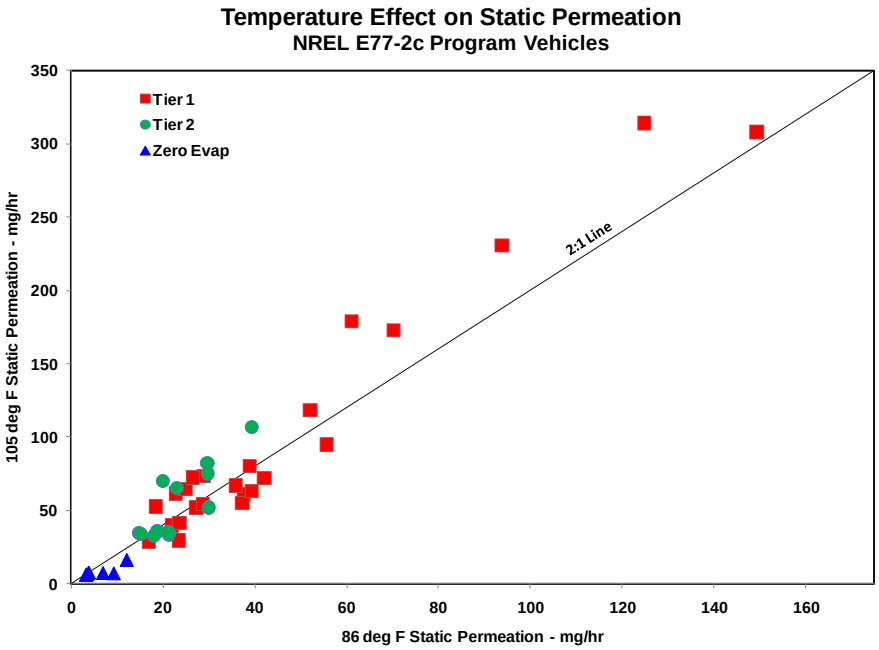


Figure 7 – Temperature Effect on Static Permeation

The measurements made in this E-77-2c program appear to be consistent with previous trends.

[11] See SAE 2001-01-0730, "Estimating Real Time Diurnal Permeation from Constant Temperature Measurements" by Marek Lockhart, et al., March 2001, and CRC "E-65 Final Report - Fuel Permeation from Automotive Systems", Harold Haskew, et al., September 2004, Figures 19 & 20.

Running Loss and Hot Soak Performance - Permeation rate comparisons are shown below in Figures 8 and 9 for the running loss and hot soak measurements for the composite fleet, with permeation trends similar to the diurnal and static results. The units for the running loss measurements are expressed in time units, mg/hour, which the authors feel are more appropriate than the regulatory units of grams per mile. The conversion back to grams per mile could be made by multiplying by 48/60 to get the mass per test, and dividing by 20 to get the miles traveled (2 x 10 miles per LA92).

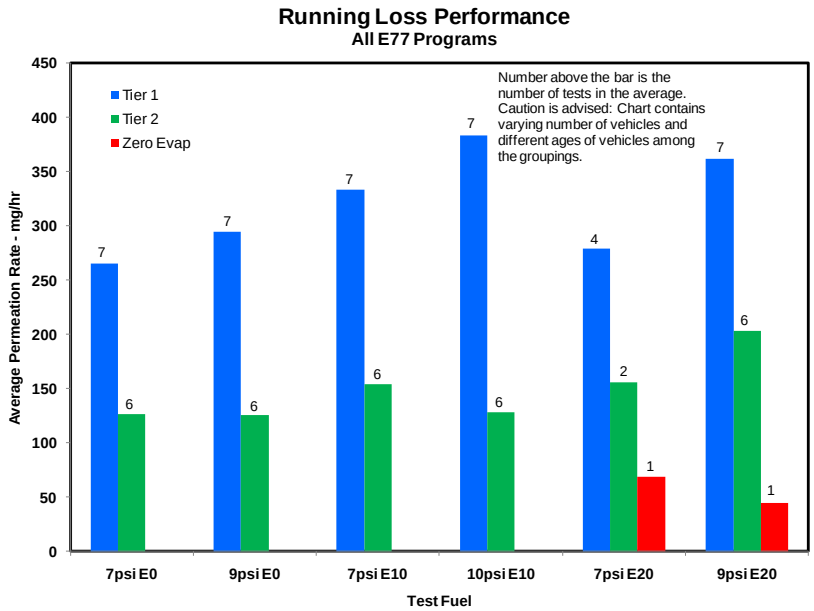


Figure 8 – Running Loss Performance

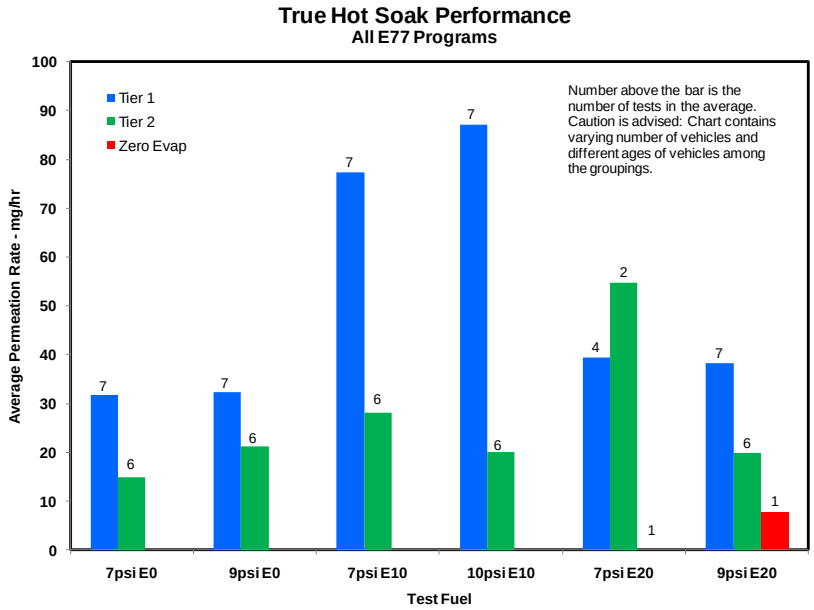


Figure 9 – Hot Soak Permeation

Tables 7 and 8 contain the data used in Figures 8 and 9, respectively.

Table 7
Tier 1 Vehicle Running Loss and Hot Soak Data

Veh. No.	Veh. Desc.	Eng./ Fuel Sys	Fuel	RL mg/hr	Tru-HS mg/hr	
202/216	1996 Ford Taurus	3.0L/PFI	10E10	174.2	11.8	
202/216	See Note 1		7E10	168.3	19.2	
202/216			9E0	109.1	25.4	
202/216			7E0	78.7	0	
202/216			9E20	54.3	7.4	
204	1999 Honda Accord	2.3L/PFI	10E10	316.4	0.4	
204			7E10	287.9	29.7	
204			9E0	249.2	44.3	
204			7E0	222.6	18.7	
204			9E20	272.0	13.4	
205	2001 Toyota Corolla	1.8L/PFI	10E10	191.6	29.5	
205			7E10	232.8	71.9	
205			9E0	103.1	1.0	
205			7E0	67.1	0.0	
205			9E20	169.7	60.3	
207	2001 Dodge Caravan	3.3L/PFI	10E10	858.1	237.7	
207			7E10	812.2	122.2	
207			9E0	833.9	5.8	**E-77-2**
207			7E0	842.5	0.0	
207			9E20	1028.2	0.0	
207L	2001 Dodge Caravan	3.3L/PFI	10E10	1001.2	392.9	
207L	See Note 2		7E10	1139.3	585.0	
206b	2002 Nissan Altima	2.5L/PFI	10E10	546.5	165.1	
206b			7E10	436.7	174.9	
206b			9E0	365.6	102.5	
206b			7E0	245.1	68.8	
206c			9E20	330.8	85.8	
206c			7E20	518.7	106.3	
207c	2001 Dodge Caravan	3.3L/PFI	10E10	999.7	1491.5	Tank Top
207c	See Note 2		7E10	2769.4	514.1	
207c			10E10	937.5	1114.0	Can Inlet
207c			7E10	114.6	610.2	
208b	2002 Chev Trailblazer	4.2L/PFI	10E10	329.5	36.0	
208b			7E10	254.7	77.3	
208b			9E0	228.0	37.9	
208b			7E0	124.9	75.0	
208c			9E20	241.5	26.9	
208c			7E20	278.5	20.5	
209b	2004 Chry Stratus	2.4L/PFI	10E10	323.6	113.7	
209b			7E10	205.7	24.5	**E-77-2b/c**
209b			9E0	144.4	5.0	
209b			7E0	166.2	16.8	
209c			9E20	367.1	71.9	
209c			7E20	256.0	28.2	
220b	2000 Chevrolet Malibu	3.4L/PFI	10E10	134.0	5.1	
220b	See Note 3		7E10	697.9	76.8	
220b			9E0	2417.0	352.5	
220b			7E0	3447.3	707.1	
221b	2000 Mitsubishi Galant	2.4L/PFI	10E10	116.2	26.9	
221b			7E10	102.0	40.5	
221b			9E0	135.2	29.0	
221b			7E0	189.8	42.5	
221c			9E20	126.6	9.5	
221c			7E20	61.9	2.5	

Averages

	RL	HS	Sample
7psi E0	265.5	31.7	7
9psi E0	294.2	32.2	7
7psi E10	333.1	77.3	7
10psi E10	383.1	87.0	7
7psi E20	278.8	39.4	4
9psi E20	362.3	38.2	7

Note 1 - Vehicle 202 was found to have fuel injector leaks, 'O' ring leaks and a fuel neck leak. Repairs were attempted, and the vehicle was renamed 216 and the test sequence was repeated. The data generated was deemed questionable and was not used in this analysis.
Note 2 - Vehicle 207 was retested as 207L with an implanted 0.020" diameter leak in the fuel cap, and was tested on the 7 and 10 psi E10 fuels. For the E77-2c program, it was tested as 207c, with implanted 0.020" leaks seperatly at the tank top and at the canister inlet. This data was inappropriate for inclusion in this analysis.
Note 3 - Vehicle 220b exhibited a leak that was later determined to be a deteriorating crack in the fuel vapor vent elbow on the fuel tank sending unit. The vehicle was dropped from further testing.

Table 8

Tier 2 Vehicle Running Loss and Hot Soak Data

Veh. No.	Veh. Desc.	Eng./ Fuel Sys	Fuel	RL mg/hr	Tru-HS mg/hr	
211	2004 Toyota Camry	3.0L/PFI	10E10	138.3	0.0	
211			7E10	56.3	13.8	
211			9E0	83.7	15.3	
211			7E0	104.6	0.7	
211			9E20	410.6	0.0	
211L	2004 Toyota Camry LE	3.0L/PFI	10E10	302.4	245.0	
211L	See Note		7E10	251.1	6.2	
212	2006 Ford Taurus	3.0L/PFI	10E10	148.9	0.0	**E-77-2**
212			7E10	201.2	0.0	
212			9E0	115.8	0.4	
212			7E0	184.5	1.8	
212			9E20	116.8	4.9	
214	2004 Ford Escape	3.0L/PFI	10E10	133.1	57.4	
214			7E10	105.7	32.9	
214			9E0	96.7	52.1	
214			7E0	36.3	3.3	
214			9E20	139.4	56	
215	2004 Toyota Highlander	3.3L/PFI	10E10	71.9	1.6	
215			7E10	97.9	0.0	
215			9E0	81.1	25.1	
215			7E0	79.7	22.5	
215			9E20	102.5	0	
210b	2004 Chev Impala	3.4L/PFI	10E10	147.5	60.6	
210b			7E10	218.3	61.8	
210b			9E0	171.1	19.8	
210b			7E0	216.0	49.0	
210c			9E20	194.3	54.0	
210c			7E20	124.6	75.9	
211c	2004 Toyota Camry LE	3.0L/PFI	10E10	820.4	1671.9	Tank Top
211c	See Note		7E10	341.8	589.4	
211c			10E10	15379.5	1990.0	Can Inlet
211c			7E10	4710.3	399.3	
213b	2004 Dodge Ram 1500	4.7L/PFI	10E10	130.9	0.9	**E-77-2b/c**
213b			7E10	243.1	60.5	
213b			9E0	203.1	14.5	
213b			7E0	135.1	12.2	
213c			9E20	257.2	4.0	
213c			7E20	186.9	33.4	

Averages

	RL	HS	Sample
7psi E0	126.0	14.9	6
9psi E0	125.3	21.2	6
7psi E10	153.8	28.2	6
10psi E10	128.4	20.1	6
7psi E20	155.8	54.7	2
9psi E20	203.5	19.8	6

Note! Vehicle 211 was renamed 211L when a 0.020" diameter leak was implanted in the fuel cap. For the E77-2c program, it was tested as 211c, with implanted 0.020" leaks seperatly at the tank top and at the canister inlet. Data generated was not appropriate to be included in this analysis.

Zero Evap Vehicle Running Loss and Hot Soak Data

Veh. No.	Veh. Desc.	Eng./ Fuel Sys	Fuel	RL mg/hr	Tru-HS mg/hr	
222c	2004 Ford Focus	2.3L/PFI	9E20	44.7	7.6	
222c			7E20	68.3	0.0	**E-77-2b/c**

Diurnal Emissions Performance - Figure 10 shows the Day One diurnal emission results for the E-77 composite fleet, segregated by ethanol level, fuel vapor pressure, and vehicle technology group. The "Day One" performance is presented here because it includes the maximum number of tests to include in the averages – the earlier Pilot Study program did not include three-day diurnal evaluations. The cumulative diurnal performance for the three-day diurnal test is presented in Figure 11 with slightly fewer tests, but a similar permeation performance pattern.

Starting at the left edge of Figure 10, there are two bars representing the average permeation measured for the 24-hour (or the first 24 hours of a longer test) diurnal test (1-day) with the 7 psi E0 fuel. The left blue bar represents the average for the nine Tier 1 vehicles that have been tested in the E-77 programs. The six newer Tier 2 vehicles' permeation average is shown with the green bar. While the number of observations is small, it indicates that, on average, the newer vehicles have lower permeation on the 7 psi E0 fuel.

A similar trend is indicated in the second pair of bars, showing the permeation performance of the E-77 vehicles tested with the higher vapor pressure (9 psi) E0 fuel. The nine Tier 1 vehicles' average indicated an increase in permeation with the higher vapor pressure fuel. The third and fourth pairs of bars in the figure show the results when the vehicles were tested with an E10 fuel. The permeation of the Tier 1 vehicles increased on average with the E10 fuels compared to the ethanol free (E0) test fuels. For the newer Tier 2 vehicles, the average permeation was not markedly different when comparing the E10 to the E0 results.

The performance of the vehicles with the E20 fuels is represented by the right two pairs of bars. Addressing first the Tier 1 vehicles, it appears that the permeation is higher with the E20 fuel than the E0, but lower with E20 compared to E10. The Tier 2 vehicles do not indicate a marked increase or difference with the E10 or E20 fuels, although the numeric values are higher.

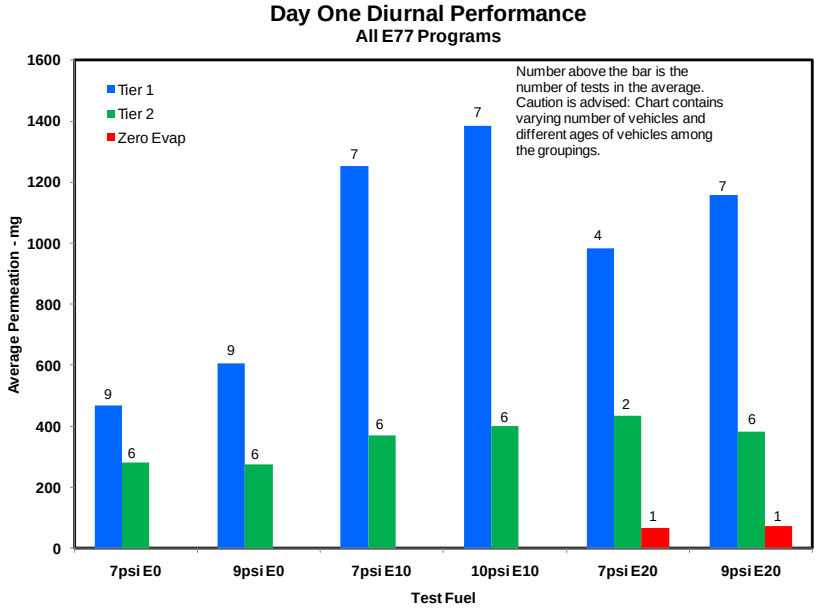


Figure 10 – Day One Diurnal Performance

Similar observations are made when the data for the cumulative three-day diurnal permeation emissions are charted in a similar fashion, as shown in Figure 11, below. In Figure 11, it should be noted that the 10 psi E10 averages for the Tier 1 vehicles are highly driven by the results for 206(b), and the results for the Tier 2 vehicles are highly driven by the results for vehicle 214.

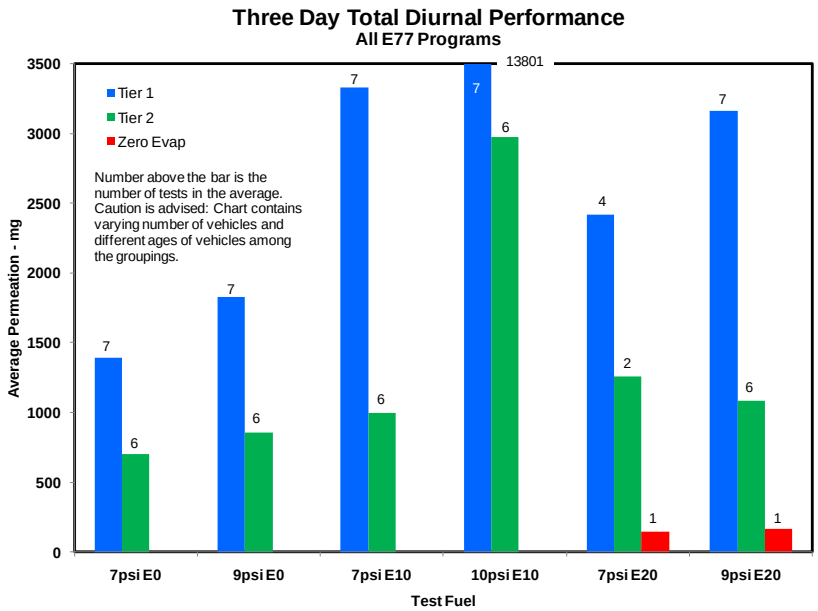


Figure 11 – Three Day Diurnal Performance

Tables 9 and 10 contain the data used in Figures 10 and 11, respectively.

Table 9

Tier 1 Vehicle Diurnal Data

Veh. No.	Veh. Desc.	Eng./ Fuel Sys	Fuel	Diurnal Results - mg Day 1	Day 2	Day 3	Total	
06	1996 Chevrolet Cavalier	2.2L/PFI	7E0	375.6	---	---	---	
			9E0	468.5	---	---	---	E-77
08	1996 Ford Explorer	4.0L/PFI	7E0	133.1	---	---	---	
			9E0	150.4	---	---	---	
202/216	1996 Ford Taurus	3.0L/PFI	10E10	2590.7	3477.9	3601.4	9670.0	
202/216	See Note 1		7E10	397.5	355.0	362.1	1114.6	
202/216			9E0	327.0	266.7	274.6	868.3	
202/216			7E0	211.7	220.8	208.1	640.6	
202/216			9E20	468.5	452.6	419.8	1340.9	
204	1999 Honda Accord	2.3L/PFI	10E10	1547.9	1779.9	1771.1	5098.9	
204			7E10	1260.2	1165.2	1165.2	3590.6	
204			9E0	628.3	581.0	577.0	1786.3	
204			7E0	367.2	287.7	293.6	948.5	
204			9E20	1103.4	960.6	981.2	3045.2	
205	2001 Toyota Corolla	1.8L/PFI	10E10	1794.1	1730.9	1741.7	5266.7	
205			7E10	1783.4	1715.0	1523.9	5022.3	
205			9E0	499.5	481.0	507.2	1487.7	**E-77-2**
205			7E0	383.0	365.4	367.0	1115.4	
205			9E20	1775.2	1690.0	1680.2	5145.4	
207	2001 Dodge Caravan	3.3L/PFI	10E10	1406.4	1264.4	1223.7	3894.5	
207			7E10	1086.5	812.0	823.6	2722.1	
207			9E0	406.4	337.3	308.0	1051.7	
207			7E0	397.5	302.6	268.9	969.0	
207			9E20	1548.0	1370.2	1360.5	4278.7	
207L	2001 Dodge Caravan	3.3L/PFI	10E10	1644.9	---	---	1644.9	
207L	See Note 2		7E10	2134.2	---	---	2134.2	
206b	2002 Nissan Altima	2.5L/PFI	10E10	2776.6	31004.6	43028.2	76809.3	
206b			7E10	2582.6	2258.5	2144.0	6985.0	
206b			9E0	1500.0	1285.6	1250.8	4036.4	
206b			7E0	1171.9	931.2	890.3	2993.3	
206c			9E20	1958.5	1787.8	1701.0	5447.3	
206c			7E20	1943.9	1708.1	1567.7	5219.7	
207c	2001 Dodge Caravan	3.3L/PFI	10E10	6512.5	---	---	---	
207c	See Note 2		7E10	7084.7	---	---	---	Tank Top
207c			10E10	10519.8	---	---	---	
207c			7E10	7066.8	---	---	---	Can Inlet
208b	2002 Chev Trailblazer	4.2L/PFI	10E10	795.0	561.4	495.8	1852.2	
208b			7E10	780.6	510.4	449.4	1740.5	
208b			9E0	778.0	567.2	519.4	1864.6	
208b			7E0	422.1	419.4	476.0	1317.5	
208c			9E20	506.5	363.2	331.9	1201.5	
208c			7E20	580.4	433.8	375.4	1389.5	
209b	2004 Chry Stratus	2.4L/PFI	10E10	535.5	423.5	475.5	1434.5	**E-77-2b/2c**
209b			7E10	383.1	349.1	323.5	1055.7	
209b			9E0	327.8	250.5	224.3	802.6	
209b			7E0	354.1	249.7	218.1	821.9	
209c			9E20	456.4	338.3	316.0	1110.7	
209c			7E20	587.7	346.5	270.4	1204.6	
220b	2000 Chevrolet Malibu	3.4L/PFI	10E10	1306.1	1889.7	2055.8	5251.6	
220b	See Note 3		7E10	1177.6	1612.1	1483.1	4272.8	
220b			9E0	6733.3	5884.8	7049.9	19668.0	
220b			7E0	6218.7	6214.7	7041.9	19475.3	
221b	2000 Mitsubishi Galant	2.4L/PFI	10E10	827.9	724.1	702.4	2254.5	
221b			7E10	894.7	676.7	618.0	2189.4	
221b			9E0	706.4	543.7	538.3	1788.4	
221b			7E0	603.0	503.1	487.0	1593.2	
221c			9E20	750.8	584.7	564.9	1900.4	
221c			7E20	817.2	544.2	498.8	1860.2	

Averages	Day 1 Mgs	Day 1 Sample	Total Mgs	Total Sample
7psi E0	467.5	9	1394.1	7
9psi E0	607.2	9	1831.1	7
7psi E10	1253.0	7	3329.4	7
10psi E10	1383.3	7	13801.5	7
7psi E20	982.3	4	2418.5	4
9psi E20	1157.0	7	3161.3	7

Note 1 - Vehicle 202 was found to have fuel injector leaks, 'O' ring leaks and a fuel neck leak. Repairs were attempted, and the vehicle was renamed 216 and the test sequence was repeated. The data generated was deemed questionable and was not used in this analysis.
Note 2 - Vehicle 207 was retested as 207L with an implanted 0.020" diameter leak in the fuel cap, and was tested on the 7 and 10 psi E10 fuels. For the E77-2c program, it was tested as 207c, with implanted 0.020" leaks seperatly at the tank top and at the canister inlet. This data was inappropriate for inclusion in this analysis.
Note 3 - Vehicle 220b exhibited a leak that was later determined to be a deteriorating crack in the fuel vapor vent elbow on the fuel tank sending unit. The vehicle was dropped from further testing.

Table 10
Tier 2 Vehicle Diurnal Data

Veh. No.	Veh. Desc.	Eng./ Fuel Sys	Fuel	Diurnal Results - mg Day 1	Day 2	Day 3	Total	
211	2004 Toyota Camry	3.0L/PFI	10E10	337.0	226.8	217.9	781.7	
211			7E10	243.8	183.8	184.3	611.9	
211			9E0	130.3	115.8	100.6	346.7	
211			7E0	207.1	100.2	87.4	394.7	
211			9E20	285.0	221.8	203.4	710.1	
211L	2004 Toyota Camry LE	3.0L/PFI	10E10	2545.4	---	---	2545.4	
211L	See Note		7E10	678.3	---	---	678.3	
212	2006 Ford Taurus	3.0L/PFI	10E10	124.3	87.9	102.8	315.0	**E-77-2**
212			7E10	184.8	100.2	75.8	360.8	
212			9E0	100.5	70.8	57.4	228.7	
212			7E0	101.6	71.2	57.0	229.8	
212			9E20	131.0	83.3	75.0	289.3	
214	2004 Ford Escape	3.0L/PFI	10E10	492.0	839.4	11247.5	12578.9	
214			7E10	524.2	397.4	394.4	1316.0	
214			9E0	455.9	358.5	1101.7	1916.1	
214			7E0	494.3	319.0	281.5	1094.8	
214			9E20	470.9	440.0	751.8	1662.7	
215	2004 Toyota Highlander	3.3L/PFI	10E10	319.2	260.2	237.0	816.4	
215			7E10	224.7	231.7	267.5	723.9	
215			9E0	202.1	165.9	176.3	544.3	
215			7E0	248.3	294.1	288.8	831.2	
215			9E20	416.8	414.8	450.6	1282.2	
210b	2004 Chev Impala	3.4L/PFI	10E10	486.5	458.3	441.3	1386.1	
210b			7E10	445.1	388.3	359.1	1192.5	
210b			9E0	407.8	377.4	358.3	1143.4	
210b			7E0	270.6	266.6	221.1	758.3	
210c			9E20	352.3	274.9	297.7	925.0	
210c			7E20	368.6	283.6	271.1	923.3	
213b	2004 Dodge Ram 1500	4.7L/PFI	10E10	650.6	615.4	700.7	1966.7	**E-77-2b/c**
213b			7E10	602.8	577.7	588.9	1769.4	
213b			9E0	346.3	328.4	292.8	967.5	
213b			7E0	357.8	283.3	276.5	917.5	
213c			9E20	644.2	529.3	460.6	1634.2	
213c			7E20	501.9	538.4	546.1	1586.4	

Averages	Day 1 Mgs	Day 1 Sample	Total Mgs	Total Sample
7psi E0	279.9	6	704.4	6
9psi E0	273.8	6	857.8	6
7psi E10	370.9	6	995.7	6
10psi E10	401.6	6	2974.1	6
7psi E20	435.2	2	1254.9	2
9psi E20	383.3	6	1083.9	6

Note! Vehicle 211 was renamed 211L when a 0.020" diameter leak was implanted in the fuel cap, data generated was not appropriate to be included in this analysis.

Zero Evap Vehicle Diurnal Data

Veh. No.	Veh. Desc.	Eng./ Fuel Sys	Fuel	Diurnal Results - mg Day 1	Day 2	Day 3	Total	
222c	2004 Ford Focus	2.3L/PFI	7E20	65.5	42.7	39.5	147.7	
222c			9E20	73.6	51.4	40.1	165.1	**E-77-2b/c**

Summary of Task 4.5

While the sample sizes are still too small to make comparison with statistical significance, several trends are suggested. Referring to the figures shown above, comparing the average permeation performance for various groups, the following trends and observations are offered:

1. The newer Tier 2 vehicles have lower permeation than Tier 1 on all fuels.

2. Permeation is higher with E10 or E20 compared to an ethanol-free (E0) fuel.

3. Permeation is lower with E20 compared to E10 on the Tier 1 vehicles, but the presence of a reduction is less clear for the newer Tier 2 vehicles based on the few tests available for analysis. Further research may be needed to determine the sensitivity of newer vehicle technologies to fuel effects.

4. Higher average permeation emissions may be associated with increased fuel vapor pressure for the Tier 1 vehicles tested in this program, but the average permeation emissions for the newer Tier 2 test vehicles show no clear trend with vapor pressure.

Task 4.7 - Effect of Leak Location on Permeation Emissions

For the last four decades[12], vehicles sold in the United States have been equipped with evaporative emission control (evap) systems that are remarkably effective in reducing fuel evaporative emissions from automotive fuel systems. Light Duty Vehicles (LDV) starting in model year 1998 even control refueling emission to a very high degree. The performance of these evap systems are, however, affected by leaks that may exist in the fuel system of a vehicle. These leaks can be the result of, among other things, poor connections, scratched or misaligned seals, loose fuel caps, and improper maintenance, such as improper repairs done to other fuel system components that could result in leaks. Undetected (and un-repaired) leaks in automotive fuel systems can be a potentially significant source of vehicle emissions.

This source of emissions (leaks) was addressed by regulation starting in MY 1998 with the implementation of onboard detection of fuel system leaks (OBD and a later OBDII). Current OBDII systems are capable of detecting vapor leaks of 0.020" diameter-equivalent or larger equivalent diameter, and alerting the operator to bring the vehicle in for service. As a result, leaks of this scale (if corrected) can become a much smaller contributor to vehicle fuel emissions.

Leaks with Pre-Enhanced, Pre-ORVR Systems - There is a need to understand the frequency and nature of leaks that may still exist in the inventory. The Coordinating Research Council (CRC) sponsored test programs (E-77, E-77-2) in recent periods that were designed to measure emissions from implanted 0.020" diameter leaks located in the gas cap in several test vehicles. The test vehicles were subjected to a series of emission tests, including a summertime (65° to 105° F) diurnal event.

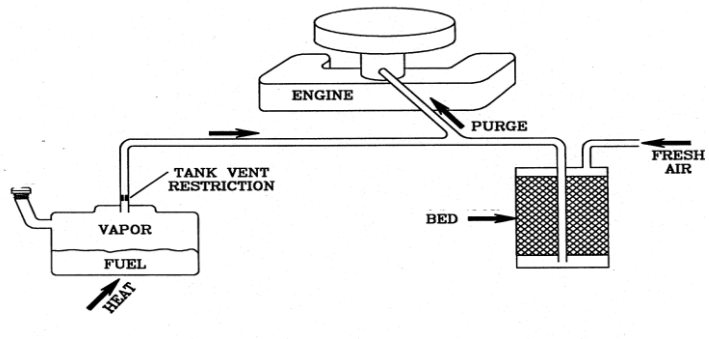


Figure 12 – Simple Tank Venting System

In the initial test program (CRC E-77), a 1996 Cavalier with Enhanced Evap control hardware was selected as the test vehicle. The Cavalier was equipped with a simple tank venting system (Figure 12) with an inline 0.055" orifice in the vent line from the tank and leading forward to the canister. Because of the flow restrictions caused by the 0.055" orifice, the length of the vent

[12] The first federal requirement for fuel evaporative emission control was model year 1971. California required systems a year earlier (1970)

line, the multiple bends, and the carbon bed in the canister, the 0.020" leak implanted in the cap provided a convenient, parallel path to the atmosphere. With an implanted leak in the fuel cap, about 21 grams of HC were emitted into the SHED (Table 11) during the diurnal test with E0 fuel, while the baseline test with no leak resulted in only 0.4 grams of diurnal emissions. It was estimated, using contemporary vapor generation models, that the uncontrolled vapor emissions from this test[13] would have been 23.2 grams if the cap had been left off completely. The 20.7 gram emissions level corresponds to a 89% loss to the environment.

Table 11

Impact of 0.020" Leak on Diurnal Emissions
65° – 105° F Diurnal
1996 Cavalier

	Test fuel	Baseline emissions (gms/day)	Emissions with 0.020" leak (gms/day)	Increase in emissions (gms/day)
1996 Chevrolet Cavalier	E0	0.38	20.70	20.32

Discussions about this test result created the realization that the location of the leak, and the configuration of the vehicle's fuel system, would probably have a significant effect on the resulting emissions. Even though the leak in the fuel cap was smaller than the 0.055" orifice in the tank vapor line, most of the HC vapors passed through the leak to the atmosphere because it was a path of relatively low resistance.

Leaks at the Fuel Cap with ORVR Systems - In a subsequent test program (E-77-2), a similar diurnal test was conducted on a 2001 Dodge Caravan (Fig. 13) and a 2004 Toyota Camry (Fig. 14) using E10 fuel. Both vehicles were equipped with Onboard Refueling Vapor Recovery (ORVR) systems as well as OBDII and Tier 1 Evap. A 0.020" leak was implanted in the fuel cap of each vehicle and the resulting SHED emissions are shown in Table 6. The resulting net increases in emissions were 1 gram for the Caravan and 0.4 grams for the Camry, much lower than the results measured during the evaluation of the Cavalier.

The following discussion attempts to explain the hardware and component differences that contributed to the different results.

[13] 7.0 psi RVP fuel, 15.3 gallon tank 40% full, 17.6 gallons total tank volume with a 67° to 103°F temperature increase.

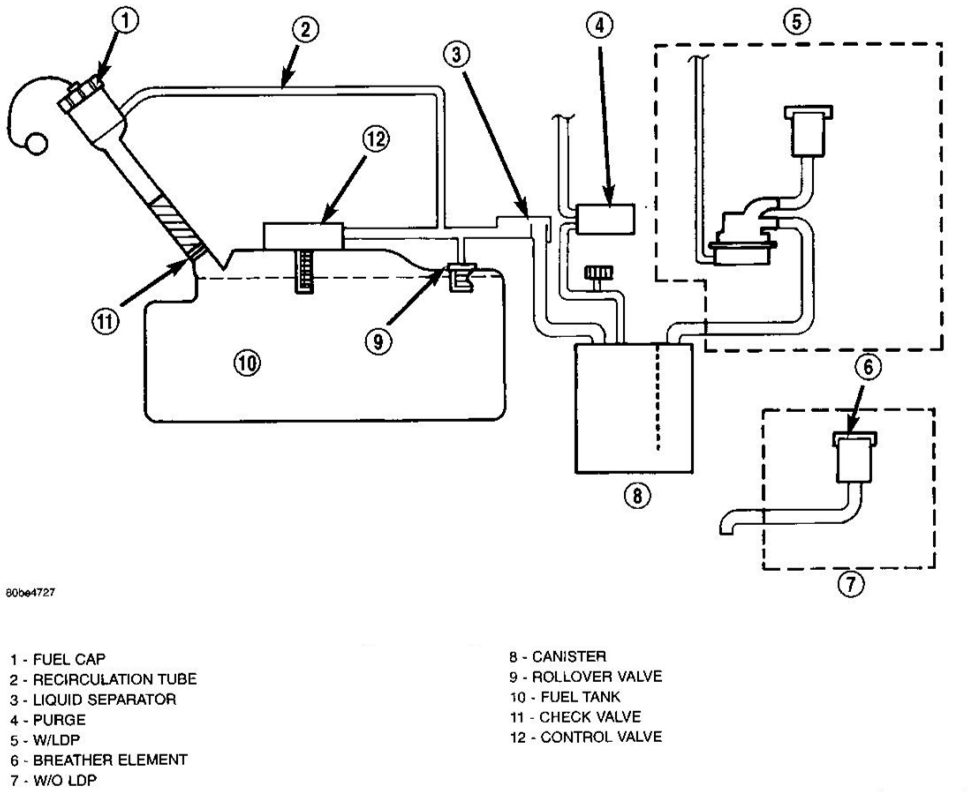


Figure 13 Dodge Caravan Fuel System with Enhanced Evap and ORVR

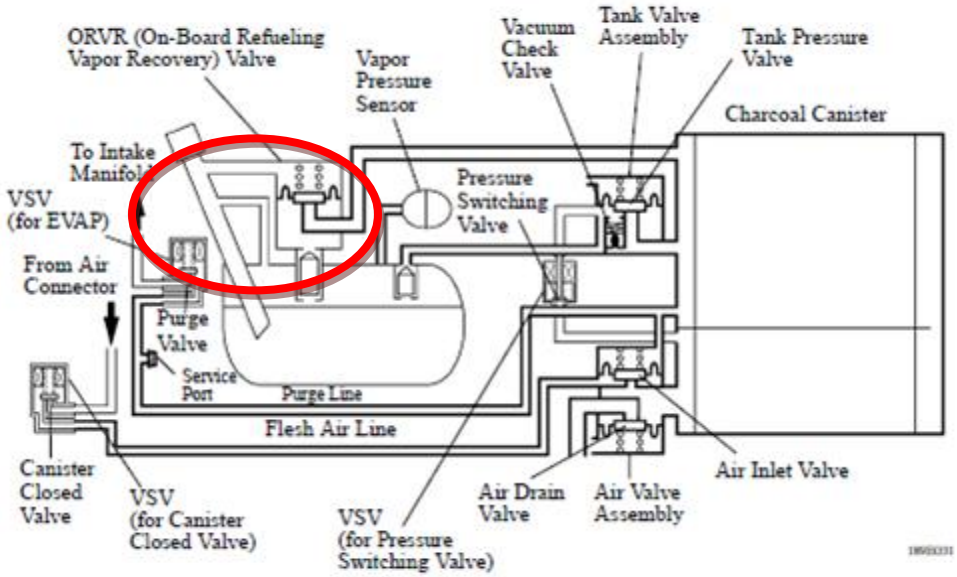


Figure 14 Toyota Camry Fuel System with Enhanced Evap and ORVR

Table 12

Impact of 0.020" Leak on Diurnal Emissions
65° – 105° F Diurnal
2002 Caravan and 2004 Camry

	Test fuel	Baseline emissions (gms/day)	Emissions with 0.020" leak (gms/day)	Increase in emissions (gms/day)
2001 Dodge Caravan	E10	1.09	2.13	1.04
2004 Toyota Camry	E10	0.24	0.68	0.44

(The use of E10 test fuel should not have a significant effect on diurnal emissions)

There is an important difference in the configurations of these two vehicles compared to the Cavalier that contributed to the low effect of leak implantation on diurnal permeation emissions. An Inlet Check Valve (ICV) is located in the fill pipe of the Dodge Caravan (item 11 on Figure 13) at the entrance to the tank. The ICV is a common component in ORVR systems and is designed to prevent spitback from the fuel tank during a refueling event. During the diurnal tests on the Caravan, the ICV seal prevented HC vapors from taking a direct communication path up the fill pipe and thus into the SHED. There is a path from the top of the tank's vapor space that communicates with the area near the fuel cap, (shown as item 2, a "recirculation tube." in Figure 13) but this appears to be a less attractive path compared to the refueling vapor path to the canister.

The Camry system shown in Figure 14 is more complex than the Caravan, as the Toyota system uses a "vent switching" configuration during refueling events.

In each of the test vehicles, the only flow path from the tank vapor space to the cap is through the vapor recirculation line shown in Figures 13 and 14. This line contains an orifice; the accompanying restrictions offered by the tubes and turns in the flow path to the cap significantly reduced the emissions from the implanted leak. The more open path for vapors is through the large refueling vent to the low restriction carbon canister. This effect could also be a result of the cap "seeing" an effective vapor space volume equivalent to the volume of the filler neck. Assuming a 2ft, 2" diameter filler neck, this could amount to ½ gallon of vapor space. Scaling the uncontrolled result of 23.2 grams by the Cavalier vapor space vs. ½ gallon results in a diurnal emission rate of about 1 gram.

Alternative Implanted Leak Locations - In order to evaluate the effect of other leak locations and system configurations on the emissions from small leaks, a test plan was included in E-77-2c that expanded on the data already observed from the tests with leaks implanted in the cap. In this test series, a 0.020 leak was implanted separately in two new locations, in or near the top of the tank, and at the vent line hose connecting to the canister. The test vehicles were the same 2002 Dodge Caravan and 2004 Toyota Camry used in the previous testing. The previous data from these vehicles were then compared to the data for the two new leak locations to add to the understanding of the impact of small leaks on emissions.

For the Task 4.7 assignment, the laboratory staff placed (implanted) a 0.020 inch internal diameter hole at various places in the vehicle's fuel system. Carburetor jets of the 0.020 inch

internal diameter size were purchased from a local source, fixed into a small disc, clamped into a stainless compression fitting and screwed into the desired position.

Previous tests had been performed with a similar size "leak" in the vehicle's fuel cap. The 0.020 inch diameter hole was placed in two different locations on each vehicle:

1. at the top of the fuel tank in the tank sending unit cover, and
2. at the connection to the canister inlet from the fuel tank.

Leak Location at the Top of the Tank - Figure 15 shows the fitting in the Caravan (207) cover with a red arrow pointing to the position of the "leak". This was sealed when the leak was moved to the canister inlet.

Figure 15 Caravan Top Tank Leak

Similarly, Figure 16 shows the fitting in position on the Toyota Camry tank.

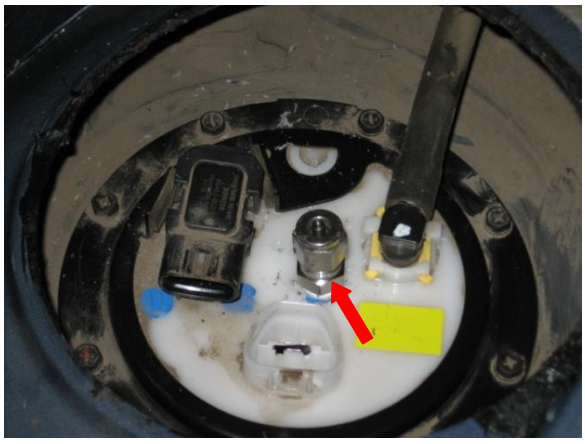


Figure 16 Camry Top Tank Leak

Leak Location at the Canister Inlet - Again, Figures 17 and 18 show the implanted leak location on the Caravan and Camry respectively.

Figure 17 Canister Vent Leak Location for Caravan

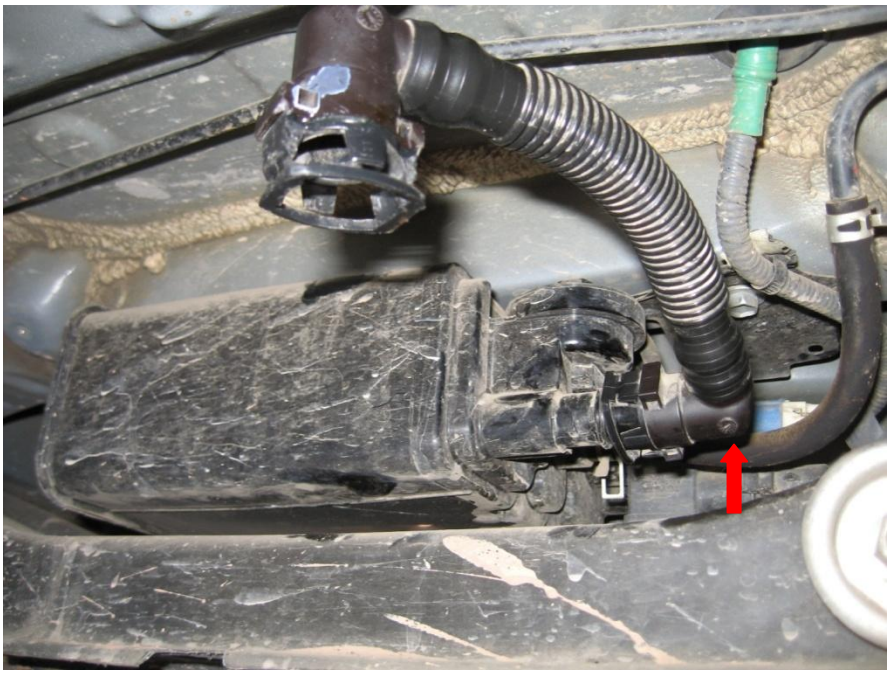


Figure 18 Canister Inlet Leak Location for Camry

Comparison of the Diurnal Permeation Results with Leaks in Various Locations – Vehicle 207
Figures 19 and 20 are summary plots of the day one diurnal results for Vehicle 207 using the 10 psi E10 and the 7 psi E10 fuel, with the leaks in various locations. The "no leak" and the "fuel cap" leak are from the previous test programs. The green and blue traces show a small effect of the leak, while the leak implanted in the top of the tank (red trace), and at the canister inlet (gold trace) show a much larger effect (compared to the "no-leak" condition).

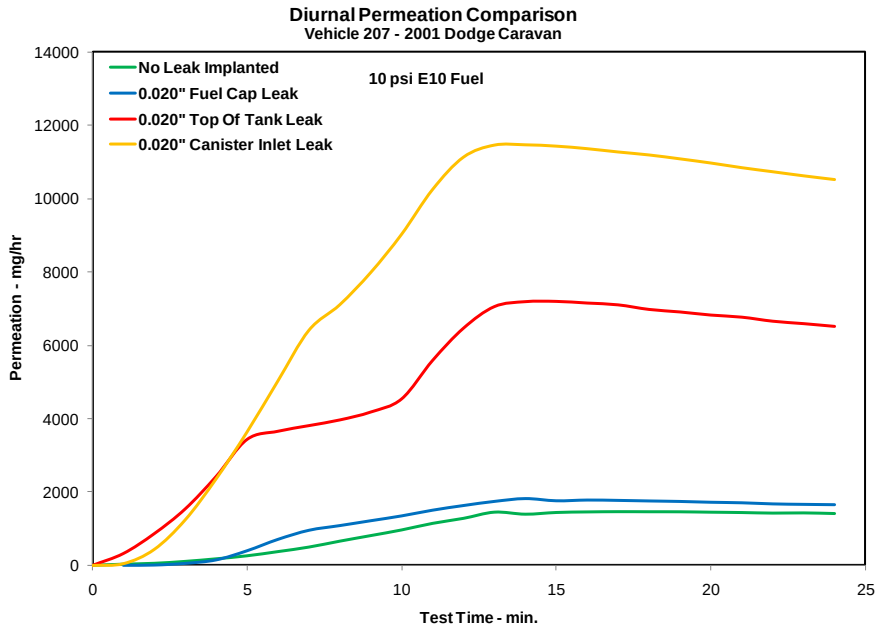


Figure 19 – Caravan Diurnal Leak Comparison – 10psi E10 Fuel

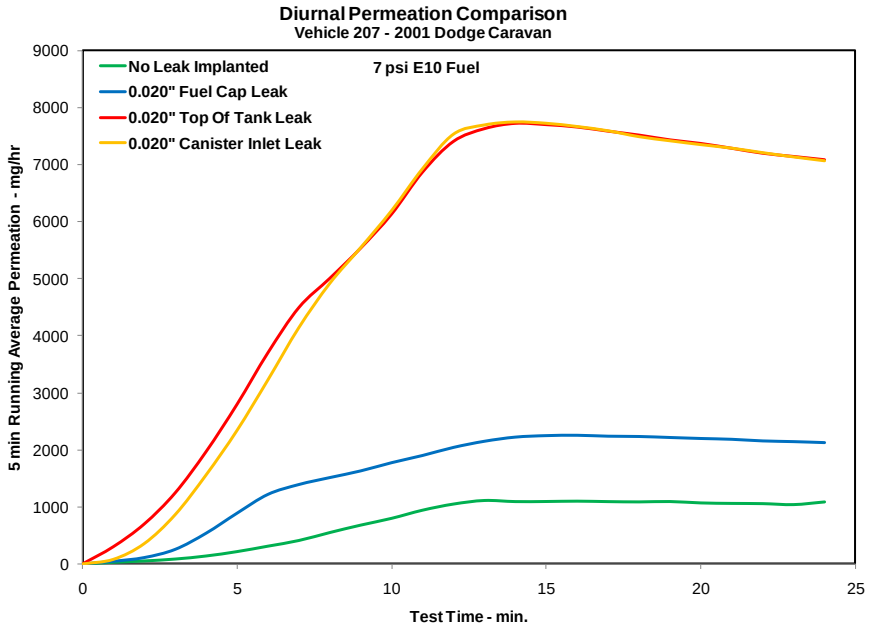


Figure 20 – Caravan Diurnal Leak Comparison – 7psi E10 Fuel

Figures 21 and 22 show the diurnal performance of Vehicle 211 with leaks in various positions. The results were similar to those seen in Figures 19 and 20.

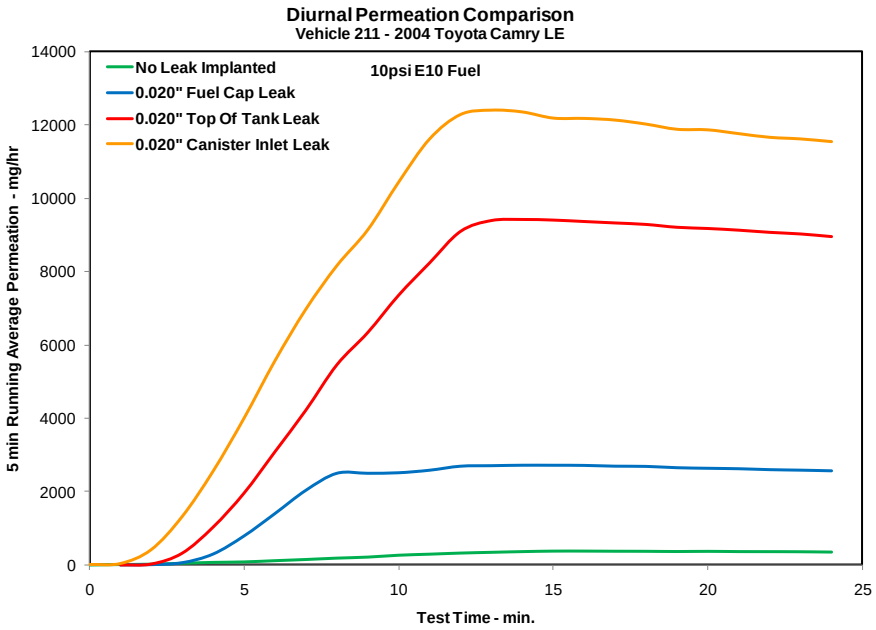


Figure 21 – Camry Diurnal Leak Comparison – 10psi E10 Fuel

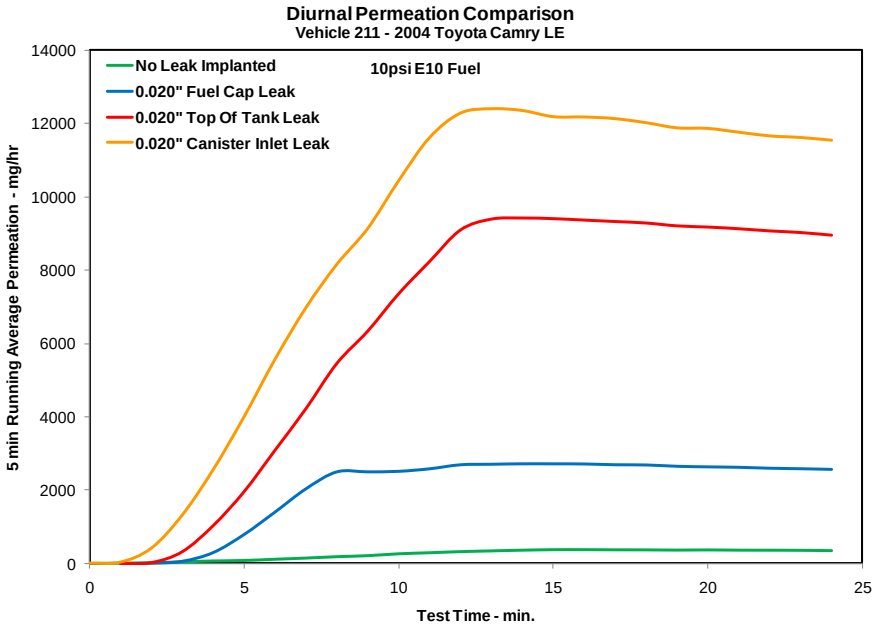


Figure 22 – Camry Diurnal Leak Comparison – 7psi E10 Fuel

Summary of Task 4.7

The tests performed for Task 4.7 demonstrated two findings that may have significance for air quality modelers:

- Vehicles fitted with ORVR systems may have changed the emission impact of a small leak at the fuel cap. Leaks added at the fuel cap for the two ORVR vehicles tested produced one day diurnal emissions almost an order of magnitude lower than was seen with a previously tested non-ORVR Cavalier. This change in the emissions measured is thought to be due to the addition of "check valves," or "anti-spitback valves" added to the systems to improve the fuel fill control.

- Diurnal emissions measured with leaks implanted at the top of the fuel tank, or at the entry to the carbon canister, were significantly higher than the emissions with a leak implanted at the fuel cap on the two ORVR-equipped vehicles tested. While it was expected that the permeation emissions from a leak at the top of the tank might be higher than those from a leak at the fuel cap, a similar difference in emissions between an implanted leak at the canister inlet versus one at the fuel cap was not.

Speciation of the Permeation Results

The E-77-2c scope of work request included gas chromatographic speciation of all the vehicle tests, including the static tests, the dynamic, and the diurnals on both fuel volatilities. This generated a sizable file of test results. The detailed speciation summaries are presented at the end of this report in Appendix II. The implanted leak tests on Vehicles 207 and 211 (Task 4.7) were also speciated, but must be analyzed separately from the Task 4.5 results, as the analysis contains not only the vehicle's permeation, but the vapor from the induced leak. The next few pages will be used to explain the project's file structure, and the calculations used to speciate and calculate the reactivity of the various tests.

Basic Speciation File Example - Table 13 is a truncated example of the basic speciation file that is generated by the laboratory (ATL). While it has been cut off after elution number 26, there are 172 species in the total report, plus methanol, ethanol and R-134a (refrigerant)[14]. This selected file exists as one of the tabs in the project data file set identified as "206cgc.xls." This example summarizes the results for the 72-hour diurnal results on vehicle 206c – Test number 7703. For the 72-hour test, sample bags of the VT-SHED are collected at the start of the diurnal (T_0), at 24 hours (T_{24}), at 48 hours (T_{48}), and finally at 72 hours (T_{72}). In this example, the results are summarized for the composite 72-hour test.

[14] Stating again, the permeation performance values used in this report have corrected the FID's misidentification of the ethanol molecule, and the identified non-fuel components, methanol and refrigerant (R-134a), have been subtracted from the totals.

Table 13

Speciation File Example

Vehicle **206c**
Type: **72DHB**
Test# **7703**

Detailed Hydrocarbon Speciation Results

			72DHB			
			Net mass	Net conc.	% total	
	Species Name	CAS #	(mg)	(ppmC)	(mg)	(ppmC)
1	Methane	00074-82-8	0.000	0.000	0%	0%
2	Ethylene	00074-85-1	1.984	0.066	0%	0%
3	Acetylene (Ethyne)	00074-86-2	0.000	0.000	0%	0%
4	Ethane	00074-84-0	0.000	0.000	0%	0%
5	Propene	00115-07-1	0.000	0.000	0%	0%
6	Propane	00074-98-6	24.285	0.770	0%	0%
7	Allene (Propadiene)	00463-49-0	0.000	0.000	0%	0%
8	Propyne	00074-99-7	0.000	0.000	0%	0%
9	2-Methylpropane	00075-28-5	101.164	3.244	2%	2%
10	2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	11.280	0.375	0%	0%
11	1,3-Butadiene	00106-99-0	0.428	0.015	0%	0%
12	n-Butane	00106-97-8	320.071	10.262	6%	6%
13	2,2-Dimethylpropane	00463-82-1	0.000	0.000	0%	0%
14	t-2-Butene	00624-64-6	0.000	0.000	0%	0%
15	1-Butyne	00107-00-6	0.000	0.000	0%	0%
16	c-2-Butene	00590-18-1	30.919	1.027	1%	1%
17	3-Methyl-1-butene	00563-45-1	0.000	0.000	0%	0%
18	2-Methylbutane (Isopentane)	00078-78-4	379.667	12.258	7%	8%
19	1-Pentene & 2-Butyne	00109-67-1+00503-17-3	52.231	1.799	1%	1%
20	2-Methyl-1-butene	00563-46-2	62.754	2.084	1%	1%
21	n-Pentane	00109-66-0	335.100	10.819	6%	7%
22	2-Methyl-1,3-butadiene	00078-79-5	2.469	0.084	0%	0%
23	t-2-Pentene	00646-04-8	162.601	5.400	3%	3%
24	3,3-Dimethyl-1-butene	00558-37-2	0.000	0.000	0%	0%
25	c-2-Pentene	00627-20-3	76.704	2.547	1%	2%
26	2-Methyl-2-butene	00513-35-9	152.719	5.071	3%	3%

The file is organized in the following fashion: Column 1 is the elution number, Column 2 is the species name and Column 3 is the CAS Number (with leading zeros as necessary to maintain a 10 digit format). The CAS number is a unique number created and maintained by the CAS Registry® (http://www.cas.org) that provides a name and property resource for recognized substances.

The right hand four columns in the figure are the test results. The EXCEL™ file contains six or more digits of precision, but the precision in the figure has been reduced for clarity. The net concentration in ppmC is calculated by subtracting (for each species) the start of test concentrations (T_0) from the 72-hour results, yielding the net increase in concentration for the three-day period. One could obtain the speciation results for the third day, for example, by subtracting the concentrations at T_{48} from the T_{72} measurement. The net mass for each of the species is calculated by using appropriate volume, concentration and density values. The last two columns are the relative contribution (% of total present) of the species to the total of all the concentrations measured.

Ozone Forming Potential (Reactivity) Methodology - The speciation information is further analyzed by calculating the composite ozone forming potential of the speciate. Table 14 below illustrates the concept. The order of presenting the individual species has been changed by

Table 14
Ozone Forming Potential Methodology
Vehicle 206c - Fuel 9 psi E20 - 3 Day Diurnal - Test 7703
Non Zero Mass Species Sorted By VOC

Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	1017.48	1474.297	
2-Methylbutane (Isopentane)	00078-78-4	1.35	379.67	514.406	
n-Pentane	00109-66-0	1.21	335.10	407.124	
n-Butane	00106-97-8	1.08	320.07	344.688	
Toluene	00108-88-3	3.93	279.47	1096.913	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	272.63	1444.528	
Benzene	00071-43-2	0.69	205.86	142.938	
n-Hexane	00110-54-3	1.13	183.93	208.697	
n-Heptane	00142-82-5	0.97	172.84	166.926	
t-2-Pentene	00646-04-8	10.47	162.60	1702.998	
2-Methyl-2-butene	00513-35-9	14.20	152.72	2167.853	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	146.70	205.061	
3-Me-1-Hexene	03404-61-3	4.27	103.91	444.084	
2-Methylpropane	00075-28-5	1.18	101.16	119.030	
Methylcyclopentane	00096-37-7	2.05	88.84	182.111	
2,2-DiMeHexane	00590-73-8	0.94	82.00	77.181	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	78.81	611.209	
c-2-Pentene	00627-20-3	10.28	76.70	788.622	
3-Methylpentane	00096-14-0	1.69	76.68	129.648	
2-Methyl-1-butene	00563-46-2	6.38	62.75	400.280	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	52.23	611.345	
t-2-Hexene	04050-45-7	8.55	41.65	356.031	
2-Methylhexane	00591-76-4	1.09	36.43	39.538	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	35.13	259.471	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	32.93	176.785	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	32.63	104.117	
n-Octane	00111-65-9	0.80	32.49	25.870	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	32.46	38.925	
c-2-Butene	00590-18-1	14.26	30.92	440.893	
1-Methylcyclopentene	00693-89-0	12.45	30.43	379.046	
c-1,2-Dimethylcyclohexane	02207-01-4	3.33	0.43	1.424	
4-Methyl-t-2-pentene	00674-76-0	8.04	0.40	3.190	
c- & t-4-Nonene	02198-23-4	4.42	0.37	1.618	
sec-Butylbenzene	00135-98-8	2.29	0.36	0.819	
1,4-Diethylbenzene	00105-05-5	4.39	0.23	0.997	
3-Ethyl-c-2-Pentene	00816-79-5	9.76	0.22	2.148	
1-Methyl-4-Isobutylbenzene	05161-04-6	3.82	0.09	0.349	
		Total	5145.3	17296.7	3.362

No MIR available, use weighted average of 3.3341

listing the species by decreasing mass in the sample. The blue arrow in the middle of the figure indicates where lines of data were eliminated from the table, to keep the figure to a convenient height. In the figure above, and typical for the E20 test results, the ethanol species has the highest mass in the sample, and thus appears as the first data line. The next largest mass is the isopentane, and so on. The next column lists the MIR value for that species. The Maximum Incremental Reactivity scale (MIR) scale[15] created by William Carter, and adopted by CARB, has been used to estimate the equivalent ozone that would be produced by the various species found in this measurement. The report listed in the footnote contains the following quote:

> *The methods and procedure used to derive the MIR scale presented in this report are comprehensively documented by Carter (2009a) and references therein, and those reports should be consulted for details. Briefly, the reactivity scale is based on calculations of relative ozone impacts, expressed as mass of additional ozone formed per mass VOC added to the emissions, for various compounds under various atmospheric conditions, given a chemical mechanism for the compounds and other relevant atmospheric species, models for various atmospheric conditions, and a modeling and reactivity assessment procedure. The methods, atmospheric scenarios, and modeling and reactivity assessment procedures were the same as employed in previous calculations of the MIR scale (Carter, 1994a, 2000, 2003), and are based on those first developed by Carter (1994a,b), with a few modifications as described by Carter (2000). The only difference between this updated scale and the previous MIR scales of Carter (2000, 2003) concern the chemical mechanism used and the number and types of VOCs whose ozone impacts are calculated.*

Multiplying the mass of the individual species by the MIR factor yields the last column, the mass of ozone that might be produced by that mass of speciate. The "average reactivity" of the sample is calculated (and shown at the bottom of each file) by summing up the speciated mass, and the estimated ozone mass, and dividing the total ozone value by the total VOC (fuel) mass. In this example, the average reactivity is 3.362 (in grams of ozone per gram of volatile organic compound).

Reactivity Comparison for Various Fuels and Test Sequences Table 15 offers a summary of the Vehicle 206c data measured and calculated using the E20 fuel. Similar summaries for the other vehicles appear with the data listings in the Appendix. Columns 4 and 6 compare the mass estimates by two different techniques. Column 4 is the mass estimate one would obtain using the SHED technique. Column 6 lists the gas chromatograph mass estimate. This technique accumulates the total mass in the sample from the sum of the individually identified molecules. The first line of data in the figure indicates good correlation, 168 mg versus 162. The second line indicates that the GC measured 17% more in the sample (column 5, GC as % of THC = 116.9%), which is less than one would hope to see. Plus or minus 10% in readings is a goal the author would hope to achieve.

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[15] **UPDATED MAXIMUM INCREMENTAL REACTIVITY SCALE FOR REGULATORY APPLICATIONS,** William P. L. Carter, College of Engineering Center for Environmental Research and Technology, University of California, Riverside, CA 92521, March 23, 2009, available at http://citeseerx.ist.psu.edu

The last column (Species Present) indicates the number of species identified using the GC. Thirty (30) or more is an indication that there was a high enough level of permeation that the chromatograph identified. Other projects, where the permeation level is low (~30 mg) can give a much lower number of species identified.

Table 15
Reactivity Comparison
Vehicle 206c

Test	Fuel	Test No.	Bag THC mg	GC as % of THC	GC VOC mg	Ozone mg	Reactivity	Species Present
86° F	E20 - 9 psi	7685	168.0	96.5	162.0	541.1	3.340	60
Static	E20 - 7 psi	7724	186.7	116.9	218.3	910.4	4.170	77
105° F	E20 - 9 psi	7689	349.2	99.3	346.6	1186.7	3.424	70
Static	E20 - 7 psi	7727	454.7	120.4	547.2	1825.1	3.335	78
Dynamic	E20 - 9 psi	25795	420.6	109.0	458.2	1709.2	3.730	69
	E20 - 7 psi	25806	615.1	116.5	716.5	2648.1	3.696	75
DHB	E20 - 9 psi	7703	5447.3	94.5	5145.3	17296.7	3.362	101
Total	E20 - 7 psi	7779	5219.7	92.8	4845.4	14230.9	2.937	102

Summary and Recommendations for Additional Investigations

There are several subjects that are recommended for additional investigation.

1. The Tier 2 (Near Zero) vehicles suggest that the effect of ethanol on permeation may be reduced (or zero?) based on the limited number of tests available to date. The indication may change if the Tier 2 vehicles are tested after they are five or more years old.

2. The Tier 2 vehicles also show a mixed effect of fuel vapor pressure on permeation. Permeation was higher in many cases with the lower vapor pressure (7 psi E20) fuel. The order of testing was always first on the 9 psi fuel, and then a week later on the 7 psi fuel. Should the order have been mixed?

3. Is it possible that the newer advanced materials (tanks, hoses, seals) used in the Tier 2 vehicles are more resistant to changes in permeation, and take longer to stabilize than previously thought?

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Steering Committee

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Appendix I – Task 4.5

Appendix I contains the individual vehicle data and plots that display the fuel vapor pressure effect on evaporative emission tests run for Task 4.5 of this program.

For each vehicle there are tables of the evaporative test results, reactivity results and plots of the 86º and 105º F static tests, the running loss and hot soak test and the cumulative three day diurnal test.

Evaporative Test Results
Vehicle 206c

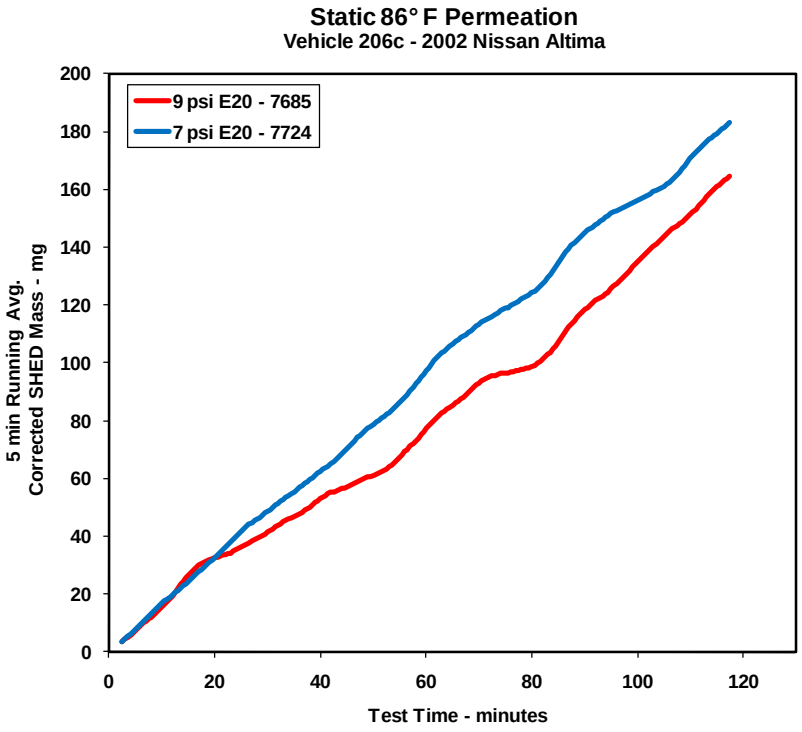
2002 Nissan Altima

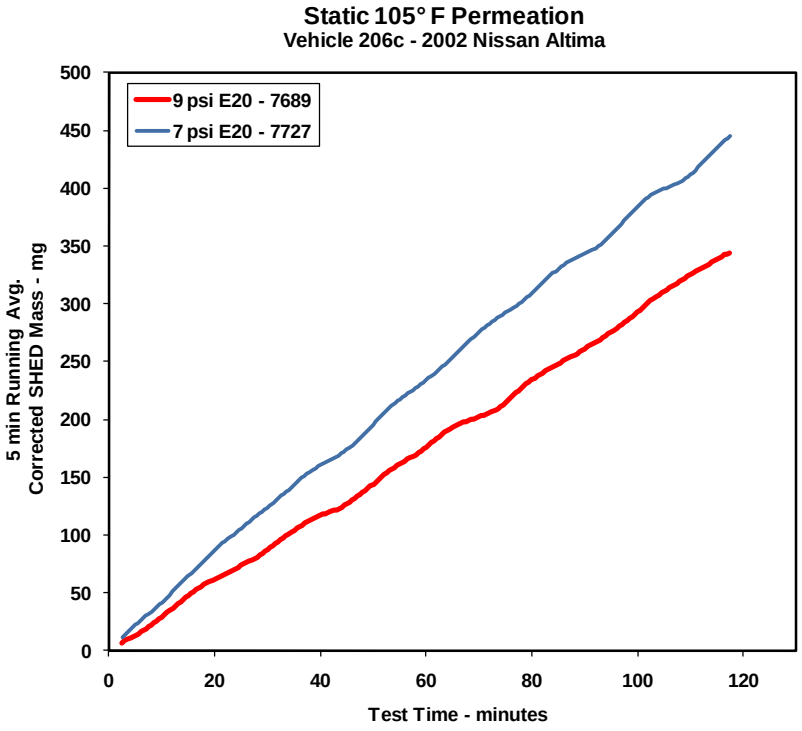
Veh	Fuel psi/EtOH	Test	Type	Date	Test#	Corrected Permeation mg/hr	SHED Results mg/day (Corrected)	Canister Loss g
206c	9.0/E20	Static (86)	Perm	09/15/09	7685	70.2		0.00
			Press. Incr.			0.0		
			Prs+Fuel Incr.			0.0		
		Static (105)	Perm	09/16/09	7689	172.9		0.00
			Press. Incr.			0.0		
			Prs+Fuel Incr.			0.0		
		Dynamic	RL	09/17/09	25795	330.8		0.20
			"True" HS			85.8		0.10
		72 DHB	65-105	09/29/09	7703			
		Day 1					1958.5	0.00
		Day 2					1787.8	1.50
		Day 3					1701.0	10.00
	7.0/E20	Static (86)	Perm	10/13/09	7724	93.8		0.00
			Press. Incr.			0.0		
			Prs+Fuel Incr.			0.0		
		Static (105)	Perm	10/14/09	7727	230.7		0.00
			Press. Incr.			0.0		
			Prs+Fuel Incr.			0.0		
		Dynamic	RL	10/21/09	25806	518.7		0.00
			"True" HS			106.3		0.00
		72 DHB	65-105	11/17/09	7779			
		Day 1					1943.9	0.00
		Day 2					1708.1	0.20
		Day 3					1567.7	0.80

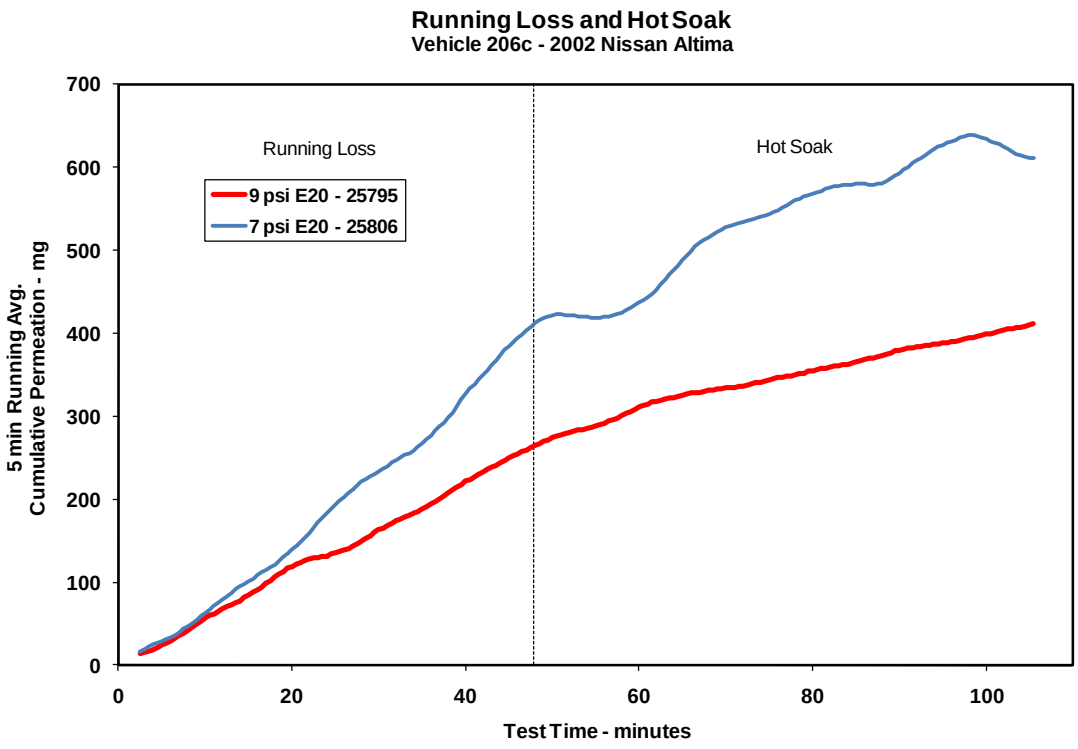
Reactivity Results

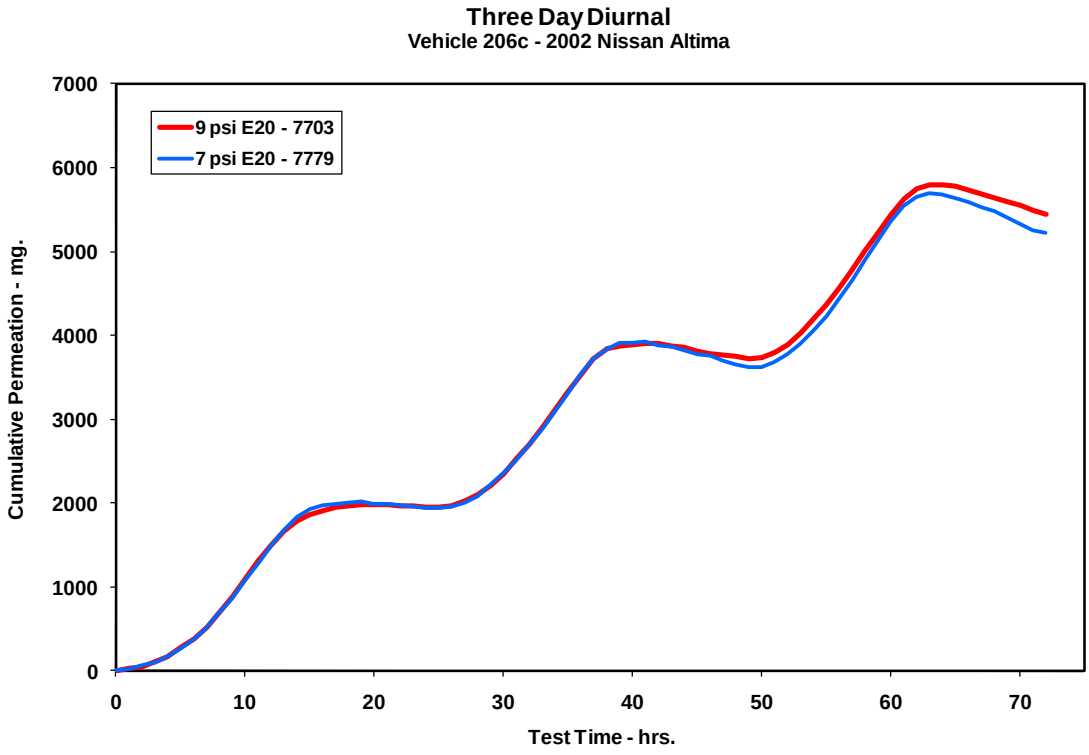
Vehicle 206c

Test	Fuel	Test No.	Bag THC mg	GC as % of THC	GC VOC mg	Ozone mg	Reactivity	Species Present
86° F	E20 - 9 psi	7685	168.0	96.5	162.0	541.1	3.340	60
Static	E20 - 7 psi	7724	186.7	116.9	218.3	910.4	4.170	77
105° F	E20 - 9 psi	7689	349.2	99.3	346.6	1186.7	3.424	70
Static	E20 - 7 psi	7727	454.7	120.4	547.2	1825.1	3.335	78
Dynamic	E20 - 9 psi	25795	420.6	109.0	458.2	1709.2	3.730	69
	E20 - 7 psi	25806	615.1	116.5	716.5	2648.1	3.696	75
DHB	E20 - 9 psi	7703	5447.3	94.5	5145.3	17296.7	3.362	101
Total	E20 - 7 psi	7779	5219.7	92.8	4845.4	14230.9	2.937	102


Static 86° F Permeation
Vehicle 206c - 2002 Nissan Altima
9 psi E20 - 7685
7 psi E20 - 7724
5 min Running Avg.
Corrected SHED Mass - mg
Test Time - minutes
0
20
40
60
80
100
120
140
160
180
200


Static 105° F Permeation
Vehicle 206c - 2002 Nissan Altima
9 psi E20 - 7689
7 psi E20 - 7727
5 min Running Avg.
Corrected SHED Mass - mg
Test Time - minutes
0
50
100
150
200
250
300
350
400
450
500


Running Loss and Hot Soak
Vehicle 206c - 2002 Nissan Altima
Running Loss
Hot Soak
9 psi E20 - 25795
7 psi E20 - 25806
5 min Running Avg.
Cumulative Permeation - mg
Test Time - minutes
0
100
200
300
400
500
600
700
0
20
40
60
80
100


Three Day Diurnal
Vehicle 206c - 2002 Nissan Altima
9 psi E20 - 7703
7 psi E20 - 7779
Cumulative Permeation - mg.
Test Time - hrs.
0
1000
2000
3000
4000
5000
6000
7000
0
10
20
30
40
50
60
70

Evaporative Test Results
Vehicle 208c

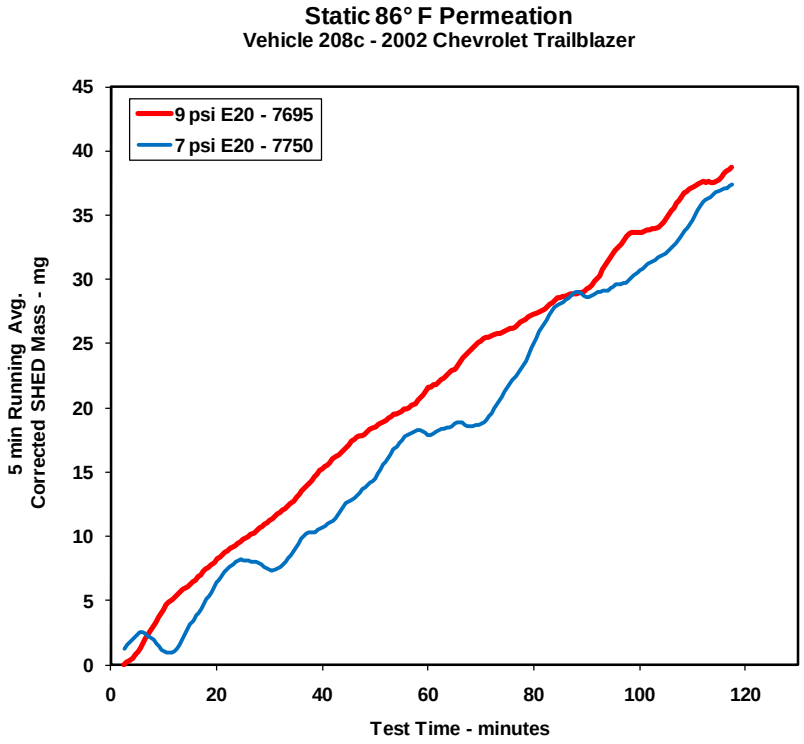
2002 Chevrolet Trailblazer

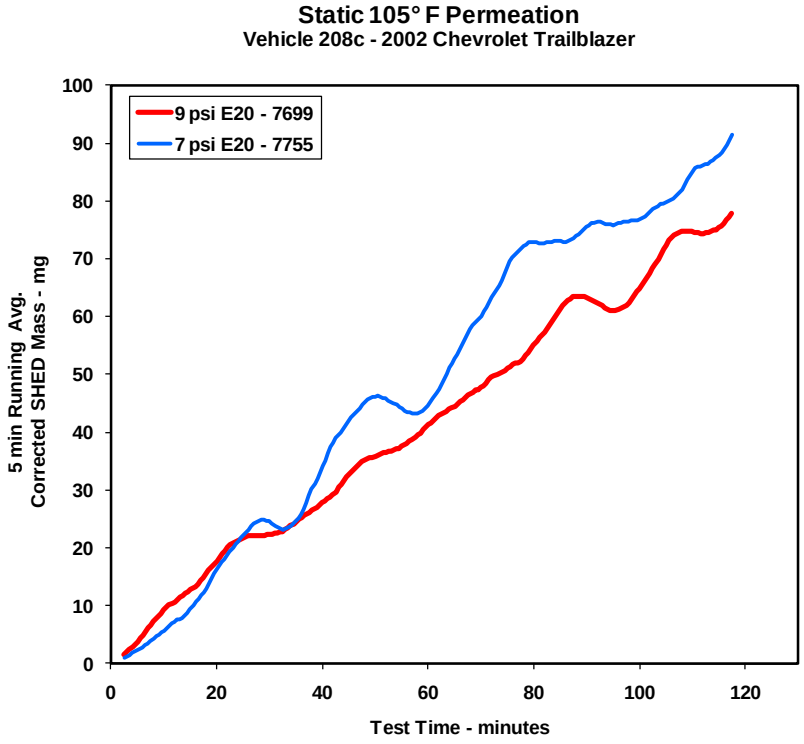
Veh	Fuel psi/EtOH	Test	Type	Date	Test#	Corrected Permeation mg/hr	SHED Results mg/day (Corrected)	Canister Loss g
208c	9.0/E20	Static (86)	Perm	09/22/09	7695	21.9		0.00
			Press. Incr.			0.0		
			Prs+Fuel Incr.			0.0		
		Static (105)	Perm	09/23/09	7699	39.6		0.00
			Press. Incr.			0.0		
			Prs+Fuel Incr.			0.0		
		Dynamic	RL	09/24/09	25798	241.5		0.00
			"True" HS			26.9		0.00
		72 DHB	65-105	10/06/09	7713			
		Day 1					506.5	0.00
		Day 2					363.2	0.00
		Day 3					331.9	0.00
	7.0/E20	Static (86)	Perm	11/03/09	7750	18.4		0.00
			Press. Incr.			0.0		
			Prs+Fuel Incr.			0.0		
		Static (105)	Perm	11/04/09	7755	52.5		0.00
			Press. Incr.			0.0		
			Prs+Fuel Incr.			0.0		
		Dynamic	RL	11/05/09	25812	278.5		0.00
			"True" HS			20.5		0.00
		72 DHB	65-105	12/08/09	7817			
		Day 1					580.4	0.00
		Day 2					433.8	0.00
		Day 3					375.4	0.00

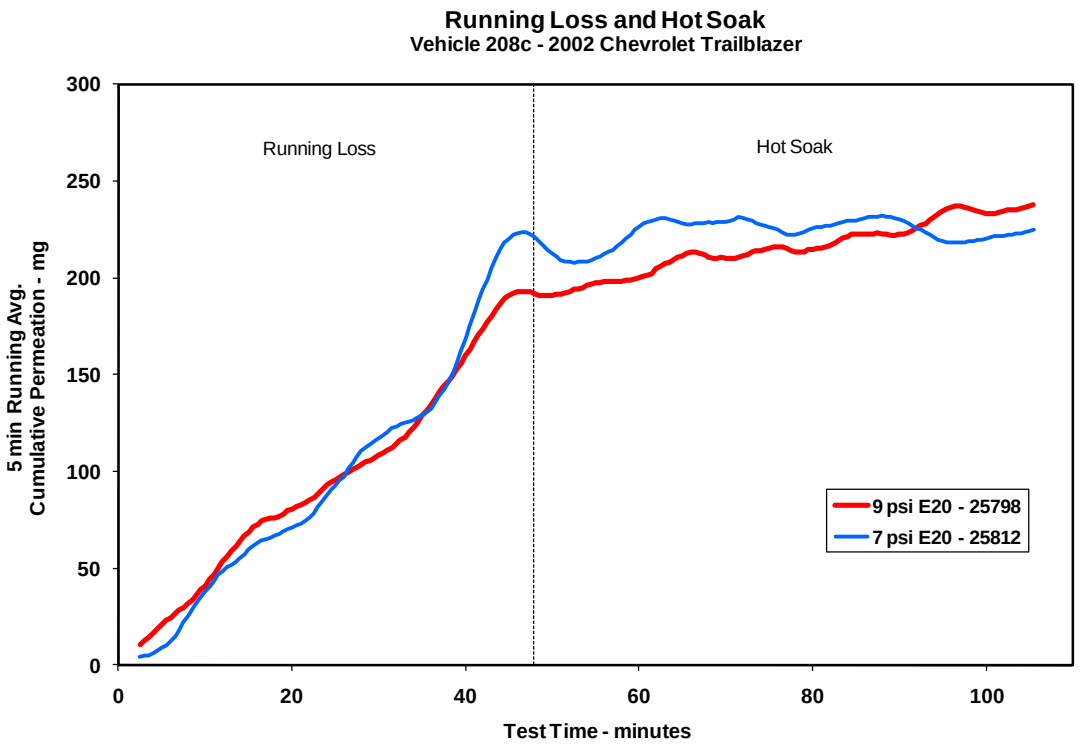
Reactivity Results

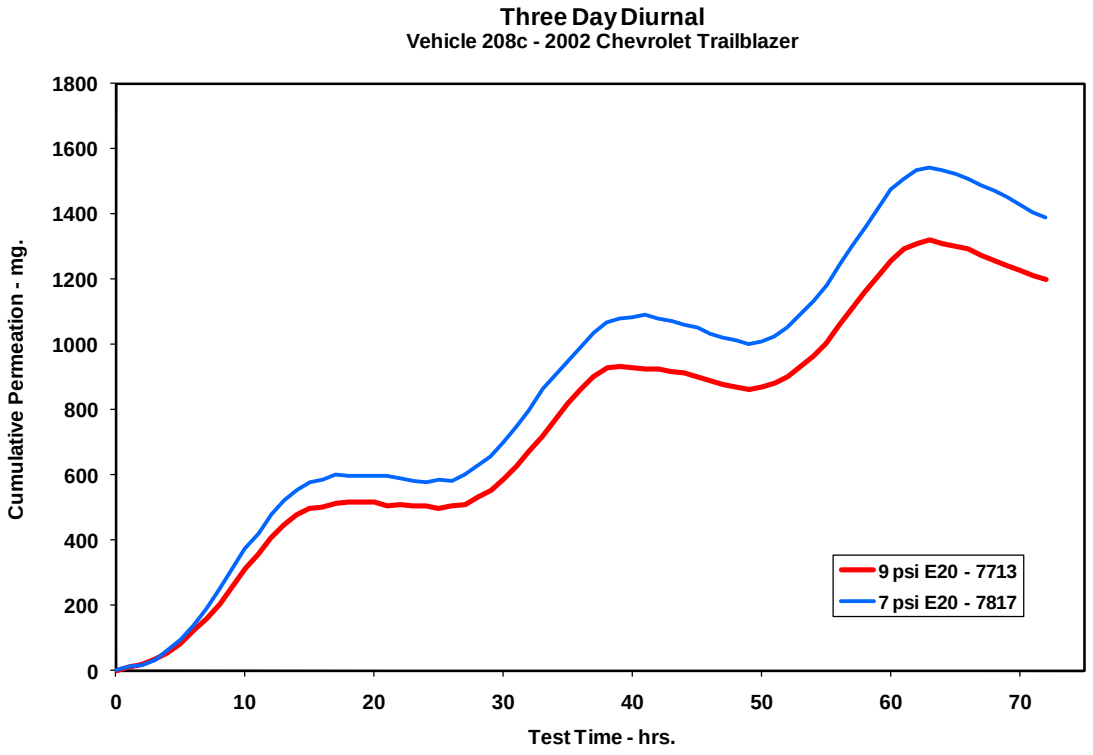
Vehicle 208c

Test	Fuel	Test No.	Bag THC mg	GC as % of THC	GC VOC mg	Ozone mg	Reactivity	Species Present
86° F	E20 - 9 psi	7695	39.9	65.3	26.0	95.6	3.672	41
Static	E20 - 7 psi	7750	38.1	181.5	69.1	213.8	3.094	57
105° F	E20 - 9 psi	7699	80.8	119.0	96.2	291.9	3.034	56
Static	E20 - 7 psi	7755	94.1	80.2	75.5	223.2	2.957	29
Dynamic	E20 - 9 psi	25798	242.1	90.8	219.9	973.2	4.426	71
	E20 - 7 psi	25812	230.0	72.4	166.6	731.1	4.389	48
DHB	E20 - 9 psi	7713	1201.5	108.0	1298.1	3629.2	2.796	85
Total	E20 - 7 psi	7817	1389.5	93.7	1301.9	3248.2	2.495	85


Static 86° F Permeation
Vehicle 208c - 2002 Chevrolet Trailblazer
9 psi E20 - 7695
7 psi E20 - 7750
5 min Running Avg.
Corrected SHED Mass - mg
Test Time - minutes
0
5
10
15
20
25
30
35
40
45
0
20
40
60
80
100
120


Static 105° F Permeation
Vehicle 208c - 2002 Chevrolet Trailblazer
9 psi E20 - 7699
7 psi E20 - 7755
5 min Running Avg.
Corrected SHED Mass - mg
Test Time - minutes
0
10
20
30
40
50
60
70
80
90
100
0
20
40
60
80
100
120


Running Loss and Hot Soak
Vehicle 208c - 2002 Chevrolet Trailblazer
Running Loss
Hot Soak
5 min Running Avg.
Cumulative Permeation - mg
Test Time - minutes
9 psi E20 - 25798
7 psi E20 - 25812
0
50
100
150
200
250
300
0
20
40
60
80
100


Three Day Diurnal
Vehicle 208c - 2002 Chevrolet Trailblazer
Cumulative Permeation - mg.
Test Time - hrs.
9 psi E20 - 7713
7 psi E20 - 7817
0
200
400
600
800
1000
1200
1400
1600
1800
0
10
20
30
40
50
60
70

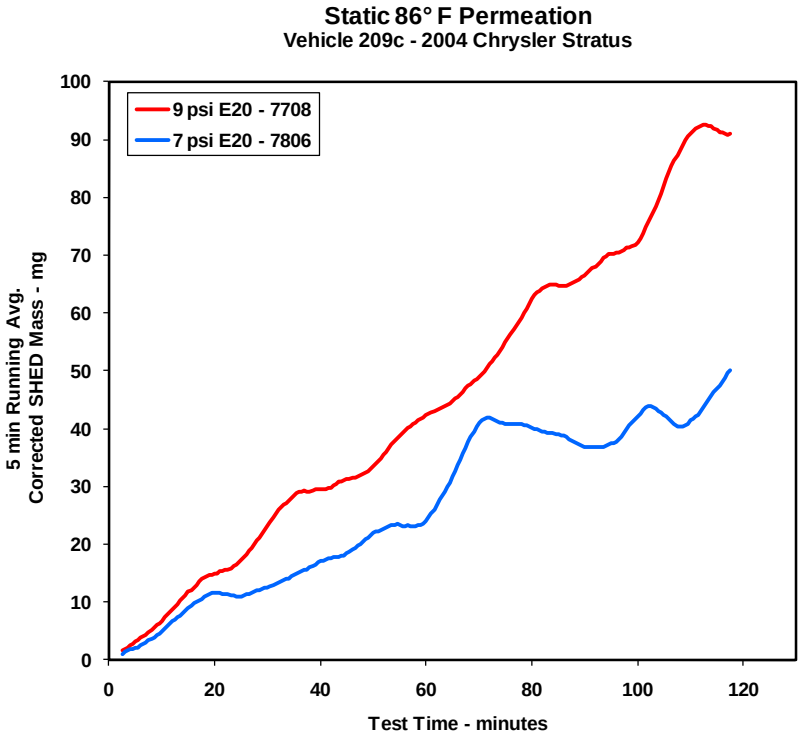
Evaporative Test Results
Vehicle 209c

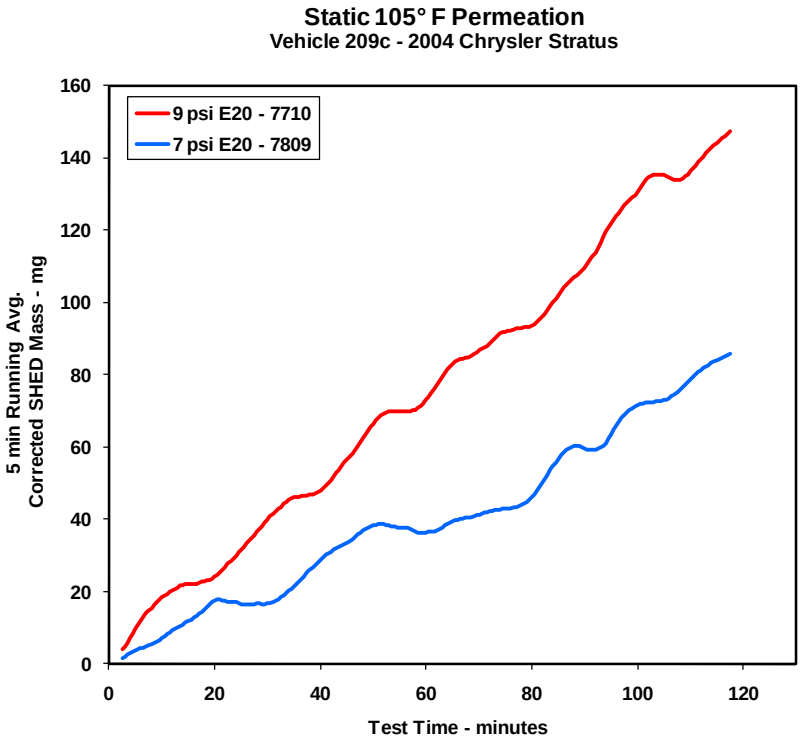
2004 Chrysler Stratus

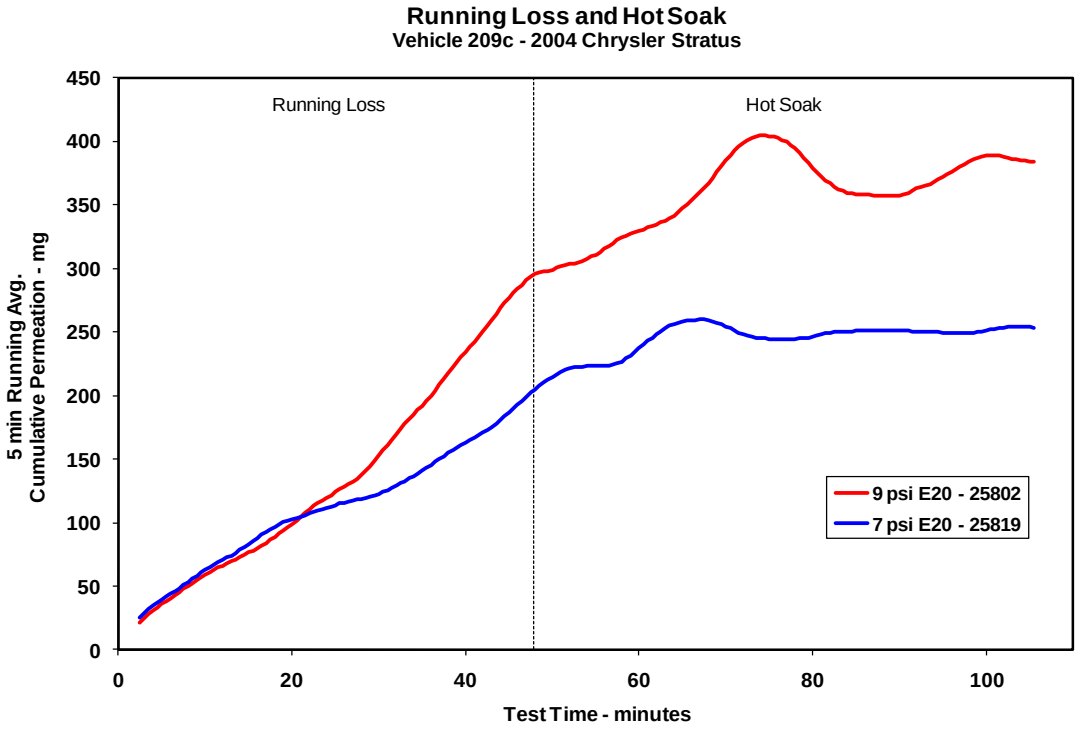
Veh	Fuel psi/EtOH	Test	Type	Date	Test#	Corrected Permeation mg/hr	SHED Results mg/day (Corrected)	Canister Loss g
209c	9.0/E20	Static (86)	Perm	10/01/09	7708	42.0		0.00
			Press. Incr.			0.0		
			Prs+Fuel Incr.			0.0		
		Static (105)	Perm	10/02/09	7710	72.1		0.00
			Press. Incr.			0.0		
			Prs+Fuel Incr.			0.0		
		Dynamic	RL	10/05/09	25802	367.1		0.00
			"True" HS			71.9		0.00
		72 DHB	65-105	11/03/09	7753			
		Day 1					456.4	0.20
		Day 2					338.3	0.30
		Day 3					316.0	0.90
	7.0/E20	Static (86)	Perm	12/02/09	7806	23.5		0.00
			Press. Incr.			0.0		
			Prs+Fuel Incr.			0.0		
		Static (105)	Perm	12/03/09	7809	41.1		0.00
			Press. Incr.			0.0		
			Prs+Fuel Incr.			0.0		
		Dynamic	RL	12/04/09	25819	256.0		0.00
			"True" HS			28.2		0.00
		72 DHB	65-105	01/12/10	7856			
		Day 1					610.7	0.00
		Day 2					316.0	0.10
		Day 3					258.1	0.40
		72 DHB	65-105	02/09/10	7881			
		Day 1					564.7	0.00
		Day 2					377.1	0.00
		Day 3					282.7	0.00

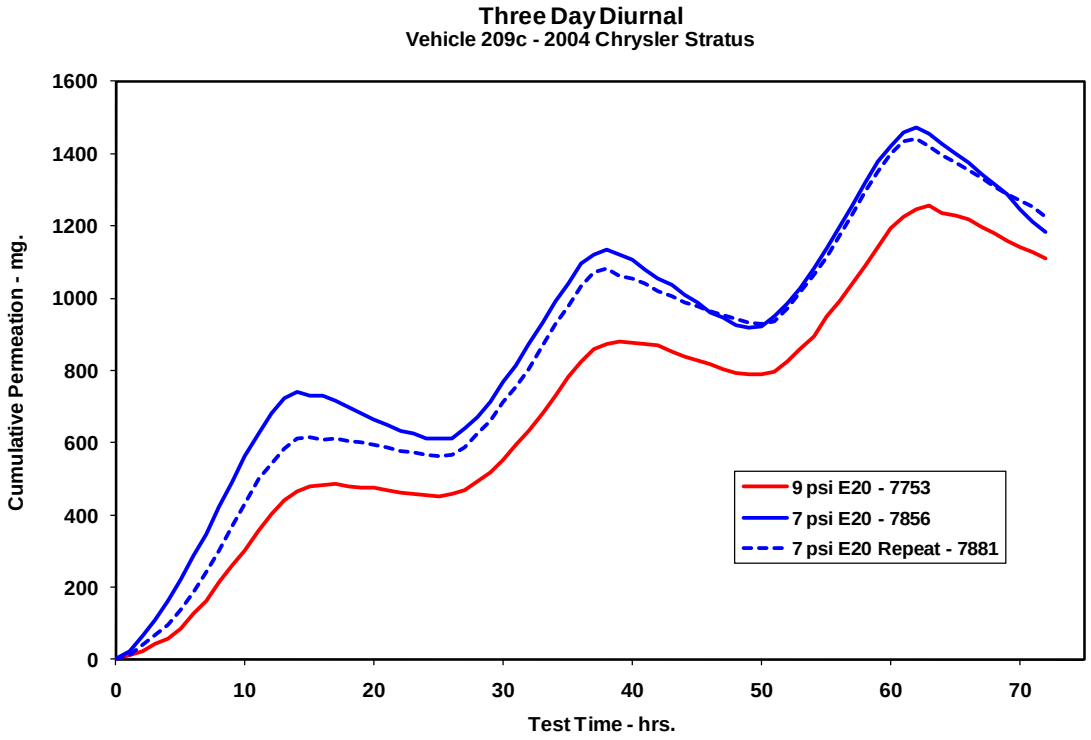
Reactivity Results
Vehicle 209c

Test	Fuel	Test No.	Bag THC mg	GC as % of THC	GC VOC mg	Ozone mg	Reactivity	Species Present
86° F	E20 - 9 psi	7708	94.5	109.6	103.6	354.9	3.427	62
Static	E20 - 7 psi	7806	52.3	105.9	55.4	181.8	3.284	54
105° F	E20 - 9 psi	7710	151.0	80.3	121.2	335.1	2.765	65
Static	E20 - 7 psi	7809	87.3	90.1	78.6	239.7	3.050	60
Dynamic	E20 - 9 psi	25802	379.3	97.9	371.2	1383.2	3.726	62
	E20 - 7 psi	25819	251.8	42.6	107.4	549.3	5.117	41
DHB	E20 - 9 psi	7753	1110.7	87.7	974.1	2457.1	2.522	88
Total	E20 - 7 psi	7856	1184.7	93.7	1110.2	2856.1	2.573	89
	E20 - 7 psi	7881	1224.6	98.9	1211.1	3048.8	2.517	90


Static 86° F Permeation
Vehicle 209c - 2004 Chrysler Stratus
9 psi E20 - 7708
7 psi E20 - 7806
5 min Running Avg.
Corrected SHED Mass - mg
Test Time - minutes
0
10
20
30
40
50
60
70
80
90
100
0
20
40
60
80
100
120


Static 105° F Permeation
Vehicle 209c - 2004 Chrysler Stratus
9 psi E20 - 7710
7 psi E20 - 7809
5 min Running Avg.
Corrected SHED Mass - mg
Test Time - minutes
0
20
40
60
80
100
120
140
160
0
20
40
60
80
100
120


Running Loss and Hot Soak
Vehicle 209c - 2004 Chrysler Stratus
Running Loss
Hot Soak
5 min Running Avg.
Cumulative Permeation - mg
Test Time - minutes
9 psi E20 - 25802
7 psi E20 - 25819
0
50
100
150
200
250
300
350
400
450
0
20
40
60
80
100


Three Day Diurnal
Vehicle 209c - 2004 Chrysler Stratus
Cumulative Permeation - mg.
Test Time - hrs.
9 psi E20 - 7753
7 psi E20 - 7856
7 psi E20 Repeat - 7881
0
200
400
600
800
1000
1200
1400
1600
0
10
20
30
40
50
60
70

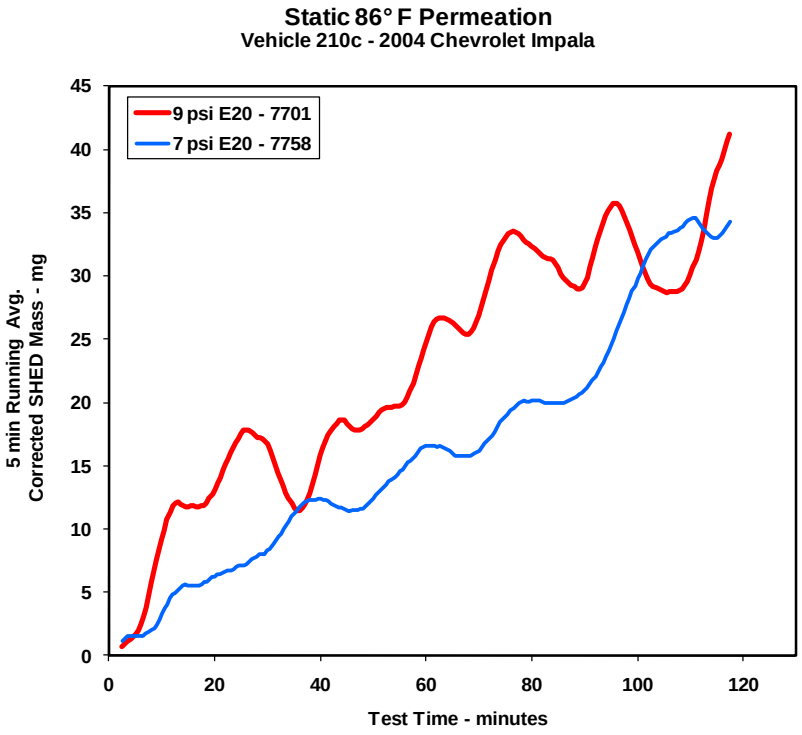
Evaporative Test Results
Vehicles 210c

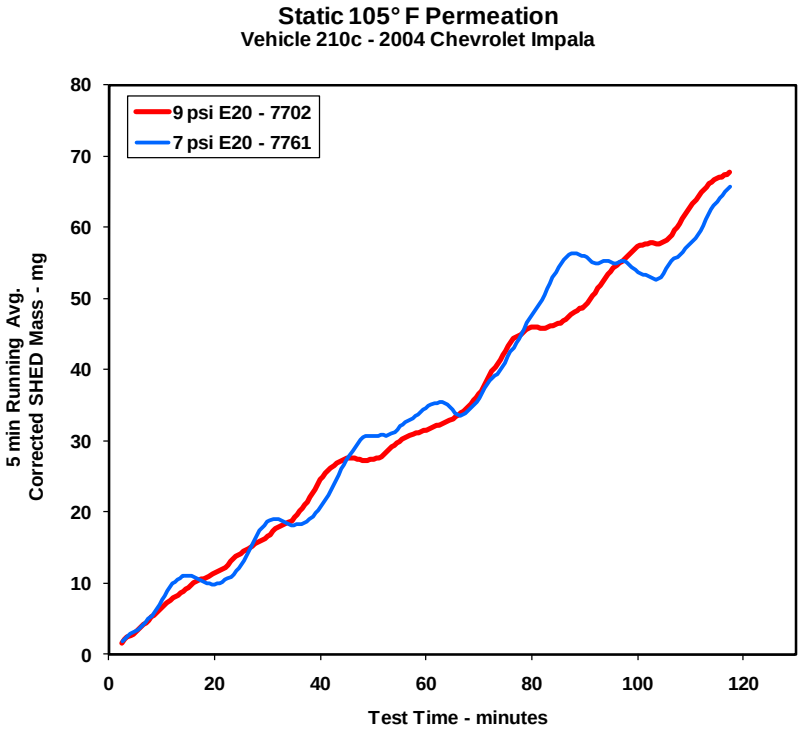
2004 Chevrolet Impala

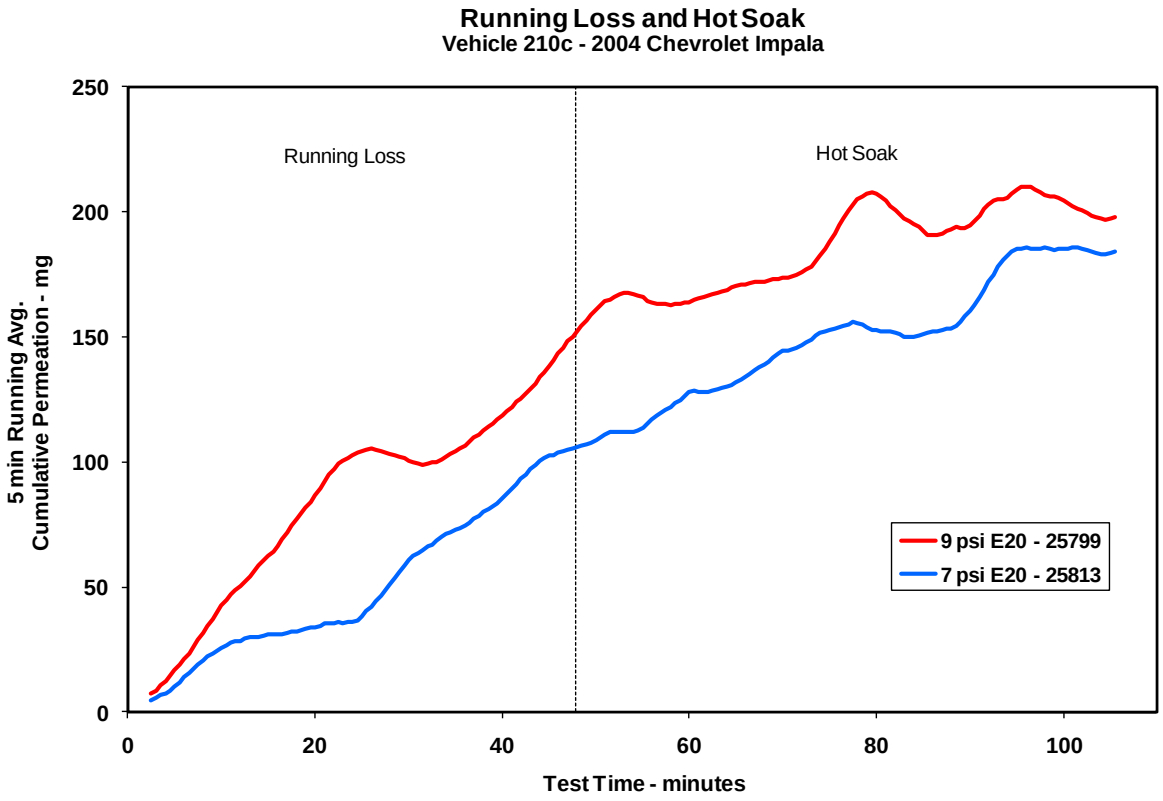
Veh	Fuel psi/EtOH	Test	Type	Date	Test#	Corrected Permeation mg/hr	SHED Results mg/day (Corrected)	Canister Loss g
210c	9.0/E20	Static (86)	Perm	09/24/09	7701	18.0		0.00
			Press. Incr.			0.0		
			Prs+Fuel Incr.			0.0		
		Static (105)	Perm	09/25/09	7702	32.7		0.00
			Press. Incr.			0.0		
			Prs+Fuel Incr.			4.6		
		Dynamic	RL	09/28/09	25799	194.3		0.00
			"True" HS			54.0		0.00
		72 DHB	65-105	10/13/09	7725			
		Day 1					352.3	0.30
		Day 2					274.9	1.60
		Day 3					297.7	7.00
	7.0/E20	Static (86)	Perm	11/05/09	7758	15.2		0.00
			Press. Incr.			0.0		
			Prs+Fuel Incr.			0.0		
		Static (105)	Perm	11/06/09	7761	34.0		0.00
			Press. Incr.			0.0		
			Prs+Fuel Incr.			0.0		
		Dynamic	RL	11/09/09	25813	124.6		0.00
			"True" HS			75.9		0.00
		72 DHB	65-105	12/15/09	7826			
		Day 1					368.6	0.50
		Day 2					283.6	0.70
		Day 3					271.1	1.20

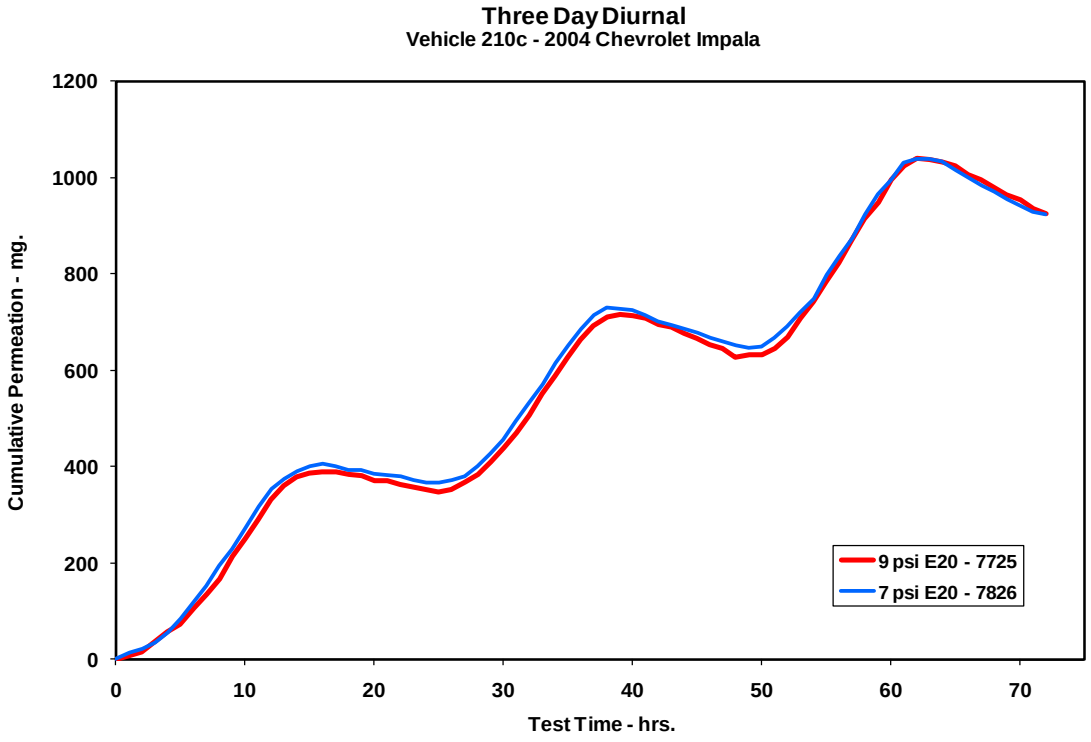
Reactivity Results
Vehicle 210c

Test	Fuel	Test No.	Bag THC mg	GC as % of THC	GC VOC mg	Ozone mg	Reactivity	Species Present
86° F	E20 - 9 psi	7701	45.2	110.5	49.9	164.6	3.297	70
Static	E20 - 7 psi	7758	35.1	73.8	25.9	108.7	4.196	48
105° F	E20 - 9 psi	7702	68.5	160.2	109.8	375.3	3.417	56
Static	E20 - 7 psi	7761	68.7	138.3	95.1	313.8	3.302	57
Dynamic	E20 - 9 psi	25799	201.7	105.6	213.0	838.9	3.939	63
	E20 - 7 psi	25813	190.8	71.4	136.2	473.0	3.473	49
DHB	E20 - 9 psi	7725	925.0	115.7	1069.8	3132.7	2.928	106
Total	E20 - 7 psi	7826	923.3	97.8	903.0	2303.4	2.551	74


Static 86° F Permeation
Vehicle 210c - 2004 Chevrolet Impala
9 psi E20 - 7701
7 psi E20 - 7758
5 min Running Avg.
Corrected SHED Mass - mg
Test Time - minutes
0
5
10
15
20
25
30
35
40
45
0
20
40
60
80
100
120


Static 105° F Permeation
Vehicle 210c - 2004 Chevrolet Impala
9 psi E20 - 7702
7 psi E20 - 7761
5 min Running Avg.
Corrected SHED Mass - mg
Test Time - minutes
0
10
20
30
40
50
60
70
80
0
20
40
60
80
100
120


Running Loss and Hot Soak
Vehicle 210c - 2004 Chevrolet Impala
Running Loss
Hot Soak
5 min Running Avg.
Cumulative Permeation - mg
Test Time - minutes
9 psi E20 - 25799
7 psi E20 - 25813
0
50
100
150
200
250
0
20
40
60
80
100


Three Day Diurnal
Vehicle 210c - 2004 Chevrolet Impala
Cumulative Permeation - mg.
Test Time - hrs.
9 psi E20 - 7725
7 psi E20 - 7826
0
200
400
600
800
1000
1200
0
10
20
30
40
50
60
70

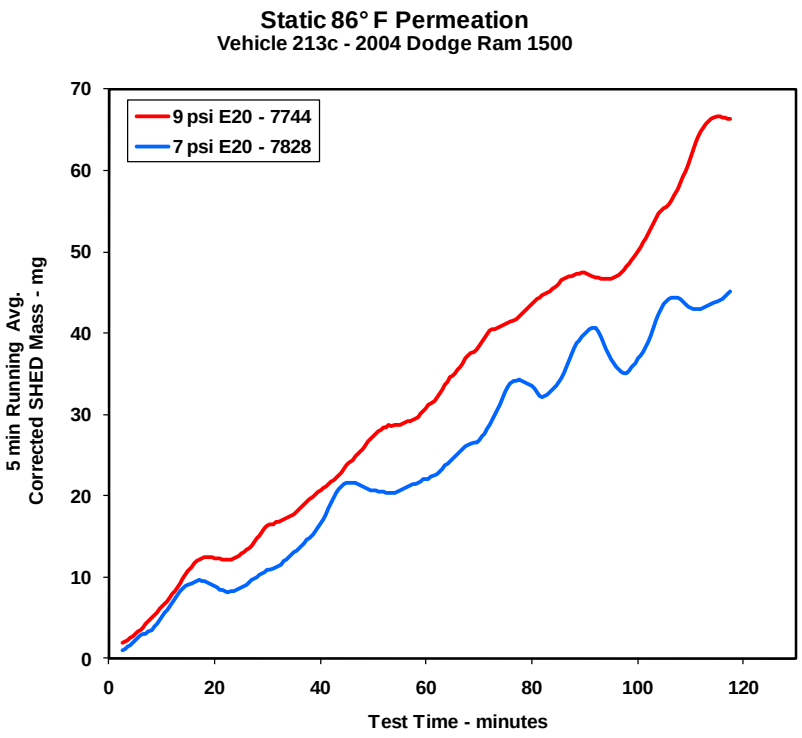
Evaporative Test Results
Vehicle 213c

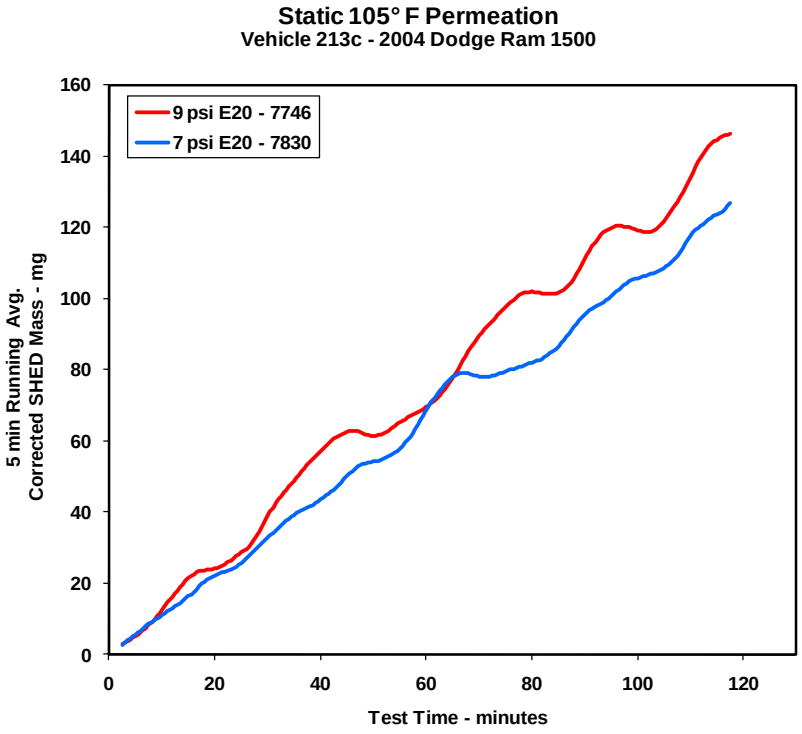
2004 Dodge Ram 1500

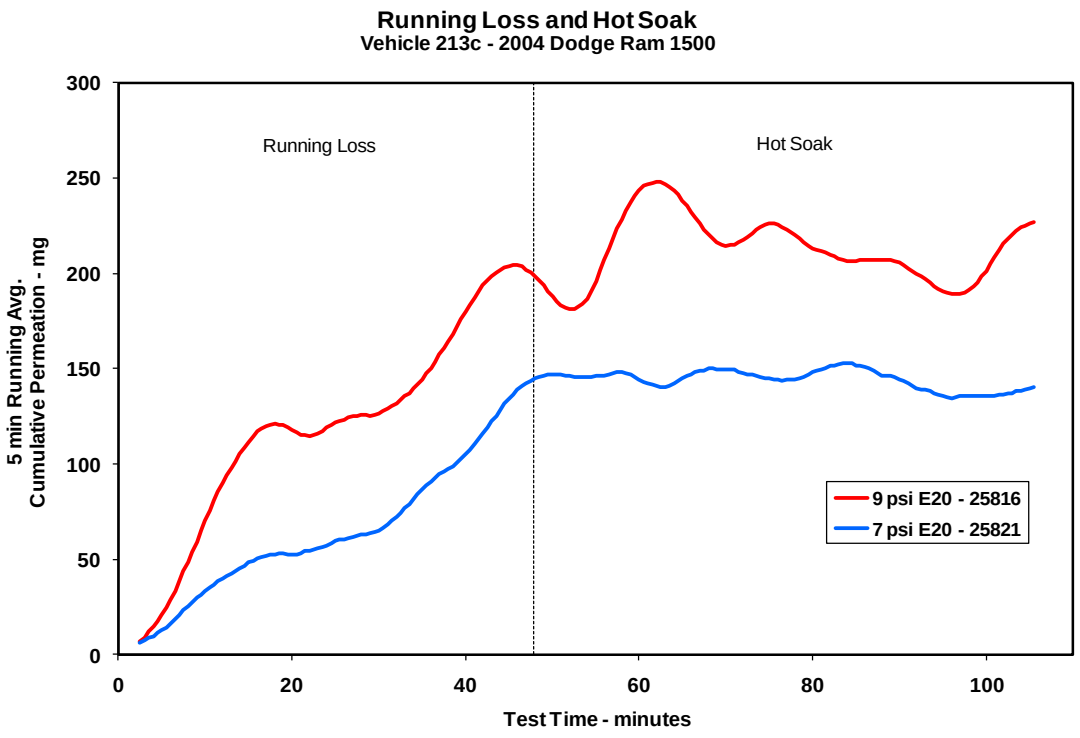
Veh	Fuel psi/EtOH	Test	Type	Date	Test#	Corrected Permeation mg/hr	SHED Results mg/day (Corrected)	Canister Loss g
213c	9.0/E20	Static (86)	Perm	10/08/09	7718	37.4		0.00
			Press. Incr.			0.0		
			Prs+Fuel Incr.			0.0		
		Static (105)	Perm	10/29/09	7746	75.1		0.00
			Press. Incr.			0.0		
			Prs+Fuel Incr.			0.0		
		Dynamic	RL	11/13/09	25816	257.2		0.82
			"True" HS			4.0		0.05
		72 DHB	65-105	12/01/09	7803			
		Day 1					644.2	0.00
		Day 2					529.3	0.00
		Day 3					460.6	0.00
	7.0/E20	Static (86)	Perm	12/16/09	7828	22.9		0.00
			Press. Incr.			0.0		
			Prs+Fuel Incr.			0.0		
		Static (105)	Perm	12/17/09	7830	65.1		0.00
			Press. Incr.			0.0		
			Prs+Fuel Incr.			0.0		
		Dynamic	RL	12/18/09	25821	186.9		0.00
			"True" HS			33.4		0.00
		72 DHB	65-105	02/02/10	7872			
		Day 1					501.9	0.00
		Day 2					538.4	0.00
		Day 3					546.1	0.00

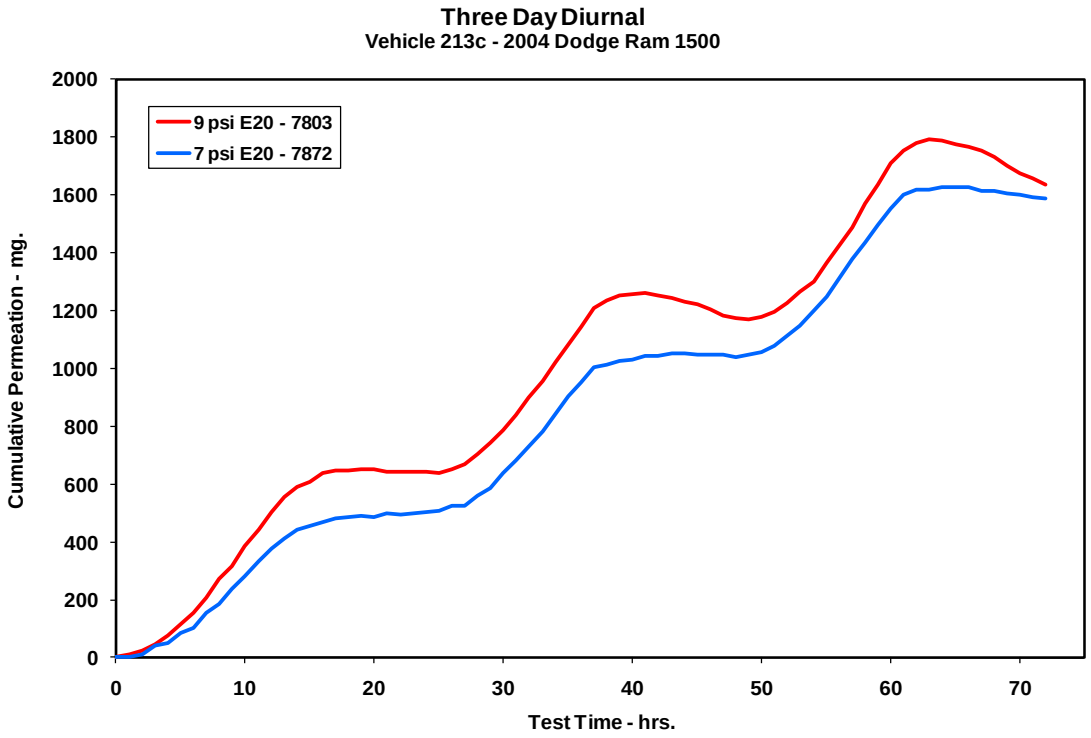
Reactivity Results
Vehicle 213c

Test	Fuel	Test No.	Bag THC mg	GC as % of THC	GC VOC mg	Ozone mg	Reactivity	Species Present
86° F	E20 - 9 psi	7744	65.4	77.1	50.4	195.9	3.887	39
Static	E20 - 7 psi	7828	47.2	108.7	51.3	147.1	2.864	49
105° F	E20 - 9 psi	7746	148.0	116.0	171.6	539.8	3.145	65
Static	E20 - 7 psi	7830	129.2	80.0	103.3	253.0	2.449	53
Dynamic	E20 - 9 psi	25816	226.8	44.8	101.6	446.4	4.392	23
	E20 - 7 psi	25821	139.4	126.9	176.8	614.3	3.474	57
DHB	E20 - 9 psi	7803	1634.2	99.1	1619.0	3929.0	2.427	92
Total	E20 - 7 psi	7872	1586.4	89.1	1412.8	3350.4	2.371	82


Static 86° F Permeation
Vehicle 213c - 2004 Dodge Ram 1500
9 psi E20 - 7744
7 psi E20 - 7828
5 min Running Avg.
Corrected SHED Mass - mg
Test Time - minutes
0
10
20
30
40
50
60
70
0
20
40
60
80
100
120


Static 105° F Permeation
Vehicle 213c - 2004 Dodge Ram 1500
9 psi E20 - 7746
7 psi E20 - 7830
5 min Running Avg.
Corrected SHED Mass - mg
Test Time - minutes
0
20
40
60
80
100
120
140
160
0
20
40
60
80
100
120


Running Loss and Hot Soak
Vehicle 213c - 2004 Dodge Ram 1500
Running Loss
Hot Soak
5 min Running Avg.
Cumulative Permeation - mg
Test Time - minutes
9 psi E20 - 25816
7 psi E20 - 25821
0
50
100
150
200
250
300
0
20
40
60
80
100


Three Day Diurnal
Vehicle 213c - 2004 Dodge Ram 1500
Cumulative Permeation - mg.
Test Time - hrs.
9 psi E20 - 7803
7 psi E20 - 7872
0
200
400
600
800
1000
1200
1400
1600
1800
2000
0
10
20
30
40
50
60
70

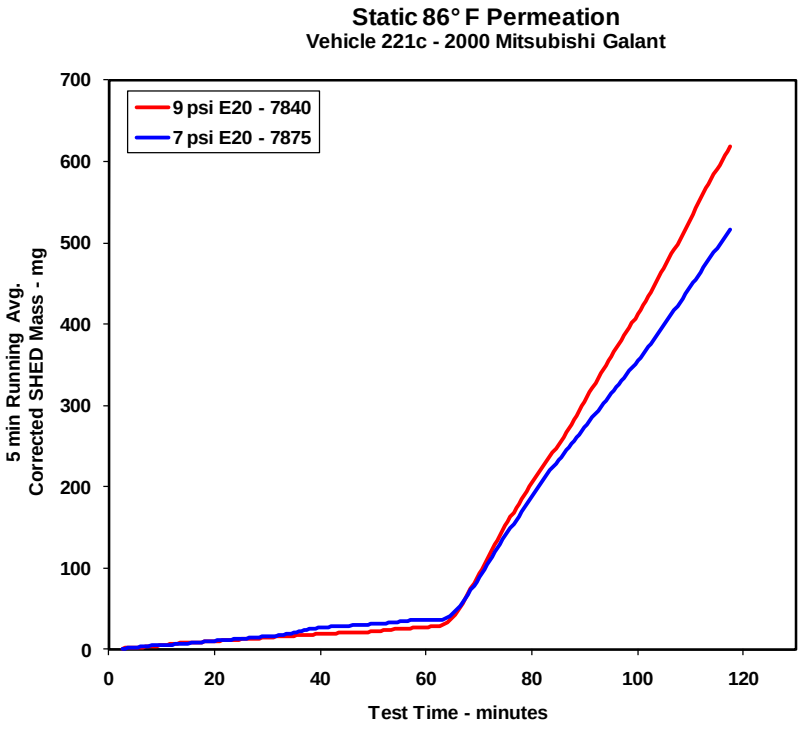
Evaporative Test Results
Vehicle 221c

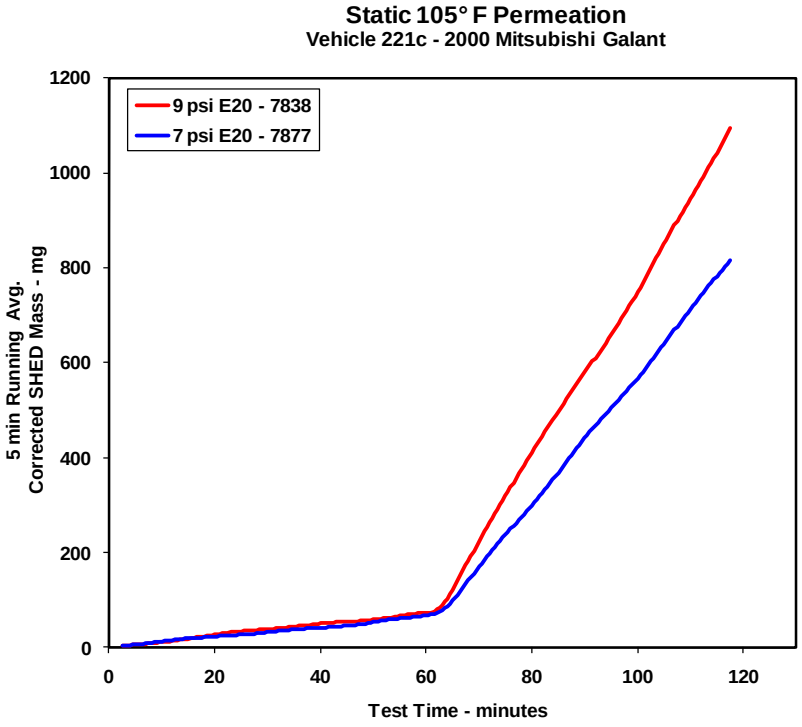
2000 Mitsubishi Galant

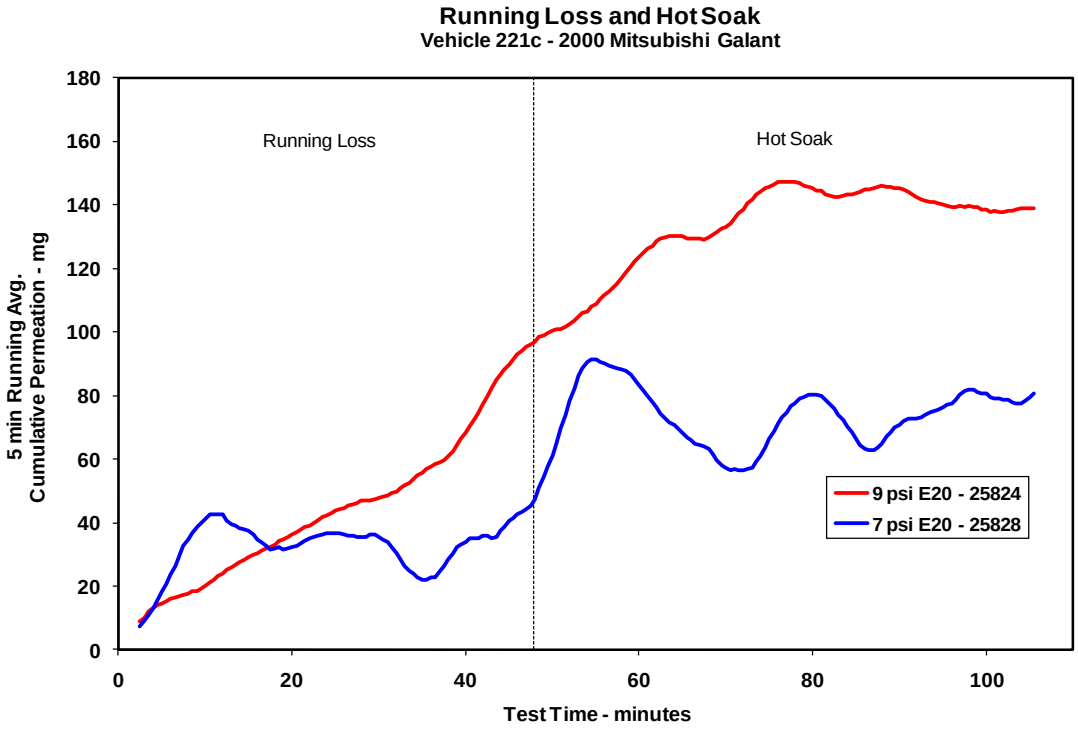
Veh	Fuel psi/EtOH	Test	Type	Date	Test#	Corrected Permeation mg/hr	SHED Results mg/day (Corrected)	Canister Loss g
221c	9.0/E20	Static (86)	Perm	12/24/09	7840	26.5		0.00
			Press. Incr.			616.5		
			Prs+Fuel Incr.			673.4		
		Static (105)	Perm	12/23/09	7838	72.3		0.00
			Press. Incr.			1032.8		
			Prs+Fuel Incr.			1097.1		
		Dynamic	RL	12/28/09	25824	126.6		0.00
			"True" HS			9.5		0.00
		72 DHB	65-105	01/19/10	7859			
		Day 1					750.8	0.40
		Day 2					584.7	1.50
		Day 3					564.9	4.00
	7.0/E20	Static (86)	Perm	02/04/10	7875	39.4		0.00
			Press. Incr.			531.2		
			Prs+Fuel Incr.			506.1		
		Static (105)	Perm	02/05/10	7877	63.0		0.00
			Press. Incr.			746.2		
			Prs+Fuel Incr.			780.6		
		Dynamic	RL	02/08/10	25828	61.9		0.00
			"True" HS			2.5		0.00
		72 DHB	65-105	03/02/10	7906			
		Day 1					817.2	0.00
		Day 2					544.2	0.00
		Day 3					498.8	0.70

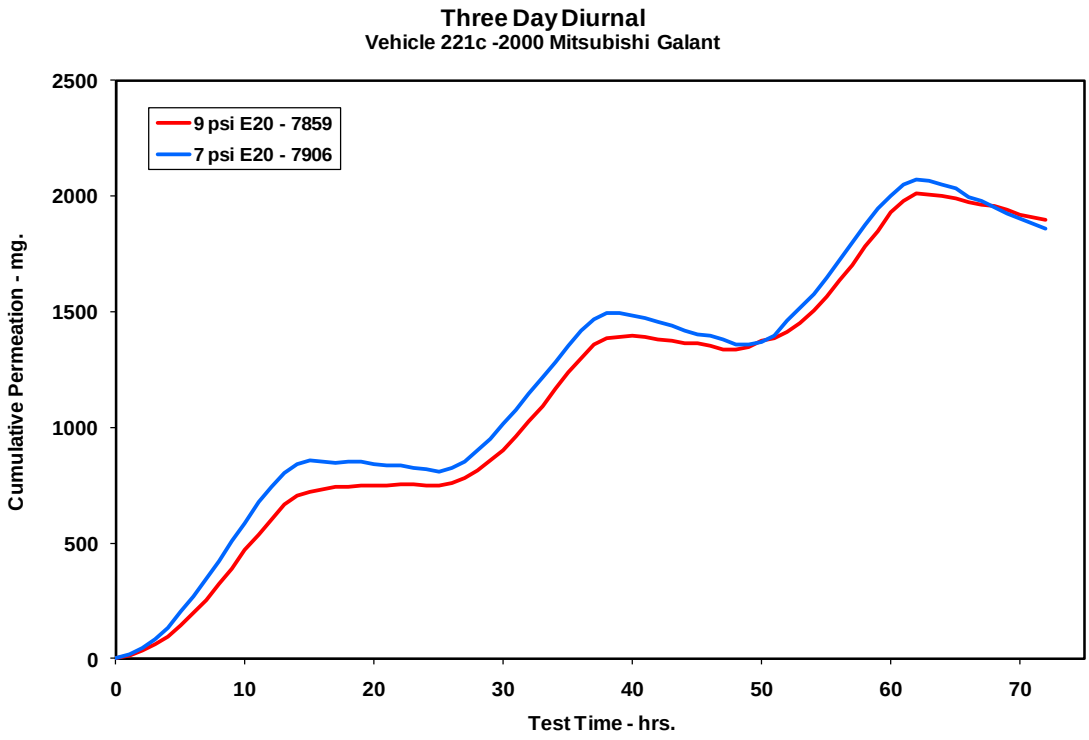
Reactivity Results
Vehicle 221c

Test	Fuel	Test No.	Bag THC mg	GC as % of THC	GC VOC mg	Ozone mg	Reactivity	Species Present
86° F	E20 - 9 psi	7840	649.6	108.3	703.3	2050.0	2.915	69
Static	E20 - 7 psi	7875	539.4	87.3	471.0	1151.2	2.444	67
105° F	E20 - 9 psi	7838	1146.9	90.7	1040.8	2648.3	2.545	68
Static	E20 - 7 psi	7877	851.0	101.8	866.4	2110.0	2.435	72
Dynamic	E20 - 9 psi	25824	137.2	117.0	160.6	572.0	3.562	55
	E20 - 7 psi	25828	91.4	53.5	48.9	210.8	4.309	20
DHB	E20 - 9 psi	7859	1900.4	94.0	1787.4	4885.5	2.733	81
Total	E20 - 7 psi	7906	1860.2	99.9	1859.0	4927.8	2.651	94


Static 86° F Permeation
Vehicle 221c - 2000 Mitsubishi Galant
9 psi E20 - 7840
7 psi E20 - 7875
5 min Running Avg.
Corrected SHED Mass - mg
Test Time - minutes
0
100
200
300
400
500
600
700
0
20
40
60
80
100
120


Static 105° F Permeation
Vehicle 221c - 2000 Mitsubishi Galant
9 psi E20 - 7838
7 psi E20 - 7877
5 min Running Avg.
Corrected SHED Mass - mg
Test Time - minutes
0
200
400
600
800
1000
1200
0
20
40
60
80
100
120


Running Loss and Hot Soak
Vehicle 221c - 2000 Mitsubishi Galant
Running Loss
Hot Soak
5 min Running Avg.
Cumulative Permeation - mg
Test Time - minutes
9 psi E20 - 25824
7 psi E20 - 25828
0
20
40
60
80
100
120
140
160
180


Three Day Diurnal
Vehicle 221c -2000 Mitsubishi Galant
Cumulative Permeation - mg.
Test Time - hrs.
9 psi E20 - 7859
7 psi E20 - 7906
0
500
1000
1500
2000
2500
10
20
30
40
50
60
70

Evaporative Test Results
Vehicle 222c

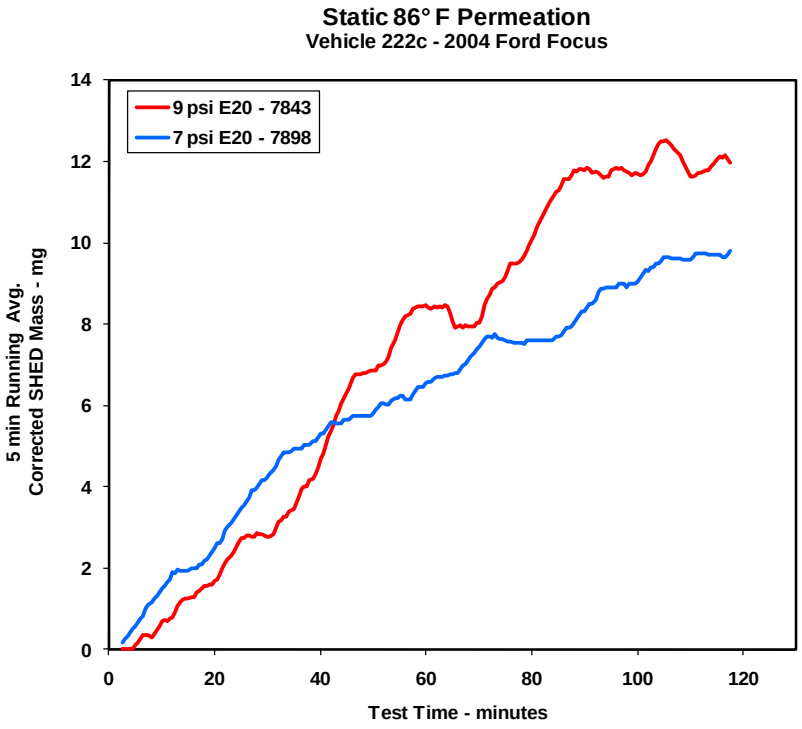
2004 Ford Focus

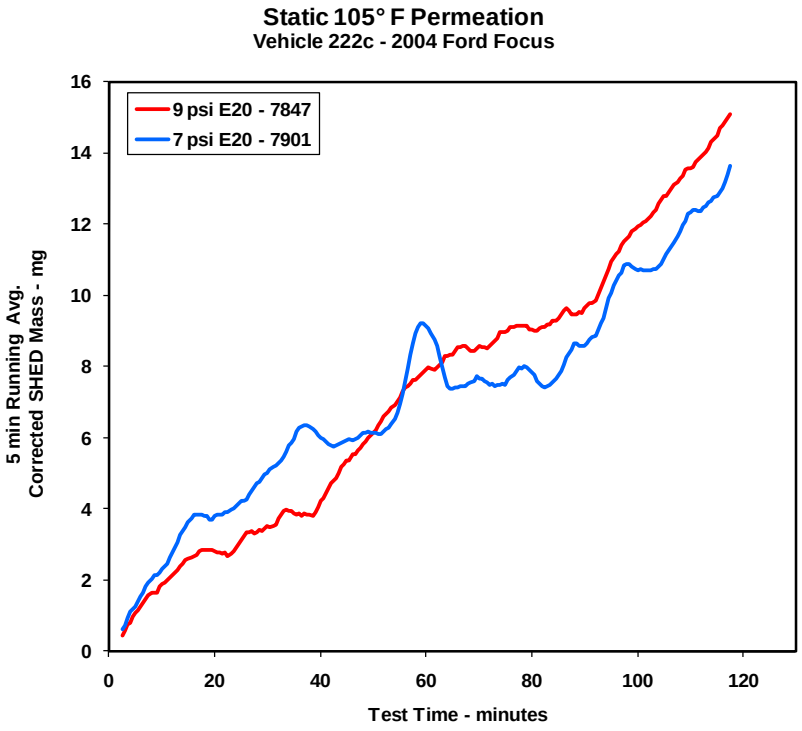
Veh	Fuel psi/EtOH	Test	Type	Date	Test#	Corrected Permeation mg/hr	SHED Results mg/day (Corrected)	Canister Loss g
222c	9.0/E20	Static (86)	Perm	12/29/09	7843	9.2		0.00
			Press. Incr.			0.0		
			Prs+Fuel Incr.			0.0		
		Static (105)	Perm	12/30/09	7847	6.9		0.00
			Press. Incr.			0.0		
			Prs+Fuel Incr.			0.0		
		Dynamic	RL	01/15/10	25827	44.7		0.00
			"True" HS			7.6		0.00
		72 DHB	65-105	02/02/10	7871			
		Day 1					73.6	0.00
		Day 2					51.4	0.00
		Day 3					40.1	0.40
	7.0/E20	Static (86)	Perm	02/25/10	7898	6.9		0.00
			Press. Incr.			0.0		
			Prs+Fuel Incr.			0.0		
		Static (105)	Perm	02/26/10	7901	7.1		0.00
			Press. Incr.			0.0		
			Prs+Fuel Incr.			0.0		
		72 DHB	65-105	03/09/10	7916			
		Day 1					65.5	0.00
		Day 2					42.7	0.30
		Day 3					39.5	0.30

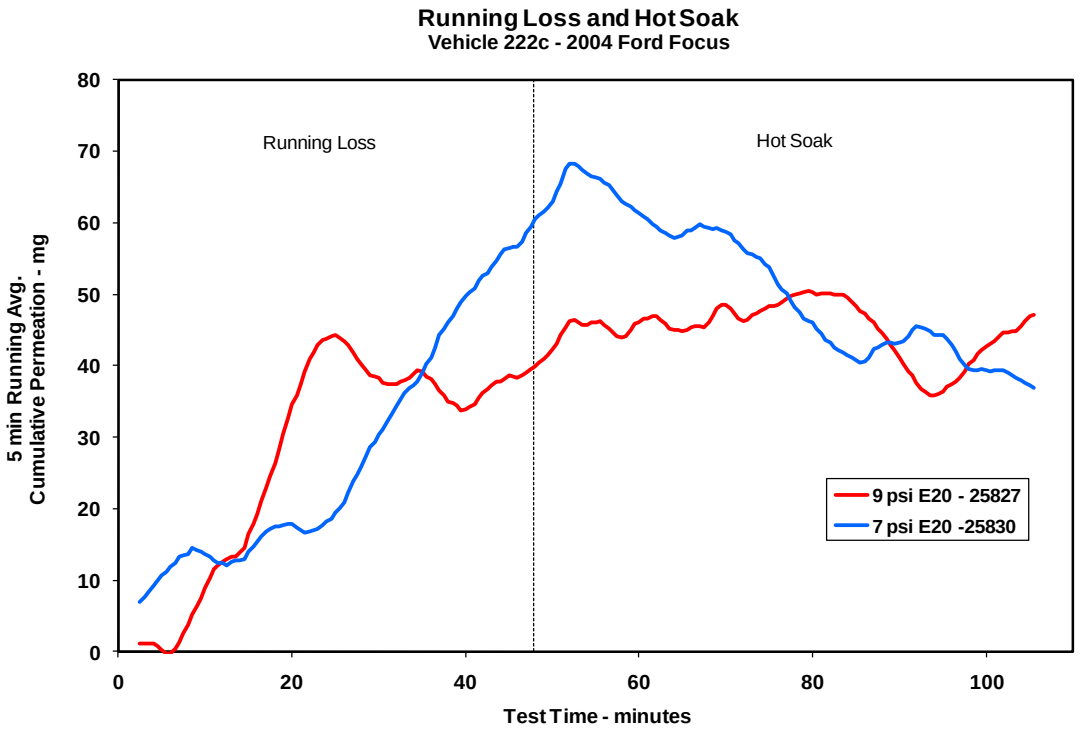
Reactivity Results
Vehicle 222c

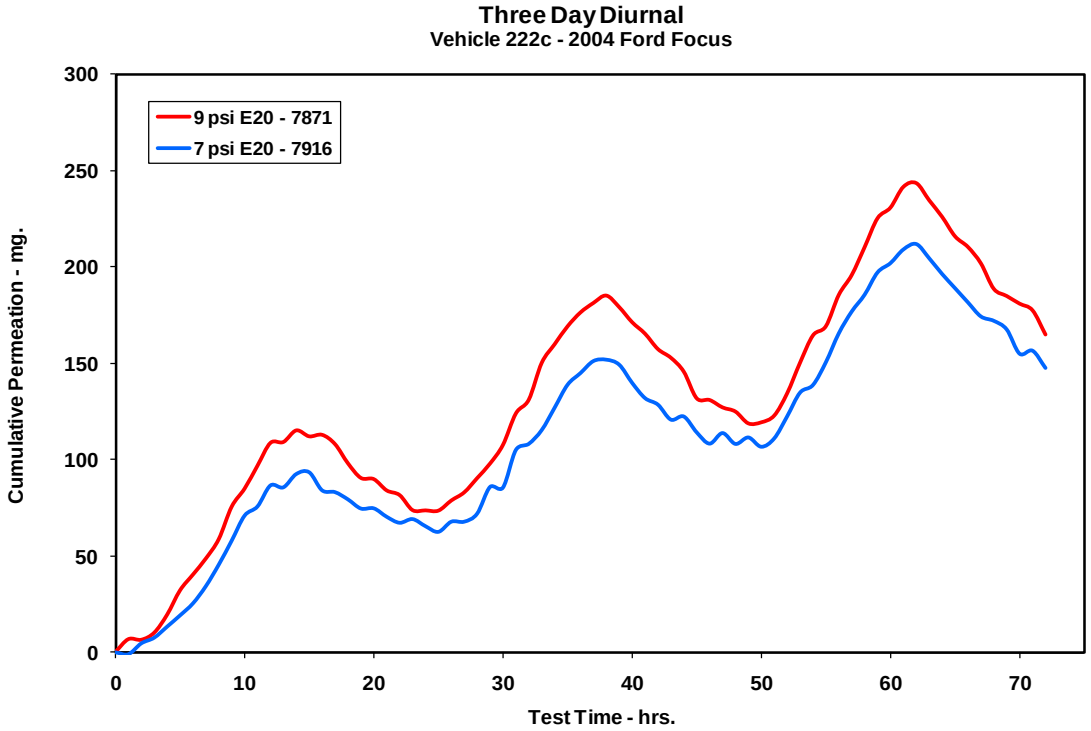
Test	Fuel	Test No.	Bag THC mg	GC as % of THC	GC VOC mg	Ozone mg	Reactivity	Species Present
86° F	E20 - 9 psi	7843	11.1	0.0	0.0	0.0	0.000	0
Static	E20 - 7 psi	7898	10.5	0.0	0.0	0.0	0.000	0
105° F	E20 - 9 psi	7847	15.3	0.0	0.0	0.0	0.000	0
Static	E20 - 7 psi	7901	14.8	0.0	0.0	0.0	0.000	0
Dynamic	E20 - 9 psi	25827	51.2	95.0	48.6	222.2	4.570	28
	E20 - 7 psi	25830	38.0	0.0	0.0	0.0	0.000	0
DHB	E20 - 9 psi	7871	165.1	88.9	146.8	393.2	2.678	12
Total	E20 - 7 psi	7916	147.7	81.9	121.1	232.5	1.920	12

This is the "Zero Evap" model tested in this program, and has very low emission levels. On many of the speciated tests in the table above, the individual species were below the GC detection limit. As such, the results appear as 0.


Static 86° F Permeation
Vehicle 222c - 2004 Ford Focus
9 psi E20 - 7843
7 psi E20 - 7898
5 min Running Avg.
Corrected SHED Mass - mg
Test Time - minutes
0
2
4
6
8
10
12
14
0
20
40
60
80
100
120


Static 105° F Permeation
Vehicle 222c - 2004 Ford Focus
9 psi E20 - 7847
7 psi E20 - 7901
5 min Running Avg.
Corrected SHED Mass - mg
Test Time - minutes
0
2
4
6
8
10
12
14
16
0
20
40
60
80
100
120


Running Loss and Hot Soak
Vehicle 222c - 2004 Ford Focus
Running Loss
Hot Soak
5 min Running Avg.
Cumulative Permeation - mg
Test Time - minutes
9 psi E20 - 25827
7 psi E20 -25830
0
10
20
30
40
50
60
70
80
0
20
40
60
80
100


Three Day Diurnal
Vehicle 222c - 2004 Ford Focus
Cumulative Permeation - mg.
Test Time - hrs.
9 psi E20 - 7871
7 psi E20 - 7916
0
50
100
150
200
250
300
0
10
20
30
40
50
60
70

Appendix II – Task 4.7

Appendix II contains the individual vehicle data and plots that display the effect of leak location on permeation emissions as run for Task 4.7 of this program.

For each vehicle there are tables of the evaporative test results, reactivity results and plots of the 86º F static tests, the running loss and hot soak test and the cumulative three day diurnal test with the implanted leak in the tank top and the canister inlet.

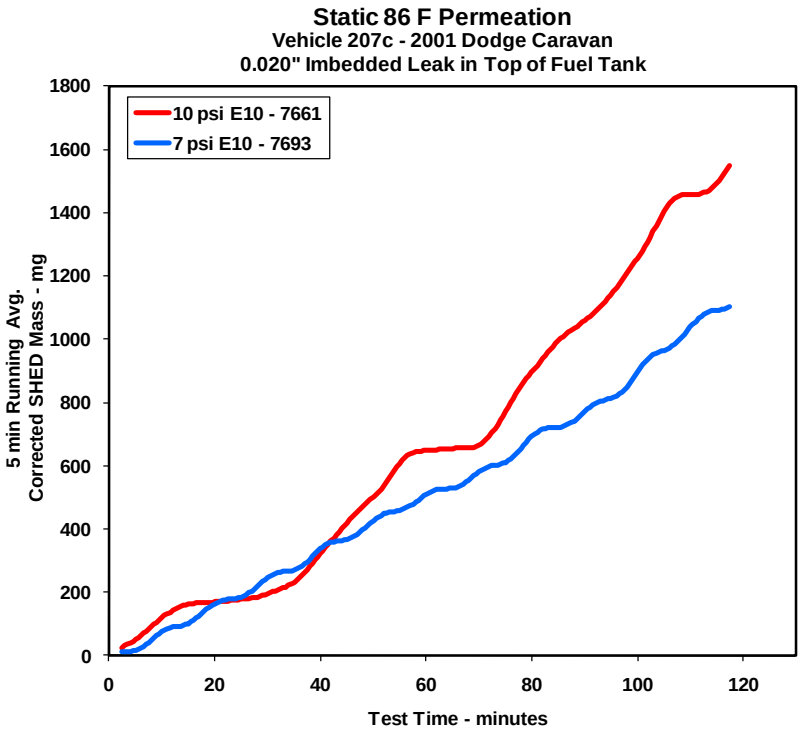
Evaporative Test Results
Vehicle 207c

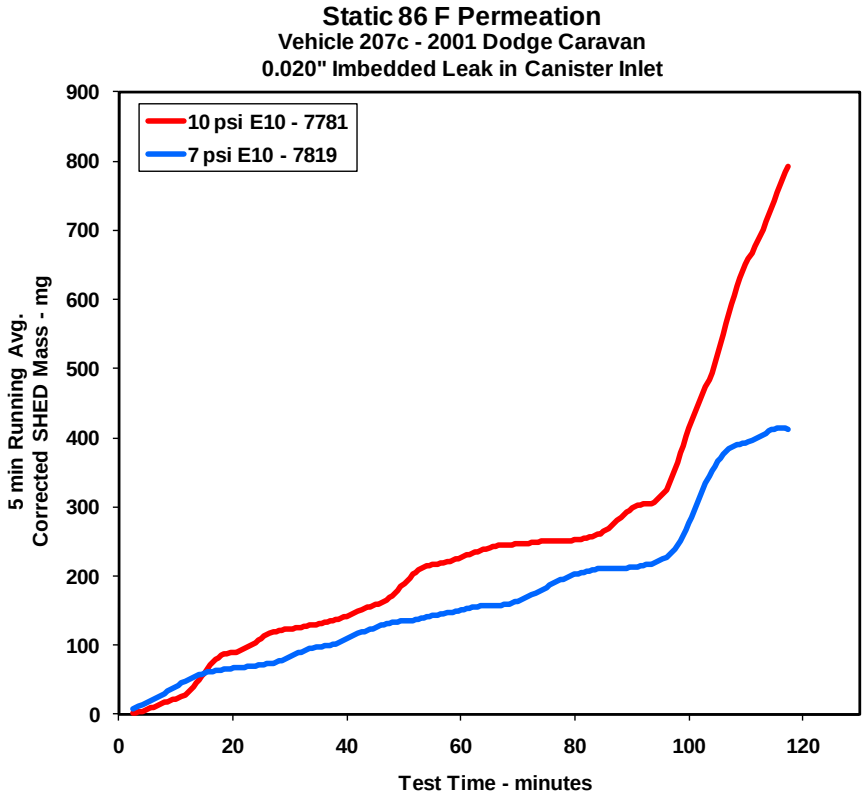
2001 Dodge Caravan

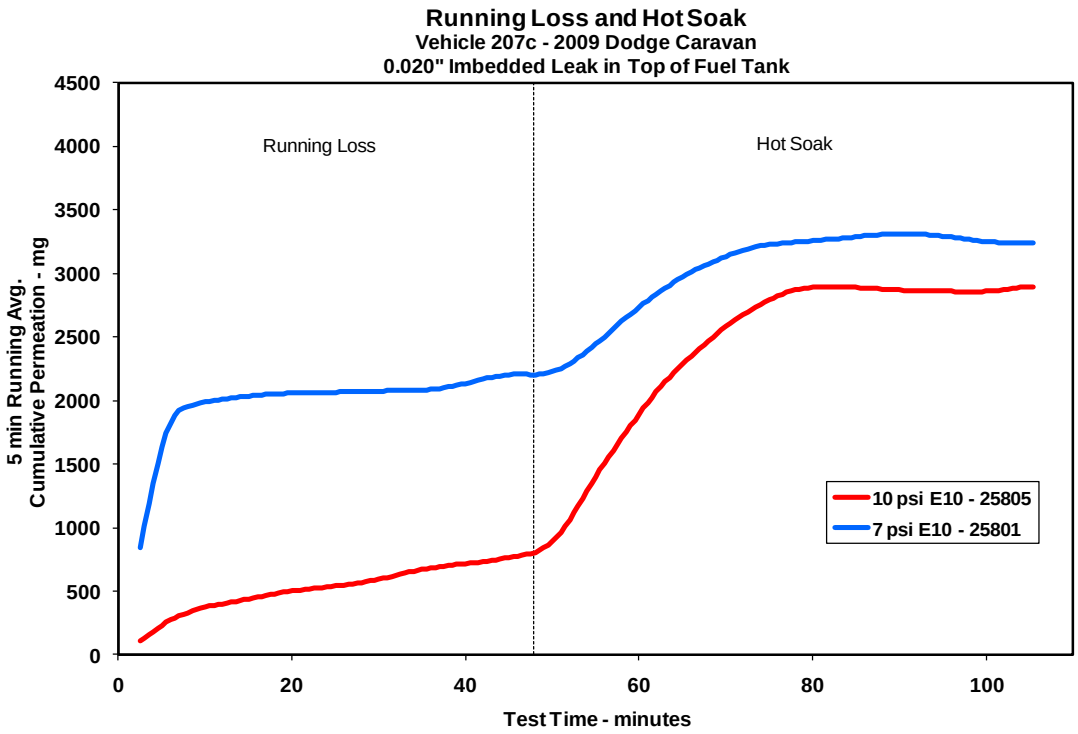
Veh	Fuel psi/EtOH	Test	Type	Date	Test#	Corrected Permeation mg/hr	SHED Results mg/day (Corrected)	Canister Loss g
207c	10.0/E10	Static	Perm	08/27/09	7661	610.2		0.00
	Tank Top (.020")		Fuel Incr.			435.3		
		Dynamic	RL	10/20/09	25805	999.7		0.00
	Tank Top (.020")		"True" HS			1491.5		0.00
		24 DHB	65-105	09/03/09	7672			
	Tank Top (.020")							
							6512.5	0.00
	7.0/E10	Static	Perm	09/18/09	7693	523.5		0.00
	Tank Top (.020")		Fuel Incr.			271.8		
		Dynamic	RL	10/02/09	25801	2769.4		0.00
	Tank Top (.020")		"True" HS			514.1		0.00
		24 DHB	65-105	10/27/09	7741			
	Tank Top (.020")						7084.7	0.00
	10.0/E10	Static	Perm	11/18/09	7781	232.5		0.00
	Can Inlet (.020")		Fuel Incr.			1083.7		
		Dynamic	RL	11/19/09	25817	937.5		0.00
	Can Inlet (.020")		"True" HS			1114.0		0.00
		24 DHB	65-105	11/24/09	7794			
	Can Inlet (.020")						10519.8	0.00
	7.0/E10	Static	Perm	12/09/09	7819	144.8		0.00
	Can Inlet (.020")		Fuel Incr.			372.7		
		Dynamic	RL	12/10/09	25820	1114.6		0.00
	Can Inlet (.020")		"True" HS			382.4		0.00
		24 DHB	65-105	12/29/09	7844			
	Can Inlet (.020")						7066.8	0.00

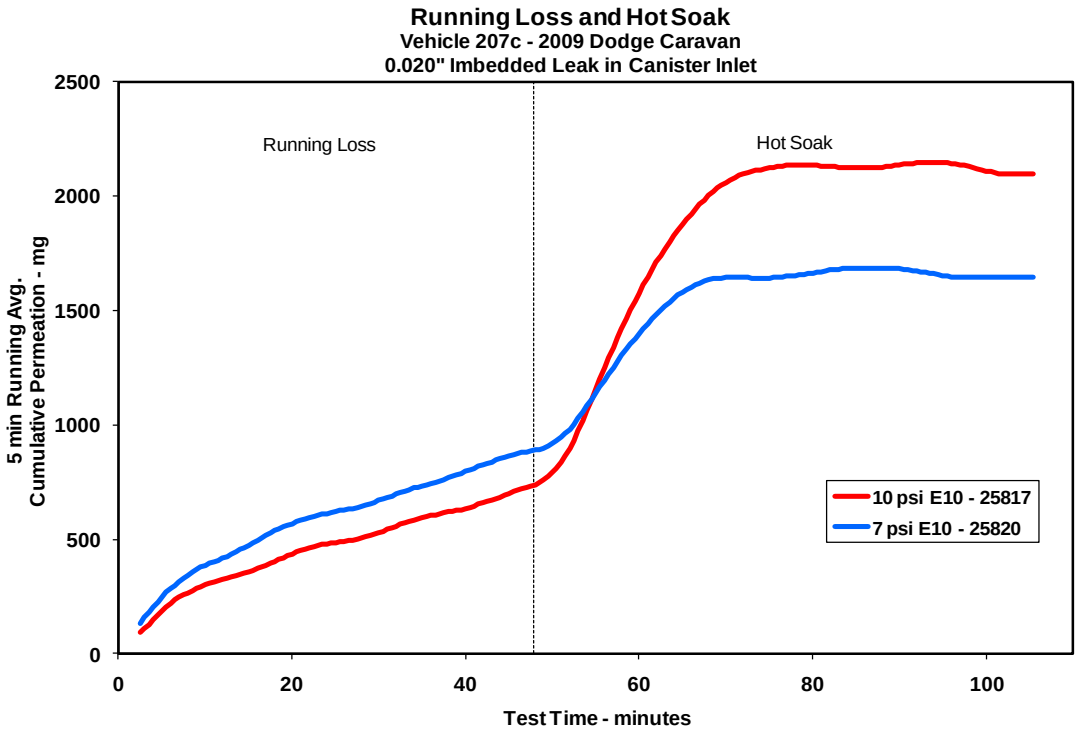
Reactivity Results
Vehicle 207c

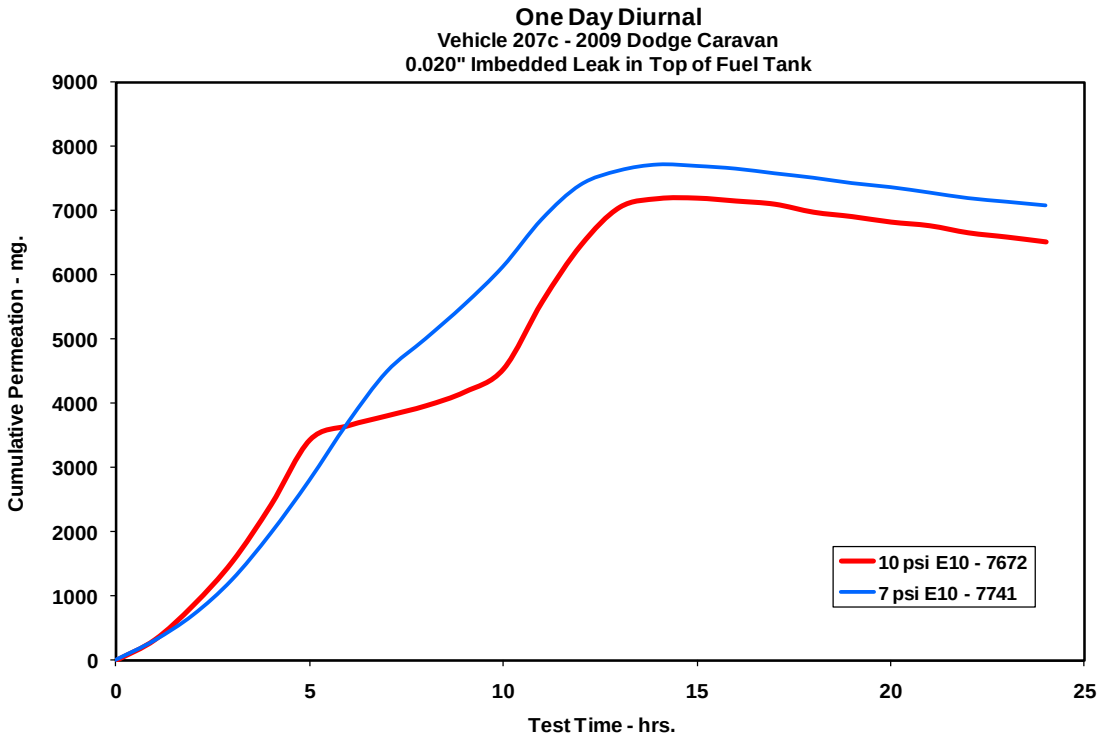
Test	Fuel	Leak	Test No.	Bag THC mg	GC as % of THC	GC VOC mg	Ozone mg	Reactivity	Species Present
86° F	E10 - 10 psi	Tank Top	7661			1392.3	3707.2	2.663	71
Static	E10 - 7 psi	Tank Top	7693			873.7	2526.9	2.892	70
	E10 - 10 psi	Can. Inlet	7781			742.7	2016.4	2.715	65
	E10 - 7 psi	Can. Inlet	7819			341.5	859.7	2.517	18
Dynamic	E10 - 10 psi	Tank Top	25805			3247.6	8987.6	2.767	99
	E10 - 7 psi	Tank Top	25801			3440.5	11624.4	3.379	76
	E10 - 10 psi	Can. Inlet	25817			1806.6	5152.1	2.852	71
	E10 - 7 psi	Can. Inlet	25820			1396.2	4836.1	3.464	90
DHB	E10 - 10 psi	Tank Top	7672			6195.8	15590.0	2.516	104
Total	E10 - 7 psi	Tank Top	7741			7698.7	22774.1	2.958	107
	E10 - 10 psi	Can. Inlet	7794			8632.1	20792.7	2.409	94
	E10 - 7 psi	Can. Inlet	7844			6858.2	20043.6	2.923	97

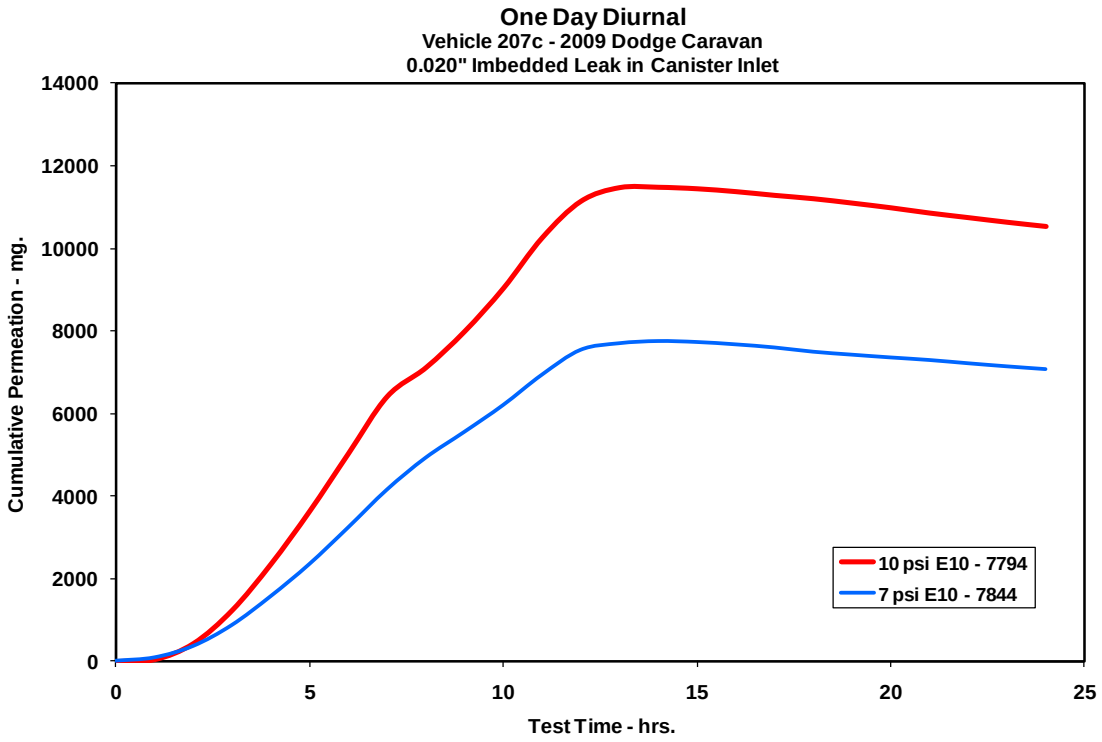

Static 86 F Permeation
Vehicle 207c - 2001 Dodge Caravan
0.020" Imbedded Leak in Top of Fuel Tank
10 psi E10 - 7661
7 psi E10 - 7693
5 min Running Avg.
Corrected SHED Mass - mg
Test Time - minutes
0
200
400
600
800
1000
1200
1400
1600
1800
0
20
40
60
80
100
120


Static 86 F Permeation
Vehicle 207c - 2001 Dodge Caravan
0.020" Imbedded Leak in Canister Inlet
10 psi E10 - 7781
7 psi E10 - 7819
5 min Running Avg.
Corrected SHED Mass - mg
Test Time - minutes
0
100
200
300
400
500
600
700
800
900
0
20
40
60
80
100
120


Running Loss and Hot Soak
Vehicle 207c - 2009 Dodge Caravan
0.020" Imbedded Leak in Top of Fuel Tank
Running Loss
Hot Soak
5 min Running Avg.
Cumulative Permeation - mg
Test Time - minutes
10 psi E10 - 25805
7 psi E10 - 25801
0
500
1000
1500
2000
2500
3000
3500
4000
4500
0
20
40
60
80
100


Running Loss and Hot Soak
Vehicle 207c - 2009 Dodge Caravan
0.020" Imbedded Leak in Canister Inlet
Running Loss
Hot Soak
5 min Running Avg.
Cumulative Permeation - mg
Test Time - minutes
10 psi E10 - 25817
7 psi E10 - 25820
0
500
1000
1500
2000
2500
0
20
40
60
80
100


One Day Diurnal
Vehicle 207c - 2009 Dodge Caravan
0.020" Imbedded Leak in Top of Fuel Tank
Cumulative Permeation - mg.
Test Time - hrs.
10 psi E10 - 7672
7 psi E10 - 7741
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
0
5
10
15
20
25


One Day Diurnal
Vehicle 207c - 2009 Dodge Caravan
0.020" Imbedded Leak in Canister Inlet
Cumulative Permeation - mg.
Test Time - hrs.
10 psi E10 - 7794
7 psi E10 - 7844
0
2000
4000
6000
8000
10000
12000
14000
0
5
10
15
20
25

Evaporative Test Results
Vehicle 211c

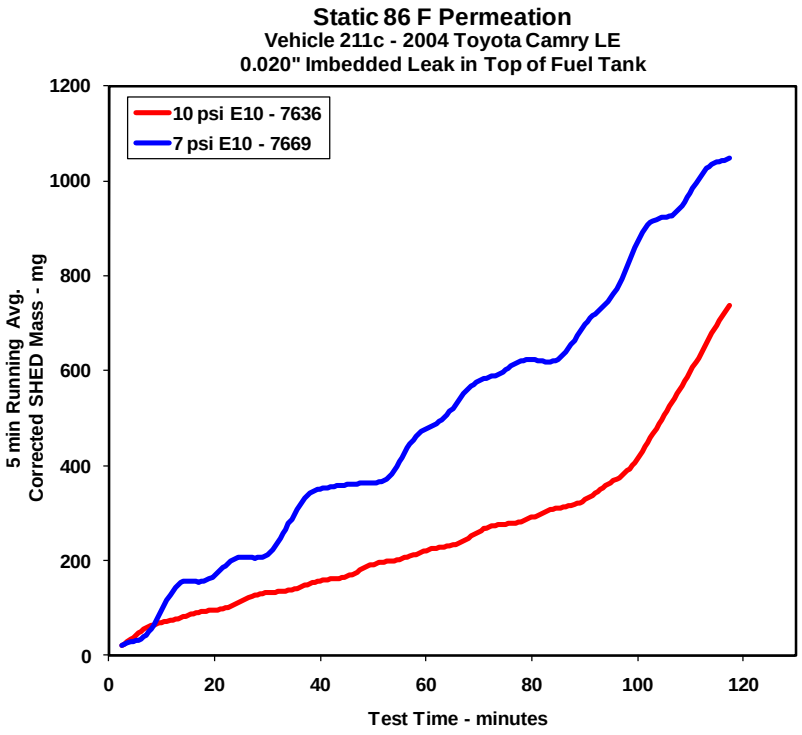
2004 Toyota Camry LE

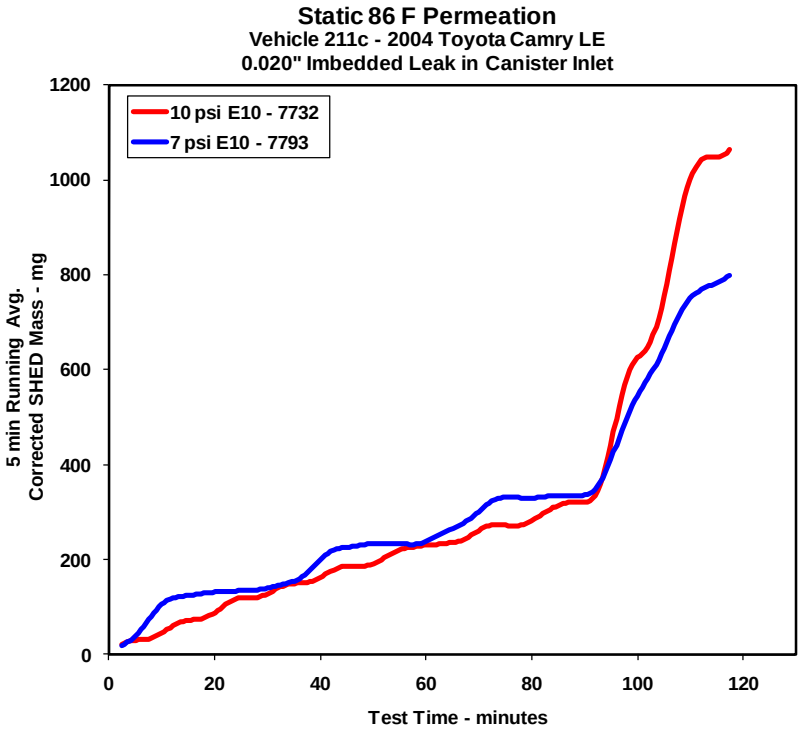
Veh	Fuel psi/EtOH	Test	Type	Date	Test#	Corrected Permeation mg/hr	SHED Results mg/day (Corrected)	Canister Loss g
211c	10.0/E10	Static	Perm	08/12/09	7636	192.5		0.00
		Tank Top (.020")	Fuel Incr.			860.1		
		Dynamic	RL	08/13/09	25788	820.4		0.00
		Tank Top (.020")	"True" HS			1671.9		0.00
		24 DHB	65-105	08/19/09	7648			
		Tank Top (.020")					8910.7	35.60
	7.0/E10	Static	Perm	09/02/09	7669	449.1		0.00
		Tank Top (.020")	Fuel Incr.			286.9		
		Dynamic	RL	09/03/09	25793	341.8		0.00
		Tank Top (.020")	"True" HS			589.4		0.00
		24 DHB	65-105	09/10/09	7681			
		Tank Top (.020")					2884.2	0.00
	10.0/E10	Static	Perm	10/19/09	7732	224.7		0.00
		Can Inlet (.020")	Fuel Incr.			1472.7		
		Dynamic	RL	10/29/09	25809	15379.5		0.00
		Can Inlet (.020")	"True" HS			1990.0		12.21
		24 DHB	65-105	11/11/09	7769			
		Can Inlet (.020")					11548.1	5.50
	7.0/E10	Static (86)	Perm	11/24/09	7793	217.0		0.00
		Can Inlet (.020")	rs+Fuel Incr.			789.0		
		Dynamic	RL	11/25/09	25818	4710.3		0.82
		Can Inlet (.020")	"True" HS			399.3		0.28

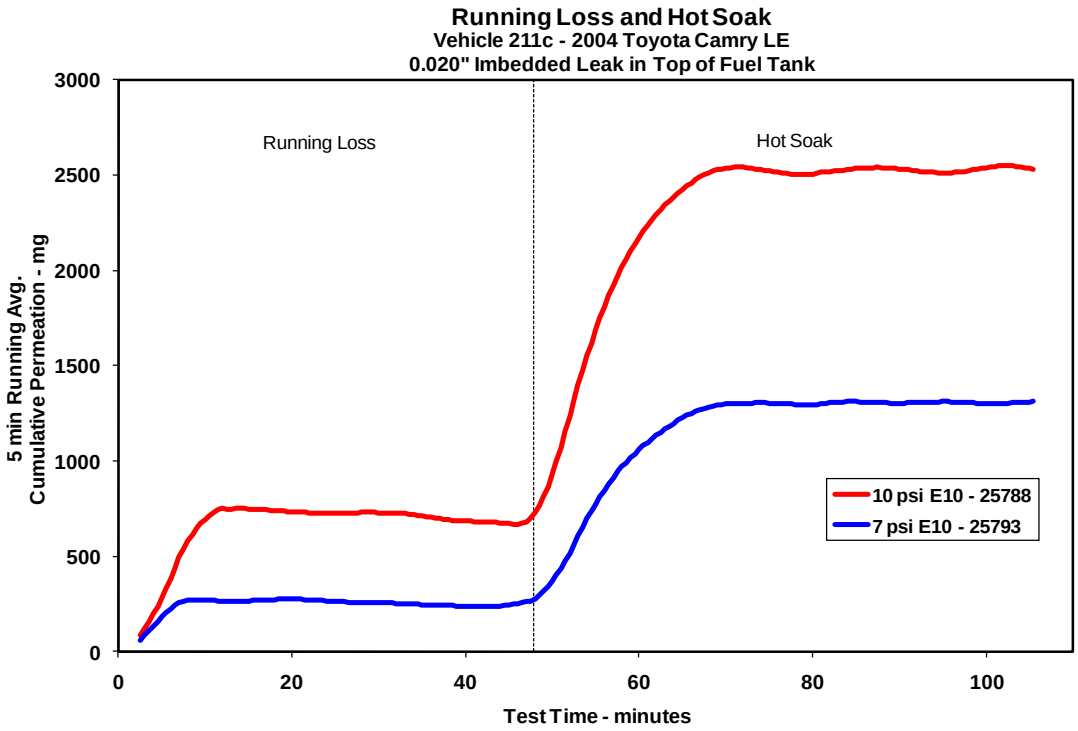
Reactivity Results

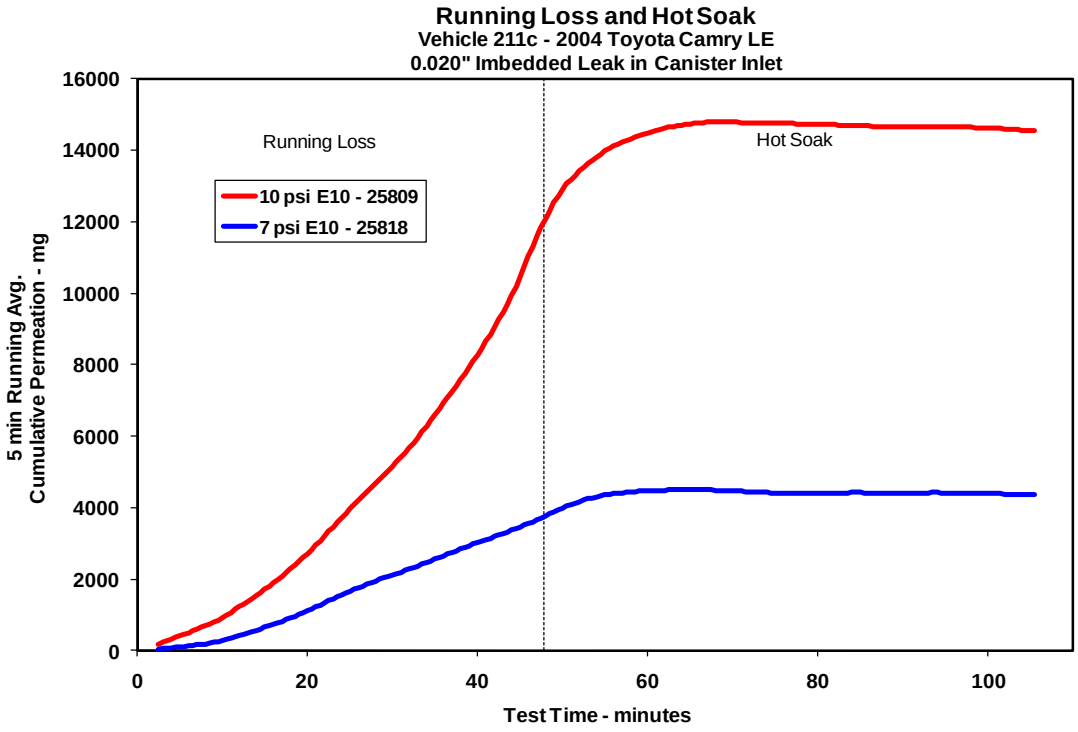
Vehicle 211c

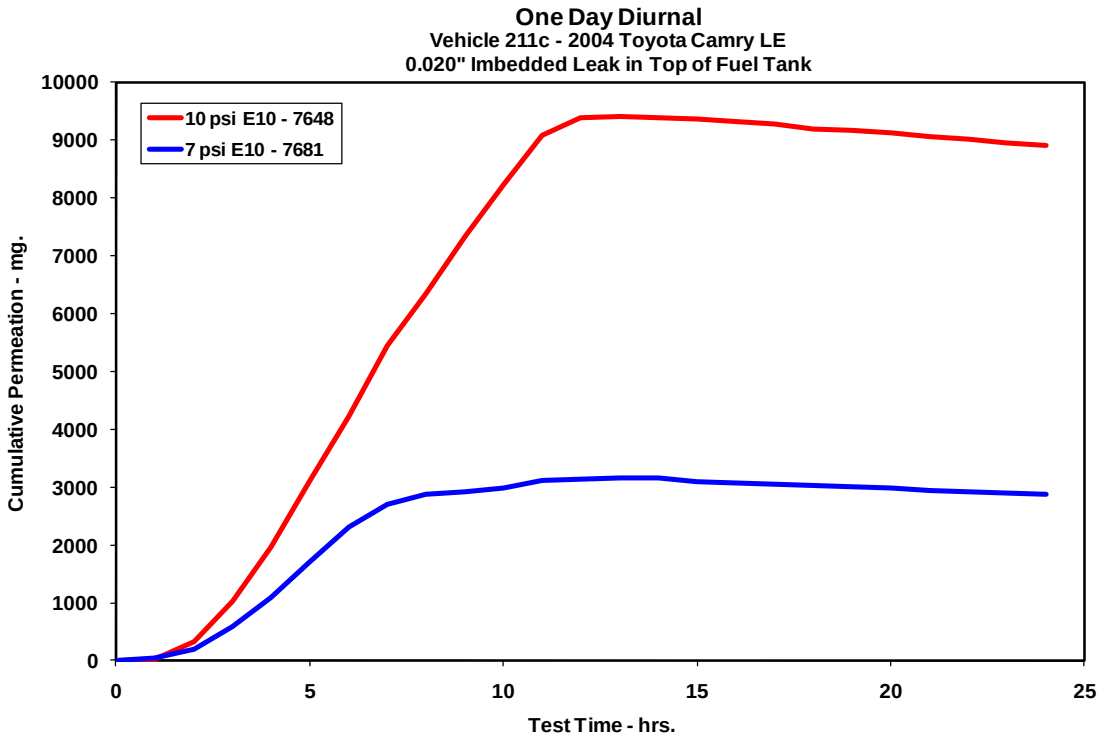
Test	Fuel	Leak	Test No.	Bag THC mg	GC as % of THC	GC VOC mg	Ozone mg	Reactivity	Species Present
86° F	E10 - 10 psi	Tank Top	7636	783.2	80.2	627.8	1669.4	2.659	61
Static	E10 - 7 psi	Tank Top	7669	1071.0	110.6	1184.6	3821.4	3.226	70
	E10 - 10 psi	Can. Inlet	7732	1127.1	101.9	1148.4	2656.3	2.313	65
	E10 - 7 psi	Can. Inlet	7793	819.2	83.4	682.9	2074.8	3.038	63
Dynamic	E10 - 10 psi	Tank Top	25788	2520.6	78.0	1965.7	6069.4	3.088	66
	E10 - 7 psi	Tank Top	25793	1311.9	100.1	1312.8	4431.1	3.375	70
	E10 - 10 psi	Can. Inlet	25809	14518.3	116.9	16978.3	40296.1	2.373	89
	E10 - 7 psi	Can. Inlet	25818	4384.5	87.5	3838.4	11846.9	3.086	69
DHB	E10 - 10 psi	Tank Top	7648	8910.7	95.9	8544.3	20902.2	2.446	45
Total	E10 - 7 psi	Tank Top	7681	2884.2	107.8	3109.3	9771.6	3.143	80
	E10 - 10 psi	Can. Inlet	7769	11548.1	93.4	10783.2	25220.2	2.339	44
	E10 - 7 psi	Can. Inlet	7836	4028.0	95.2	3835.6	11646.0	3.036	83

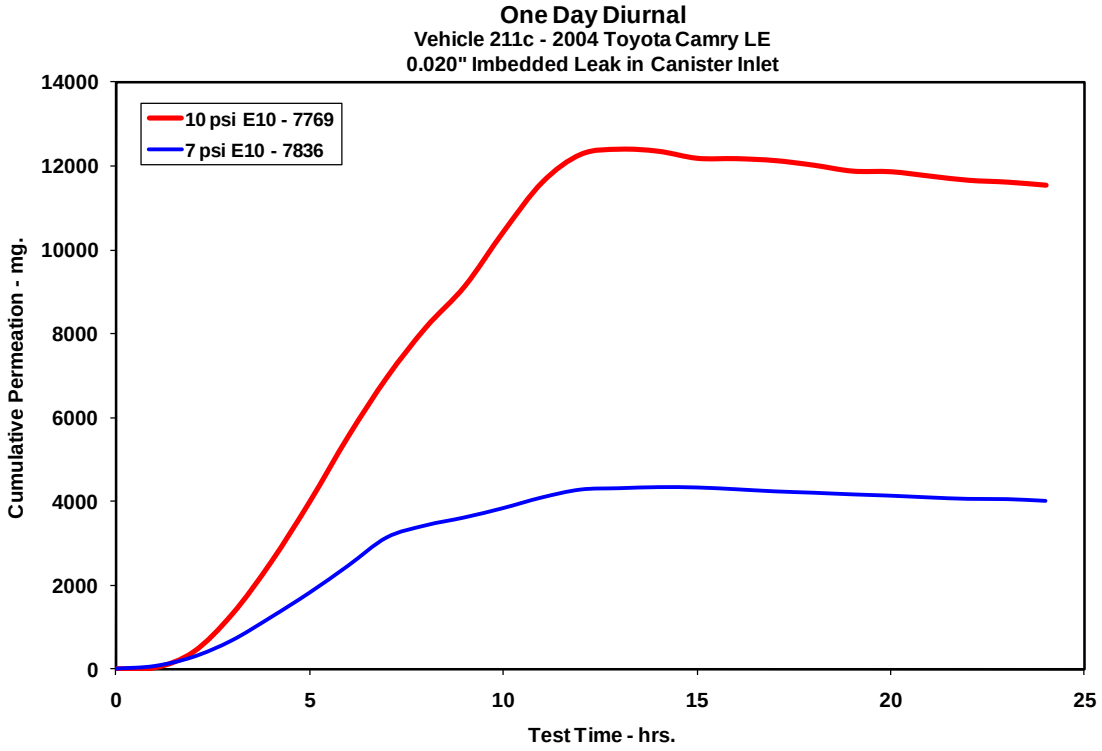

Static 86 F Permeation
Vehicle 211c - 2004 Toyota Camry LE
0.020" Imbedded Leak in Top of Fuel Tank
10 psi E10 - 7636
7 psi E10 - 7669
5 min Running Avg.
Corrected SHED Mass - mg
Test Time - minutes
0
200
400
600
800
1000
1200
0
20
40
60
80
100
120


Static 86 F Permeation
Vehicle 211c - 2004 Toyota Camry LE
0.020" Imbedded Leak in Canister Inlet
10 psi E10 - 7732
7 psi E10 - 7793
5 min Running Avg.
Corrected SHED Mass - mg
Test Time - minutes
0
200
400
600
800
1000
1200
0
20
40
60
80
100
120


Running Loss and Hot Soak
Vehicle 211c - 2004 Toyota Camry LE
0.020" Imbedded Leak in Top of Fuel Tank
Running Loss
Hot Soak
10 psi E10 - 25788
7 psi E10 - 25793
5 min Running Avg.
Cumulative Permeation - mg
Test Time - minutes
0
500
1000
1500
2000
2500
3000
0
20
40
60
80
100


Running Loss and Hot Soak
Vehicle 211c - 2004 Toyota Camry LE
0.020" Imbedded Leak in Canister Inlet
Running Loss
Hot Soak
10 psi E10 - 25809
7 psi E10 - 25818
5 min Running Avg.
Cumulative Permeation - mg
Test Time - minutes
0
2000
4000
6000
8000
10000
12000
14000
16000
0
20
40
60
80
100


One Day Diurnal
Vehicle 211c - 2004 Toyota Camry LE
0.020" Imbedded Leak in Top of Fuel Tank
10 psi E10 - 7648
7 psi E10 - 7681
Cumulative Permeation - mg.
Test Time - hrs.
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
0
5
10
15
20
25


One Day Diurnal
Vehicle 211c - 2004 Toyota Camry LE
0.020" Imbedded Leak in Canister Inlet
10 psi E10 - 7769
7 psi E10 - 7836
Cumulative Permeation - mg.
Test Time - hrs.
0
2000
4000
6000
8000
10000
12000
14000
0
5
10
15
20
25

Appendix III – Test Concept

The testing concept and procedures used in this program have evolved throughout the CRC E-77 program series, and are included here for reference.

The E-77 Test Concept: Measuring Leaks, Permeation and Diurnal Vapor Losses

CRC's E-77 emission test programs have developed (and strive to continually improve) new methodologies for understanding and quantifying vehicle evaporative emission rates. The concept partitions and assigns the vehicle's contribution to the evaporative emission inventory into three mechanisms:

1. Permeation
2. Tank vapor venting
3. Leaks (with two subsets - Liquid and Vapor)

Permeation is the migration of HC through the various elastomers in a vehicle fuel system[16]. Previous testing has shown that permeation rate is strongly affected by the material's temperature, doubling for each 10ºC (18ºF) increase in the range of normal summer temperatures (See, among others, CRC E-65.3 report) It is also strongly affected by gasoline composition, especially with ethanol-containing fuels.

Tank vapor venting emissions are controlled by fitting a carbon canister to the atmospheric tank vent. Figure A1 is a schematic of a typical early control system. During a daily heating period, the temperature of the vehicle's fuel tank increases, forcing HC vapors from the tank. Excess emissions, exceeding the carbon canister's capacity, are vented to the atmosphere.

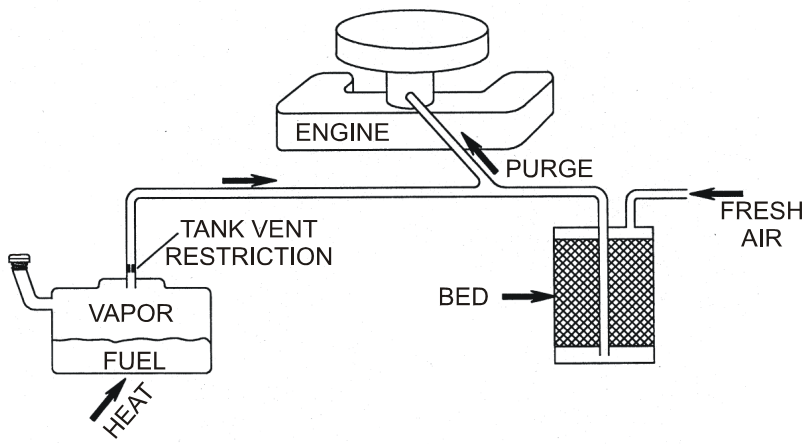


Figure A-1. Control System Schematic

[16] "Fuel Permeation from Automotive Systems: Final Report CRC Project E-65," Haskew, Liberty and McClement, September 2004, available on the CRC and California Air Resources Board websites.

Leaks can be liquid or vapor. Mass emissions are measured in a VT SHED or Variable Temperature Sealed Housing for Evaporative Determination. The SHED test method combines all three emission mechanisms (leaks, diurnal venting, and permeation) into a single test result.

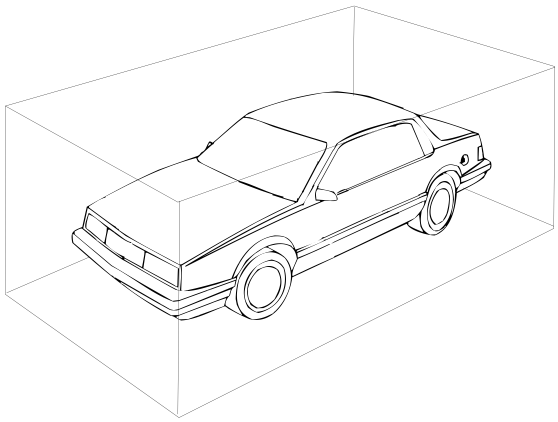


Figure A-2. Sealed Housing for Evaporative Determination

The SHED technique involves placing the vehicle in a sealed enclosure (Figure A2), and calculating the mass in the enclosure from the volume, density and concentration in the enclosure at the start and end of a time period. The difference between the mass at the start and end of test is the emission rate, e.g., grams per unit time.

Permeation and tank venting losses are strongly driven by fuel composition, ambient temperature, and ambient temperature change. Liquid leaks are not strongly affected by normal summer temperatures, and are thought to have two components:

1. Static leaks occurring while the engine is turned off and the vehicle is stationary
2. Increase in leak rate caused by the system pressure increase during engine operation.

Each is described in detail below.

1. Static Permeation Testing

The constant temperature (static) permeation rate is measured in a traditional SHED (Constant temperature) in the following manner.

A. The fuel tank is drained and filled to 40% tank capacity with the test fuel.
B. The day before testing, the vehicle is driven over four road trips of 7.5 miles each to precondition the canister.[17] (These drives are similar to the LA-4)
C. Upon return from the road pre-conditioning, the fuel tank is drained and filled to 40% tank capacity with the test fuel.[18]
D. Vehicle is parked for 18-22 hours in a controlled temperature environment at test temperature (86ºF)
E. The vehicle is then moved (without starting) into the test (86ºF) SHED
F. The canister vent is connected to the SHED bulkhead fitting which routes the vapor to the trap canister outside the SHED
G. The tank system pressurization hose is connected
H. The fuel pump electrical connection is connected

[17] This conditioning can be done in the laboratory on a chassis dynamometer if proper attention is paid to underbody cooling and unrepresentative fuel tank temperatures are avoided.
[18] Vehicles with ORVR systems will add the refueling vapors to the canister. This is OK.

I. The SHED is sealed, the inside temperature is allowed to stabilize and the test is started. Continuous total hydrocarbon (THC) measurements are made using a FID. Ethanol, methanol and R134a concentrations are measured using an INNOVA analyzer. All measurements are made at least every minute for one hour to determine the stabilized permeation rate.
J. At the end of the static test (60 minutes), the vehicle's vapor system is pressurized to 5 inches of water for thirty minutes. Measurements are made to quantify vapor leaks as determined by a change in the SHED uncorrected mass.
K. The fuel pump is then energized for 30 minutes while maintaining the 5 inches of water on the vapor system. Liquid leaks are quantified as determined by a change in the SHED concentrations.

The purpose of steps J and K above is to validate that the permeation rate measurement was made without the presence of any leak – either liquid or vapor.

2. Running Loss Test (Dynamic Test)

A. The vehicle is placed in the RL-SHED and prepared for test. (The fuel level and condition for the dynamic test is the fuel remaining after completion of the static test – 40% fresh fill of the appropriate test fuel)
B. Outside air source for the engine is connected
C. Vehicle exhaust is connected
D. Fuel tank thermocouple is connected
E. Canister vent is connected to the SHED bulkhead fitting which routes the vapor to the trap canister outside the SHED
F. Vehicle is allowed to stabilize in the RL-SHED at test temperature (86°F) for a minimum of 12 hours – preferably overnight.
G. Two cycles of the Unified Cycle (LA-92) driving schedule (48 minutes.) are driven while measuring the mass emissions in the SHED. Vehicle is allowed to idle (in drive) for 30 seconds between the two cycles. Ambient air temperature is maintained (to the extent possible) at 86°F. Fuel tank surface temperature is monitored during vehicle operation. It should increase during the drive from 10 to 18°F to simulate expected on-road temperature increase. Measured mass emissions are corrected using the INNOVA data for the ethanol, methanol and refrigerant emissions.

3. Hot Soak[19]

This procedure is executed immediately following the Running Loss Test procedure described above.

A. Engine is turned off, transmission selector is placed in park, and driver exits the enclosure, using the double door air lock, taking care to minimize any air exchange between the laboratory and the SHED. This starts the one hour "hot soak" period.

[19] Our definition is that the "hot soak" is the temporary increase in emission rate caused by the vehicle's immediately preceding operation. It is the increase in the SHED mass (corrected for EtOH, MeOH and R-134a) over the one hour period minus the previously established "static" permeation rate.

B. Measurement of mass emissions in the SHED are continued for another 60 minutes (until time = 108 minutes), correcting for the ethanol, methanol and refrigerant mass using the INNOVA instrument data. This ends the hot soak. Hot soak emissions are calculated as the net difference for the one hour hot soak ($CorrMass_{108} – CorrMass_{48}$ minus the 86°F static hourly rate, all mass rates in mg/hour).

4. Diurnal Test

A. The fuel tank is drained and filled to 40% tank capacity with the test fuel.
B. The day before testing, the vehicle is to be driven over four road trips of 7.5 miles each to precondition the vehicle and the canister.
C. Upon return from the road pre-conditioning, the fuel tank is drained and filled to 40% tank capacity with the test fuel.
D. The vehicle is parked for 18-22 hours in a controlled temperature environment at the initial diurnal test temperature (65ºF).
E. The SHED is sealed, allowed to stabilize at the 65°F temperature and the 3-day California Diurnal Test is started.
F. "Continuous" (every 30 seconds) total hydrocarbon (THC) measurements are made using a FID. Ethanol, methanol and R134a (refrigerant) concentrations are measured using an INNOVA analyzer, at least every 10 minutes for the duration of the test (72 hours).

Static Permeation Test – Leak Validation

If a leak is detected during either the vapor system pressure portion (Step J) or the pump energized portion (Step K) of the Static Permeation Test procedure, it calls into question whether the permeation rate measurement accurately reflects fuel system permeation or if instead a combination of permeation and the implied leak was measured. If a leak is confirmed, the permeation rate measurement is called into question, and an investigation, possible remedy, and retest is indicated.

The permeation rate measurement must be corrected for the FID's ethanol misrepresentation, and the presence of non-fuel hydrocarbons (methanol and refrigerant). The leak check however, is made using the change in mass increase in the SHED using the <u>uncorrected FID mass</u> calculation as the determinate. We found that the corrections for ethanol, methanol and refrigerant were introducing "noise" into the trace that we were misinterpreting as leak(s).

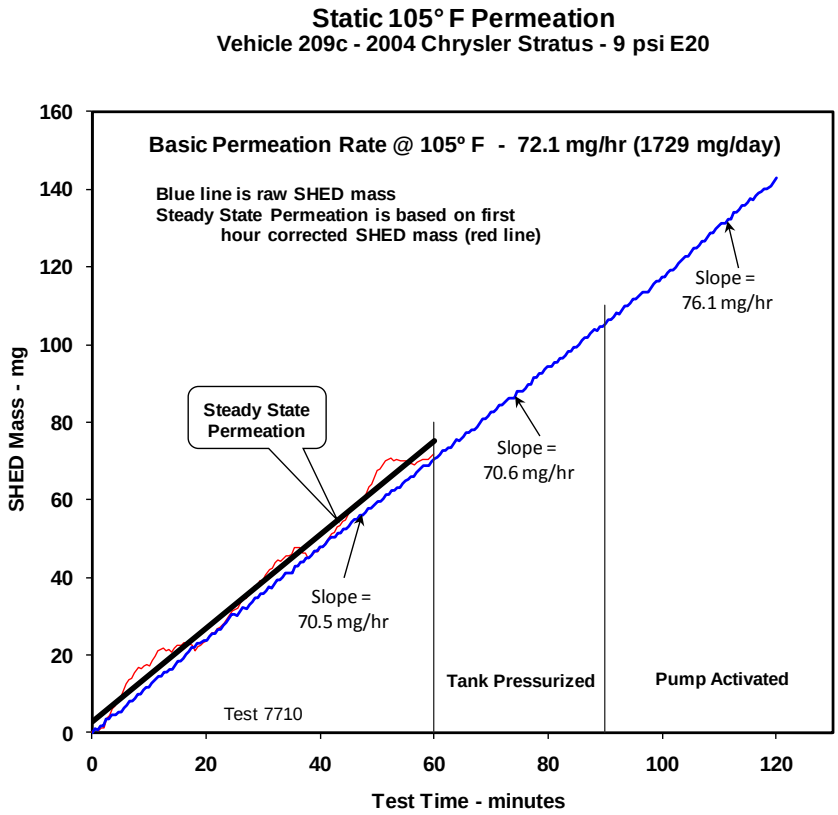


Figure A-3. Leak Test

Figure A-3 represents the calculations made during the inspection of data from a successful test. EXCEL's© "SLOPE" function is used to calculate the linear regression values based on the FID calculation for mass for: Time 0 to 60 minutes, Time 64 to 90 minutes, and Time 94 to 120 minutes. A 4 minute gap was included between each sequence to establish the new mass emission rate during the "pressure on," (T_{60} to T_{90}), and the "pump energized" periods.

The slope of 70.6 mg/hr for the "Tank Pressurized" period in the example above is compared to the slope of 70.5 mg/hr calculated for the permeation rate (or hot soak) period. If the "Tank Pressurized" slope is not more than 10% higher than the 0 to 60 minute permeation rate, we assume that there is no leak present. A similar comparison is made for the slope determined during the "pump on" period. The choice of a 10% allowance is arbitrary and is used here to allow for normal and unavoidable test variation.

For tests in which the above procedure determines that no leak is present, a value of zero is reported in the test summary for the leak results. If a positive value is reported, it calls that test into question, and an investigation, possible repair, and retest is indicated.

Static Permeation Rate Determination

The static permeation rate is determined based on a linear regression through the individual corrected fuel data points (30 second data) for the first 60 minutes of testing as illustrated by the corrected FID data shown in the red trace in Figure A-3 above; in this case 72.1 mg/hour.

Dynamic (Running Loss) and Hot Soak Test

The preceding section addressed the concepts of separating the permeation emissions from the tank venting emissions, and establishing the presence or absence of leaks. The second part of this study includes a dynamic test to measure the permeation and tank venting emissions during vehicle operation ("running losses") and the temporary condition following vehicle operation known as the "hot soak."

This is considered a "dynamic" test because the vehicle is driven and the fuel and vapor system temperatures rise during the test. The ambient temperature in the Running Loss SHED during test was held constant at 86°F, while the vehicle's fuel system temperature rose during the test. Two 1435 second (23.9-minute) LA-92 driving cycles were performed consecutively during the running loss measurements with a 30 second idle in-between. During this test, tank fuel temperature was expected to rise by an average approximately 18°F above the initial ambient temperature. The running loss air handling system included a proportional speed under-car blower operated as a slave to dynamometer speed. This apparatus was used during running loss testing with minor tuning for specific vehicles. It is, without additional input, capable of reasonable fuel tank temperature control. Each vehicle was fitted with a surface-mount thermocouple at the front of the fuel tank, located at approximately the 1/8th fill level to measure the fuel liquid temperature. No attempt was made to follow a predefined fuel tank temperature profile (FTTP) in this program. Fuel temperatures were recorded, and results are available in the real-time records.

Figure A-4 - Vehicle Installed in Running

Vehicle running loss emissions are measured in a special version of a SHED known as a Running Loss SHED (RL-SHED)[20], shown in Figure A-4. Special features of the RL-SHED include a sealed chassis dynamometer for simulating vehicle driving loads, a sealed outside air supply for engine intake, a sealed exhaust conduit for engine exhaust, and an under-chassis fan for simulating underbody air flow as described above. A vehicle is operated inside the RL-SHED over a chosen driving cycle. The increase in HC emissions inside the enclosure are measured and calculated as mass emissions per 40 CFR §86.163-96. Vehicle testing in an RL-SHED is complicated by several factors, including:

1. The engine must be supplied with external induction air.
2. The exhaust must be conducted externally without any leaks.
3. The load supplied to the vehicle through the chassis dynamometer must not create or allow external leaks.
4. The internal SHED temperature must be maintained while sizable heat is rejected to the ambient by the running engine and exhaust.
5. The cooling air supplied to the radiator must be modulated to represent the vehicle's road speed.
6. The underbody (and especially the fuel system) temperature should represent the rate of rise experienced by a real road-drive.

Canister vent losses were isolated from permeation emissions using the technique described previously. The vehicle's carbon canister fresh air vent was connected to the outside of the RL-SHED using a leak-tight Teflon® hose connected to a small carbon "trap" canister located on a

[20] See SAE 1999-01-1464, "Running Loss Emissions from In-Use Vehicles, Harold Haskew, et al., May 1999, for a more comprehensive discussion of running loss measurement detail. Also available as CRC Report 612, Project E35-2, "Running Loss Emissions from In-Use Vehicles", available in the engineering report section of the CRC web-site www.crcao.org

top-loading precision scale outside the SHED. The scale precision was 0.01 grams (10 milligrams). There were no tank venting emissions measured on any of the running loss test measurements. All of the vehicles appeared to be actively "purging" the vehicle's control canister and drawing fresh air during the test. If there were any emissions from the vehicle's canister, as might have occurred if there were no vehicle purge or if very high volatility fuels with excessive vapor generation were used, it would have been measured.

The Running Loss Driving Cycle consisted of two cycles of the "Unified Driving Cycle," otherwise known as the LA-92. A velocity versus time plot for one cycle is shown in Figure A-5.

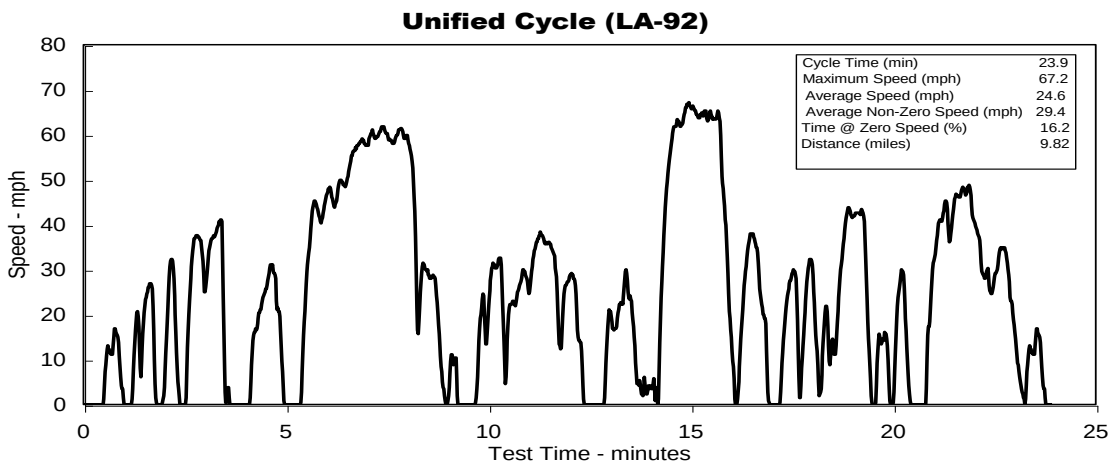


Figure A-5 - Running Loss Driving Cycle

The LA-92 cycle takes 24 minutes to complete, and covers 9.8 miles, with many speed changes. Two back-to-back cycles were driven, the first as a "cold start," and the second following a 30 second vehicle idle. The "cold start" condition was created by soaking the vehicle for a minimum of 18 hours at 86°F, moving it to the stabilized 86°F RL-SHED, making the test connections, and then waiting a minimum of one hour before the initial start and run.

The SHED emissions were measured during the 48 minutes of engine operation, and then continuously for one hour after the engine was turned off. This one hour, engine-off duration was the "hot soak" period. The total test time is 1 hour and 48 minutes.

Figure A-6 shows results from the 9 psi E20 fuel test on Vehicle 209c. The horizontal axis is test time in minutes, and the vertical axis is the HC mass measured in the RL-SHED during the test period.

The engine was shut off at the end of the second LA92 drive cycle (~48 minutes), and the analysis system continued to measure the HC emissions in the SHED for the next 60 minutes. This represented the "hot soak" portion of the test.

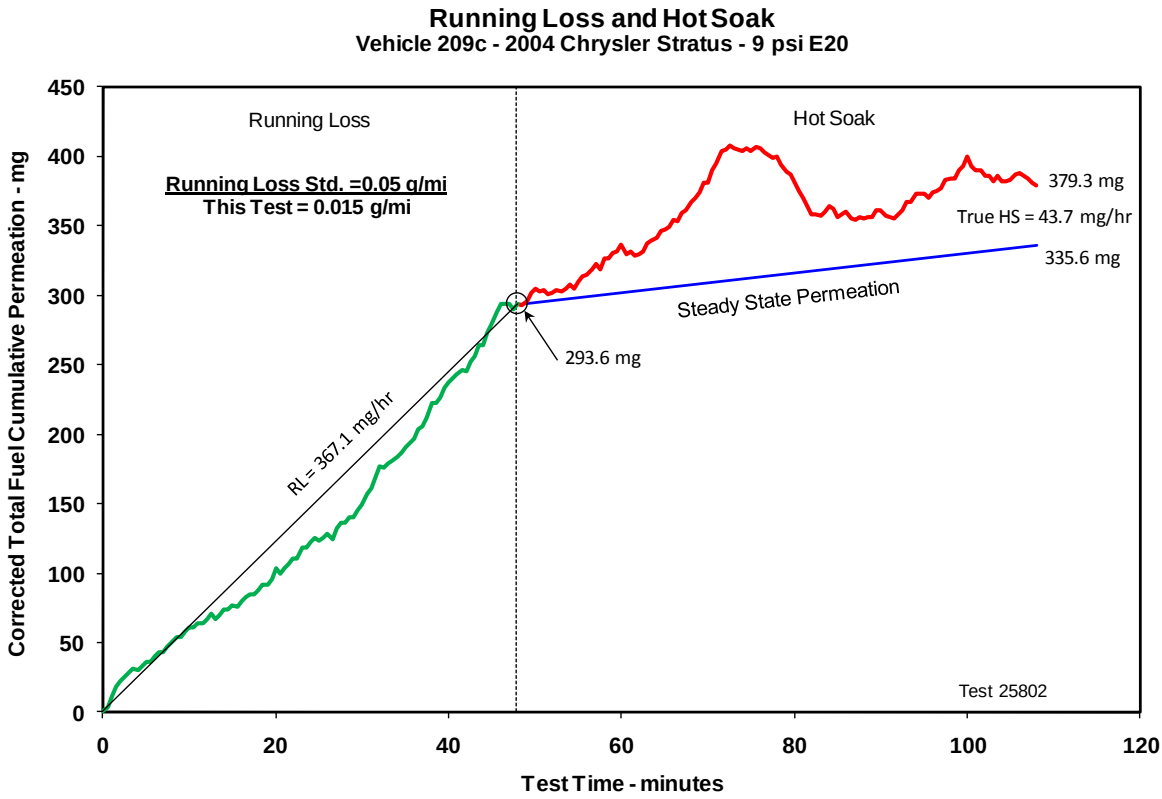


Figure A-6 - Running Loss and Hot Soak

The "True" Hot Soak

The traditional hot soak is determined from the increase in SHED emissions as measured for one hour following a prescribed drive to heat up the vehicle (2 LA-92 cycles during the Running Loss Test). Hot soak emissions, however, have two components; one that is caused by the elevated temperature resulting from the drive, and another that results from one hour of static permeation.

To separate these two components and determine the "true" hot soak emissions, the following procedure was used. "Traditional" hot soak emissions were first calculated by subtracting the "start of hot soak" cumulative SHED hydrocarbon value (i.e., 293.6 mg @ t = 48 minutes) from the final cumulative SHED hydrocarbon value (i.e., 379.3 mg @ t = 108 min.). This resulted in a cumulative SHED hydrocarbon value of 85.7 mg for the one hour hot soak. The previously determined 86ºF static permeation value (i.e., 42.0 mg/hr) was then subtracted to arrive at the "true" hot soak value of 43.7 mg.

In Figure A-6, the static permeation rate is superimposed as a solid blue line on the plot from the starting point of the hot soak until its end (one hour). While the "traditional" hot soak would be calculated as 85.7 mg, the "true" hot soak is determined as 43.7 mg. True hot soak values reported here were determined in this manner.

Diurnal Test

Diurnal permeation was determined by subjecting the vehicle to a three-day period in a temperature controlled SHED while recording the total hydrocarbon every 30 seconds. The SHED environmental temperature was varied from 65°F to 105°F per the California Diurnal Test protocol. Canister vent losses were isolated from permeation emissions using the technique described previously. The vehicle's carbon canister fresh air vent was connected to the outside of the RL-SHED using a leak-tight Teflon® hose connected to a small (1 L) carbon "trap" canister located on a top-loading precision scale. The scale precision was 0.01 grams (10 milligrams).

ATL's Speciation Method

ATL has developed a hydrocarbon speciation method that is functionally equivalent to the dual-GC AQIRP method. The AQIRP, or "Auto/Oil Program," test method was first documented in two SAE papers:

1. SAE 920320, Advanced Emission Speciation Methodologies for the Auto/Oil Air Quality Improvement Research Program -I. Hydrocarbons and Ethers; and
2. SAE 920321, Advanced Emissions Speciation Methodologies for the Auto/Oil Air Quality Improvement Research Program – II. Aldehydes, Ketones, and Alcohols

A later update to the HC and Oxygenates procedures was published as:

SAE 930142, Improved Emissions Speciations Methodology for Phase II of the Auto/Oil Air Quality Improvement Program Hydrocarbons and Oxygenates

(See also, for reference, ARB's SOP NO. MLD 115, "Procedure for the Determination of Ethers and Alcohols in Gasoline by Gas Chromatography", January 2003, and SOP NO. MLD 118, "Procedures for the Detailed Hydrocarbon Analysis of Gasolines by Single Column High Efficiency (Capillary) Column Gas Chromatography", August 1997)

Instrumentation demands are simplified, and overall analysis time is shortened; yet high resolution and sensitivity are still achieved. In this single-GC/dual column method, all components are separated using on column type and temperature program. Analysis time for a cycle is 65 minutes. Each exhaust or evaporative gas sample is simultaneously injected (using a single sampling from the bag) into two identical columns present in the GC. A Varian Model 3400 GC is used for hydrocarbon (HC) analysis. The GC is equipped with a dual temperature-controlled Valco 6-port valve injector; dual flame ionization detectors (FID), and dual 60 meter x 0.32-mm ID fused silica capillary columns with 1.0µ polydimethylsiloxane stationary phase (J&W DB-1). One of the injectors uses an 85 µL sampling loop for low sensitivity analysis of C_1-C_{12} while the other injector either uses a 1000 µL loop for high sensitivity analysis of C_4-C_{12} (for simultaneous low/high sensitivity analysis of a single bag sample). Column A contains a 85µl sample loop (splitless injection) that provides an injection volume that is small enough to allow resolution of the C_1 through C_4 hydrocarbons while large enough to retain the highest sensitivity possible. Column B receives a 1000µl splitless injection, providing higher sensitivity for components eluting after isobutane. Quantitative comparison of two overlap components

(butane and isopentane) provides a quality control measure. Data from Column A is used to detect and quantitate the 12 earliest eluting hydrocarbons with detection limits of 15-25 ppb_vC corresponding to 0.2-0.3 mg/mi hydrocarbon for FTP stages 1 and 3, and 0.3-0.5 mg/mi for FTP stage 2. Data from Column B gives detection limits 0.017-0.04 mg/mi HC for components eluting after isopentane (18th in elution order). The components eluting between the 9th and 18th in elution order have detection limits ranging between the levels listed above for each column.

The advantage of this approach is that, even for relatively clean vehicles, essentially all of the first 12 species are typically present at levels exceeding the Column A detection limit. Those speciated components that are below the first column detection limit tend to be in the molecular weight range best suited for the 1000µl injection analysis, which provides the limits 0.017-0.04 mg/mi HC for components eluting after isopentane (18th in elution order), where additional sensitivity is needed. In previous work that applied this analysis approach, detection limits were determined to be between 0.02-0.06 mg/mi for the toxics 1,3-butadiene and benzene.
ATL's hydrocarbon method uses Varian 3600 GCs with dual injectors, columns, and flame ionization detectors, allowing two similar analyses to be run simultaneously, as mentioned above. A Varian Star PC-based (using Microsoft Windows™) data system is used for data acquisition. Custom-made software is used for peak identification and converting data into a Microsoft Excel™ spreadsheet format. A comparison of the total hydrocarbon determined using the GC versus the CVS ("speciation recovery") is used as a quality control measure, and ATL routinely achieves hydrocarbon speciation recoveries ranging from 93% to 105% for lower emitting vehicles. A 23 hydrocarbon component standard mixture is analyzed at the start of each day on each GC to provide quantifying coefficients and a quality control check on daily reproducibility of instrument performance.

Appendix IV – Speciation and Reactivity Results

Appendix I contains the individual vehicle data generated from the speciation tests performed on all the evaporative tests run for this program.

For each vehicle there is a summary table reactivity results followed by the speciation results for each test. The data shown for the speciation test is sorted by decreasing VOC mass identified.

Vehicle 206c

Test	Fuel	Test No.	Bag THC mg	GC as % of THC	GC VOC mg	Ozone mg	Reactivity	Species Present
86° F	E20 - 9 psi	7685	168.0	96.5	162.0	541.1	3.340	60
Static	E20 - 7 psi	7724	186.7	116.9	218.3	910.4	4.170	77
105° F	E20 - 9 psi	7689	349.2	99.3	346.6	1186.7	3.424	70
Static	E20 - 7 psi	7727	454.7	120.4	547.2	1825.1	3.335	78
Dynamic	E20 - 9 psi	25795	420.6	109.0	458.2	1709.2	3.730	69
	E20 - 7 psi	25806	615.1	116.5	716.5	2648.1	3.696	75
DHB	E20 - 9 psi	7703	5447.3	94.5	5145.3	17296.7	3.362	101
Total	E20 - 7 psi	7779	5219.7	92.8	4845.4	14230.9	2.937	102

Vehicle 206c - Fuel 9 psi E20 - 86°F Static - Test 7685					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	40.93	59.307	
Toluene	00108-88-3	3.93	11.67	45.800	
2-Methylbutane (Isopentane)	00078-78-4	1.35	11.14	15.091	
n-Pentane	00109-66-0	1.21	6.48	7.871	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	6.30	46.563	
n-Butane	00106-97-8	1.08	6.07	6.533	
Cyclohexane	00110-82-7	1.14	5.52	6.281	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	5.29	28.046	
Benzene	00071-43-2	0.69	5.28	3.668	
Propane	00074-98-6	0.46	4.24	1.938	
t-2-Pentene	00646-04-8	10.47	3.99	41.785	
n-Heptane	00142-82-5	0.97	3.78	3.649	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	3.76	29.140	
n-Hexane	00110-54-3	1.13	3.71	4.207	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	2.93	15.716	
2-Methyl-2-butene	00513-35-9	14.20	2.84	40.369	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	2.71	3.791	
Methylcyclohexane	00108-87-2	1.56	2.27	3.531	
c-2-Pentene	00627-20-3	10.28	1.88	19.331	
Methylcyclopentane	00096-37-7	2.05	1.81	3.718	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	1.81	21.222	
3-Methylpentane	00096-14-0	1.69	1.70	2.882	
2-Methyl-1-butene	00563-46-2	6.38	1.60	10.232	
2-Methylpropane	00075-28-5	1.18	1.52	1.783	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	1.51	4.827	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	1.39	6.111	
ortho-Xylene	00095-47-6	7.58	1.33	10.090	
2-Methylhexane	00591-76-4	1.09	1.19	1.287	
n-Octane	00111-65-9	0.80	1.13	0.900	
t-2-Hexene	04050-45-7	8.55	1.09	9.344	
n-Propylbenzene	00103-65-1	1.96	0.89	1.748	
1,3,5-Trimethylbenzene	00108-67-8	11.75	0.81	9.575	
2,3-Dimethylbutane	00079-29-8	0.90	0.80	0.716	
Cyclopentene	00142-29-0	6.69	0.76	5.114	
3-Methyl-c-2-pentene	00922-62-3	12.52	0.73	9.169	
1-Methylcyclopentene	00693-89-0	12.45	0.71	8.838	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	0.69	4.537	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	0.66	0.792	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	0.66	3.633	
2,4,4-Trimethyl-2-Pentene	00107-40-4	6.30	0.65	4.119	
3-Methyl-t-2-pentene	00616-12-6	11.66	0.64	7.473	
2-Methyl-2-pentene	00625-27-4	11.03	0.64	7.008	
3-Methylheptane	00589-81-1	1.12	0.61	0.683	
c-2-Butene	00590-18-1	14.26	0.59	8.461	

Vehicle 206c - Fuel 9 psi E20 - 86°F Static - Test 7685 continued					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2,3-Dimethylpentane	00565-59-3	1.25	0.57	0.715	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	0.50	0.545	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	0.48	3.777	
2,4-Dimethylpentane	00108-08-7	1.46	0.46	0.665	
2,2,5-Trimethylhexane	03522-94-9	1.05	0.45	0.474	
2-Methylheptane	00592-27-8	0.97	0.44	0.430	
t-3-Hexene & c-3-Hexene	13269-52-8+07642-09-3	7.43	0.39	2.934	
2,3,4-Trimethylpentane	00565-75-3	0.95	0.39	0.371	
t-1,2-Dimethylcyclopentane	00822-50-4	3.32	0.32	1.067	
c-1,3-Dimethylcyclopentane	02532-58-3	3.32	0.31	1.027	
Ethylbenzene	00100-41-4	2.96	0.28	0.831	
c-1,3-Dimethylcyclohexane	00638-04-0	3.32	0.21	0.707	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	0.18	0.295	
2,4-Dimethylhexane	00589-43-5	1.61	0.14	0.230	
2,2-Dimethylbutane	00075-83-2	1.11	0.13	0.147	
n-Undecane	01120-21-4	0.52	0.03	0.017	
		Total	162.0	541.1	3.340
No MIR available, use weighted average of 3.322					

Vehicle 206c - Fuel 9 psi E20 - 105°F Static - Test 7689					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	77.32	112.029	
Toluene	00108-88-3	3.93	28.26	110.931	
2-Methylbutane (Isopentane)	00078-78-4	1.35	22.49	30.476	
n-Pentane	00109-66-0	1.21	16.69	20.279	
n-Butane	00106-97-8	1.08	15.31	16.491	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	14.40	76.281	
Benzene	00071-43-2	0.69	13.17	9.145	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	10.36	80.328	
n-Hexane	00110-54-3	1.13	9.84	11.164	
n-Heptane	00142-82-5	0.97	9.55	9.227	
t-2-Pentene	00646-04-8	10.47	8.67	90.854	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	8.08	43.401	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	7.70	10.763	
2-Methyl-2-butene	00513-35-9	14.20	7.64	108.513	
2,2-DiMeHexane	00590-73-8	0.94	6.48	6.097	
3-Me-1-Hexene	03404-61-3	4.27	5.97	25.518	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	4.93	21.677	
2-Methylpropane	00075-28-5	1.18	4.83	5.687	
Methylcyclopentane	00096-37-7	2.05	4.82	9.875	
3-Methylpentane	00096-14-0	1.69	4.23	7.157	
c-2-Pentene	00627-20-3	10.28	3.98	40.907	
2-Methyl-1-butene	00563-46-2	6.38	3.89	24.834	
1,3,5-Trimethylbenzene	00108-67-8	11.75	3.39	39.892	
Propane	00074-98-6	0.46	3.01	1.376	
ortho-Xylene	00095-47-6	7.58	2.77	21.014	
n-Octane	00111-65-9	0.80	2.63	2.092	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	2.43	2.919	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	2.41	28.204	
t-2-Hexene	04050-45-7	8.55	2.32	19.857	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	2.13	11.803	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	1.96	14.452	
2,3-Dimethylbutane	00079-29-8	0.90	1.88	1.693	
2-Methylhexane	00591-76-4	1.09	1.84	1.996	
c-2-Butene	00590-18-1	14.26	1.77	25.239	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	1.77	5.633	
Ethylbenzene	00100-41-4	2.96	1.69	5.008	
1-Methylcyclopentene	00693-89-0	12.45	1.65	20.562	
n-Propylbenzene	00103-65-1	1.96	1.59	3.125	
3-Methyl-t-2-pentene	00616-12-6	11.66	1.54	17.969	
Cyclopentene	00142-29-0	6.69	1.32	8.836	
Cyclopentane	00287-92-3	2.24	1.32	2.955	
2-Methylheptane	00592-27-8	0.97	1.26	1.223	
3-Methyl-c-2-pentene	00922-62-3	12.52	1.20	14.989	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	1.17	7.728	

Vehicle 206c - Fuel 9 psi E20 - 105°F Static - Test 7689 continued					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2-Methyl-2-pentene	00625-27-4	11.03	1.12	12.354	
2,3,4-Trimethylpentane	00565-75-3	0.95	0.96	0.912	
1,2,3-Trimethylbenzene	00526-73-8	11.94	0.95	11.335	
3-Methylheptane	00589-81-1	1.12	0.94	1.061	
2,3-Dimethylpentane	00565-59-3	1.25	0.76	0.954	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	0.76	6.052	
c-1,3-Dimethylcyclohexane	00638-04-0	3.40	0.75	2.546	
2,4-Dimethylpentane	00108-08-7	1.46	0.72	1.057	
t-1,2-Dimethylcyclopentane	00822-50-4	3.40	0.68	2.298	
Ethylcyclohexane	01678-91-7	1.35	0.63	0.847	
3 & 4-Methyl-1-Pentenes	00691-37-2+00760-20-3	5.78	0.61	3.552	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	0.60	0.963	
2,4-Dimethylhexane	00589-43-5	1.61	0.57	0.919	
4-Methyloctane	02216-34-4	0.85	0.53	0.449	
2,2-Dimethylbutane	00075-83-2	1.11	0.51	0.570	
c-1,3-Dimethylcyclopentane	02532-58-3	3.40	0.48	1.619	
Unknown #1		3.40	0.47	1.585	
t-1,4-Dimethylcyclohexane	02207-04-7	3.40	0.45	1.535	
1,2-Dimethyl-4-Ethylbenzene	00934-80-5	7.54	0.44	3.289	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	0.38	0.420	
3-Methyloctane	02216-33-3	0.88	0.38	0.337	
n-Nonane	00111-84-2	0.68	0.35	0.239	
3,3-Dimethylpentane	00562-49-2	1.12	0.25	0.285	
2,2-Dimethylpentane	00590-35-2	1.04	0.25	0.260	
2,2,5-Trimethylhexane	03522-94-9	1.05	0.24	0.257	
1-Methyl-3-Propylbenzene	01074-43-7	7.08	0.11	0.776	
		Total	346.6	1186.7	3.424
No MIR available, use weighted average of 3.396					

Vehicle 206c - Fuel 9 psi E20 - Dynamic - Test 25795					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	73.27	106.160	
Toluene	00108-88-3	3.93	35.83	140.646	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	23.09	123.990	
n-Heptane	00142-82-5	0.97	19.94	19.258	
2-Methylbutane (Isopentane)	00078-78-4	1.35	19.04	25.801	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	18.81	145.846	
3-Me-1-Hexene	03404-61-3	4.27	16.76	71.615	
Benzene	00071-43-2	0.69	15.85	11.004	
n-Pentane	00109-66-0	1.21	15.66	19.031	
n-Butane	00106-97-8	1.08	13.25	14.268	
n-Hexane	00110-54-3	1.13	12.27	13.926	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	12.13	64.245	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	11.88	52.213	
2,2-DiMeHexane	00590-73-8	0.94	10.09	9.495	
1,3,5-Trimethylbenzene	00108-67-8	11.75	9.45	111.076	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	7.97	11.138	
2-Methyl-2-butene	00513-35-9	14.20	7.47	105.970	
t-2-Pentene	00646-04-8	10.47	6.20	64.956	
Methylcyclopentane	00096-37-7	2.05	6.20	12.702	
3-Methylpentane	00096-14-0	1.69	5.04	8.518	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	4.95	7.953	
Indan	00496-11-7	3.23	4.91	15.896	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	4.82	5.780	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	4.82	26.685	
Unknown #16		3.62	4.81	17.425	
1,2,3-Trimethylbenzene	00526-73-8	11.94	4.45	53.161	
c-2-Pentene	00627-20-3	10.28	4.39	45.108	
1-Methyl-2-Propylbenzene	01074-17-5	5.43	4.29	23.286	
2-Methylpropane	00075-28-5	1.18	4.26	5.010	
n-Octane	00111-65-9	0.80	4.21	3.351	
2-Methyl-1-butene	00563-46-2	6.38	4.00	25.494	
ortho-Xylene	00095-47-6	7.58	3.65	27.632	
Ethylbenzene	00100-41-4	2.96	3.62	10.735	
2-Methylheptane	00592-27-8	0.97	3.60	3.479	
3-Methylheptane	00589-81-1	1.12	3.08	3.463	
1-Methyl-3-Propylbenzene	01074-43-7	7.08	2.99	21.195	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	2.99	35.001	
2-Methylhexane	00591-76-4	1.09	2.56	2.775	
2,3,4-Trimethylpentane	00565-75-3	0.95	2.52	2.387	
2,3-Dimethylbutane	00079-29-8	0.90	2.43	2.181	
t-1,2-Dimethylcyclopentane	00822-50-4	3.62	2.33	8.453	
Unknown #22	.	3.62	2.15	7.784	
c-1,3-Dimethylcyclohexane	00638-04-0	3.62	2.12	7.694	
1-Methylcyclopentene	00693-89-0	12.45	2.10	26.118	

Vehicle 206c - Fuel 9 psi E20 - Dynamic - Test 25795 continued					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
c-1,3-Dimethylcyclopentane	02532-58-3	3.62	1.99	7.209	
n-Nonane	00111-84-2	0.68	1.89	1.293	
1,4-Dimethyl-2-Ethylbenzene	01758-88-9	7.54	1.88	14.159	
n-Propylbenzene	00103-65-1	1.96	1.87	3.660	
Cyclopentene	00142-29-0	6.69	1.81	12.085	
3-Methyl-t-2-pentene	00616-12-6	11.66	1.77	20.606	
3-Methyl-c-2-pentene	00922-62-3	12.52	1.63	20.443	
1,3-Dimethyl-2-Ethylbenzene	02870-04-4	10.16	1.47	14.906	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	1.46	4.663	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	1.41	1.540	
2,3,5-Trimethylhexane	01069-53-0	1.12	1.36	1.524	
2,2-Dimethylpentane	00590-35-2	1.04	1.26	1.310	
2,4,4-TMe-1- & 2,3-DMe-2-Pentene	00107-39-1+10574-37-5	6.54	1.21	7.928	
1,4-Diethylbenzene	00105-05-5	4.39	1.17	5.152	
c-2-Butene	00590-18-1	14.26	1.15	16.375	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	1.14	7.538	
2-Methyl-1,3-butadiene	00078-79-5	10.48	1.14	11.930	
t-2-Hexene	04050-45-7	8.55	1.07	9.180	
2,2-Dimethylbutane	00075-83-2	1.11	1.03	1.150	
2-Methyl-2-pentene	00625-27-4	11.03	0.96	10.613	
4-Methyl-t-2-pentene	00674-76-0	8.04	0.94	7.554	
1-Methyl-4-Isobutylbenzene	05161-04-6	3.82	0.76	2.895	
n-Decane	00124-18-5	0.59	0.72	0.424	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	0.45	3.597	
Unknown #1		3.62	0.44	1.580	
		Total	458.2	1709.2	3.730
No MIR available, use weighted average of 3.6208					

Vehicle 206c - Fuel 9 psi E20 - 3 Day Diurnal - Test 7703					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	1017.48	1474.297	
2-Methylbutane (Isopentane)	00078-78-4	1.35	379.67	514.406	
n-Pentane	00109-66-0	1.21	335.10	407.124	
n-Butane	00106-97-8	1.08	320.07	344.688	
Toluene	00108-88-3	3.93	279.47	1096.913	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	272.63	1444.528	
Benzene	00071-43-2	0.69	205.86	142.938	
n-Hexane	00110-54-3	1.13	183.93	208.697	
n-Heptane	00142-82-5	0.97	172.84	166.926	
t-2-Pentene	00646-04-8	10.47	162.60	1702.998	
2-Methyl-2-butene	00513-35-9	14.20	152.72	2167.853	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	146.70	205.061	
3-Me-1-Hexene	03404-61-3	4.27	103.91	444.084	
2-Methylpropane	00075-28-5	1.18	101.16	119.030	
Methylcyclopentane	00096-37-7	2.05	88.84	182.111	
2,2-DiMeHexane	00590-73-8	0.94	82.00	77.181	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	78.81	611.209	
c-2-Pentene	00627-20-3	10.28	76.70	788.622	
3-Methylpentane	00096-14-0	1.69	76.68	129.648	
2-Methyl-1-butene	00563-46-2	6.38	62.75	400.280	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	52.23	611.345	
t-2-Hexene	04050-45-7	8.55	41.65	356.031	
2-Methylhexane	00591-76-4	1.09	36.43	39.538	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	35.13	259.471	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	32.93	176.785	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	32.63	104.117	
n-Octane	00111-65-9	0.80	32.49	25.870	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	32.46	38.925	
c-2-Butene	00590-18-1	14.26	30.92	440.893	
1-Methylcyclopentene	00693-89-0	12.45	30.43	379.046	
2,3-Dimethylbutane	00079-29-8	0.90	29.52	26.532	
Cyclopentene	00142-29-0	6.69	29.22	195.335	
3-Methyl-t-2-pentene	00616-12-6	11.66	26.69	311.214	
Cyclopentane	00287-92-3	2.24	25.40	56.827	
Propane	00074-98-6	0.46	24.28	11.101	
3-Methyl-c-2-pentene	00922-62-3	12.52	22.77	285.007	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	21.13	139.567	
2-Methyl-2-pentene	00625-27-4	11.03	19.64	216.725	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	18.75	82.383	
2,4-Dimethylpentane	00108-08-7	1.46	15.38	22.451	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	15.10	24.247	
ortho-Xylene	00095-47-6	7.58	14.25	107.970	
2,3-Dimethylpentane	00565-59-3	1.25	13.73	17.140	
2,3,4-Trimethylpentane	00565-75-3	0.95	13.54	12.850	

Vehicle 206c - Fuel 9 psi E20 - 3 Day Diurnal - Test 7703 continued

Non Zero Mass Species Sorted By VOC

Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2-Methylheptane	00592-27-8	0.97	12.71	12.292	
Ethylbenzene	00100-41-4	2.96	12.37	36.651	
2,2-Dimethylbutane	00075-83-2	1.11	11.66	12.955	
1,3,5-Trimethylbenzene	00108-67-8	11.75	11.33	133.193	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	11.28	89.574	
3-Methylheptane	00589-81-1	1.12	10.21	11.484	
t-1,2-Dimethylcyclopentane	00822-50-4	3.33	10.04	33.460	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	9.10	50.428	
c-1,3-Dimethylcyclopentane	02532-58-3	3.33	8.68	28.956	
n-Propylbenzene	00103-65-1	1.96	8.17	16.017	
c-1,3-Dimethylcyclohexane	00638-04-0	3.33	7.88	26.259	
3 & 4-Methyl-1-Pentenes	00691-37-2+00760-20-3	5.78	7.05	40.714	
2,3,5-Trimethylhexane	01069-53-0	1.12	5.65	6.329	
Ethylcyclohexane	01678-91-7	1.35	5.56	7.475	
n-Nonane	00111-84-2	0.68	4.89	3.336	
Unknown #1		3.33	4.88	16.281	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	4.50	4.913	
2,2-Dimethylpentane	00590-35-2	1.04	4.24	4.421	
4-Methyloctane	02216-34-4	0.85	3.29	2.788	
2,2,5-Trimethylhexane	03522-94-9	1.05	3.16	3.326	
1,2,3-Trimethylbenzene	00526-73-8	11.94	2.87	34.282	
3-Methyloctane	02216-33-3	0.88	2.87	2.536	
3,3-Dimethylpentane	00562-49-2	1.12	2.84	3.172	
2-Methyl-1,3-butadiene	00078-79-5	10.48	2.47	25.888	
3,3-Dimethylhexane	00563-16-6	1.15	2.14	2.470	
Ethylene	00074-85-1	8.88	1.98	17.628	
t-1,3 & c-1,4-DiMeCyHexane	02207-03-6+00624-29-3	3.33	1.78	5.925	
1-Octene	00111-66-0	3.14	1.70	5.347	
c-2-Heptene	06443-92-1	7.08	1.47	10.435	
Unknown #8		3.33	1.47	4.886	
2,2,3-Trimethylbutane	00464-06-2	1.05	1.41	1.491	
Unknown #5		3.33	1.32	4.386	
1-Nonene	00124-11-8	2.49	1.22	3.031	
Unknown #6	.	3.33	1.21	4.021	
Unknown #16		3.33	1.20	4.008	
Unknown #9		3.33	1.18	3.924	
1-Methyl-3-Propylbenzene	01074-43-7	7.08	1.18	8.333	
Isopropylbenzene (Cumene)	00098-82-8	3.33	1.16	3.880	
Indan	00496-11-7	3.23	1.04	3.374	
Styrene	00100-42-5	1.66	0.95	1.585	
2,4-Dimethylheptane	02213-23-2	1.26	0.90	1.141	

Vehicle 206c - Fuel 9 psi E20 - 3 Day Diurnal - Test 7703 continued

Non Zero Mass Species Sorted By VOC

Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2-MeOctane & 2,3-DiMeHeptane	03074-71-3+03221-61-2	0.85	0.78	0.666	
Unknown #3		3.33	0.72	2.404	
3-Me-t-3-Hexene & t-2-Heptene	03899-36-3+14686-13-6	8.38	0.71	5.945	
n-Decane	00124-18-5	0.59	0.67	0.395	
2,4,4-TMe-1- & 2,3-DMe-2-Pentene	00107-39-1+10574-37-5	6.54	0.63	4.105	
2,4-DiMeOctane+AlBenz+PrCyHexane	04032-94-4+00300-57-2+	1.18	0.62	0.737	
Unknown #14		3.33	0.55	1.850	
1-Heptene	00592-76-7	4.29	0.51	2.194	
1,3-Butadiene	00106-99-0	12.45	0.43	5.325	
c-1,2-Dimethylcyclohexane	02207-01-4	3.33	0.43	1.424	
4-Methyl-t-2-pentene	00674-76-0	8.04	0.40	3.190	
c- & t-4-Nonene	02198-23-4	4.42	0.37	1.618	
sec-Butylbenzene	00135-98-8	2.29	0.36	0.819	
1,4-Diethylbenzene	00105-05-5	4.39	0.23	0.997	
3-Ethyl-c-2-Pentene	00816-79-5	9.76	0.22	2.148	
1-Methyl-4-Isobutylbenzene	05161-04-6	3.82	0.09	0.349	
		Total	5145.3	17296.7	3.362
No MIR available, use weighted average of 3.3341					

Vehicle 206c - Fuel 7 psi E20 - 86°F Static - Test 7724					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	28.84	41.793	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	14.90	115.566	
Toluene	00108-88-3	3.93	12.17	47.766	
Benzene	00071-43-2	0.69	7.47	5.186	
2-Methylbutane (Isopentane)	00078-78-4	1.35	7.44	10.083	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	7.29	38.615	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	7.11	31.251	
n-Pentane	00109-66-0	1.21	6.84	8.305	
n-Butane	00106-97-8	1.08	6.11	6.584	
Methylcyclohexane	00108-87-2	1.56	5.51	8.576	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	5.30	28.454	
n-Hexane	00110-54-3	1.13	4.98	5.652	
1,3,5-Trimethylbenzene	00108-67-8	11.75	4.82	56.673	
n-Heptane	00142-82-5	0.97	4.75	4.583	
Propane	00074-98-6	0.46	4.68	2.137	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	4.16	48.681	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	4.03	4.834	
2-Methyl-2-butene	00513-35-9	14.20	3.56	50.602	
t-2-Pentene	00646-04-8	10.47	3.47	36.348	
ortho-Xylene	00095-47-6	7.58	3.23	24.490	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	3.15	17.481	
c-2-Butene	00590-18-1	14.26	3.12	44.524	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	2.91	21.483	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	2.90	4.048	
n-Octane	00111-65-9	0.80	2.89	2.300	
n-Propylbenzene	00103-65-1	1.96	2.72	5.339	
Cyclohexane	00110-82-7	1.14	2.67	3.042	
2-Methylhexane	00591-76-4	1.09	2.67	2.898	
2,3-Dimethylbutane	00079-29-8	0.90	2.59	2.328	
Ethylbenzene	00100-41-4	2.96	2.28	6.765	
t-2-Hexene	04050-45-7	8.55	2.27	19.378	
Methylcyclopentane	00096-37-7	2.05	2.21	4.529	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	2.04	6.504	
1,2,3-Trimethylbenzene	00526-73-8	11.94	1.80	21.485	
Cyclopentane	00287-92-3	2.24	1.67	3.744	
1-Methylcyclopentene	00693-89-0	12.45	1.61	20.099	
3-Methyl-t-2-pentene	00616-12-6	11.66	1.54	17.932	
2-Methyl-1-butene	00563-46-2	6.38	1.50	9.546	
3-Methyl-c-2-pentene	00922-62-3	12.52	1.46	18.246	
Cyclopentene	00142-29-0	6.69	1.45	9.721	
2-Methylheptane	00592-27-8	0.97	1.44	1.394	
2,4-Dimethylpentane	00108-08-7	1.46	1.38	2.009	
c-2-Pentene	00627-20-3	10.28	1.35	13.873	
2,3,4-Trimethylpentane	00565-75-3	0.95	1.33	1.265	

Vehicle 206c - Fuel 7 psi E20 - 86°F Static - Test 7724 continued

Non Zero Mass Species Sorted By VOC

Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
3-Methylheptane	00589-81-1	1.12	1.31	1.478	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	1.31	8.644	
3-Methylpentane	00096-14-0	1.69	1.23	2.086	
2,3-Dimethylpentane	00565-59-3	1.25	1.23	1.535	
2-Methyl-2-pentene	00625-27-4	11.03	1.22	13.422	
2,4-Dimethylhexane	00589-43-5	1.61	1.03	1.653	
Indan	00496-11-7	3.23	0.87	2.810	
2,2-Dimethylbutane	00075-83-2	1.11	0.86	0.952	
n-Nonane	00111-84-2	0.68	0.85	0.583	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	0.84	6.702	
t-1,2-Dimethylcyclopentane	00822-50-4	4.12	0.70	2.886	
1-Methyl-3-Propylbenzene	01074-43-7	7.08	0.69	4.869	
c-1,3-Dimethylcyclopentane	02532-58-3	4.12	0.62	2.553	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	0.60	0.652	
Ethylcyclohexane	01678-91-7	1.35	0.57	0.773	
1-MeCyHexene & 4-MeHeptane	00591-49-1+00589-53-7	3.86	0.57	2.213	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	0.53	0.849	
2,2,5-Trimethylhexane	03522-94-9	1.05	0.52	0.545	
2,2-Dimethylpentane	00590-35-2	1.04	0.47	0.489	
3 & 4-Methyl-1-Pentenes	00691-37-2+00760-20-3	5.78	0.45	2.621	
1,4-Diethylbenzene	00105-05-5	4.39	0.45	1.982	
c-1,3-Dimethylcyclohexane	00638-04-0	4.12	0.44	1.831	
4-Methyloctane	02216-34-4	0.85	0.43	0.366	
4-Methyl-t-2-pentene	00674-76-0	8.04	0.41	3.322	
Unknown #1		4.12	0.34	1.408	
Isopropylbenzene (Cumene)	00098-82-8	4.12	0.32	1.332	
2-Methylpropane	00075-28-5	1.18	0.29	0.340	
n-Undecane	01120-21-4	0.52	0.29	0.150	
2-Methyl-1,3-butadiene	00078-79-5	10.48	0.27	2.880	
3,3-Dimethylpentane	00562-49-2	1.12	0.26	0.295	
t-1,4-Dimethylcyclohexane	02207-04-7	4.12	0.26	1.074	
1-Methyl-4-Isobutylbenzene	05161-04-6	3.82	0.21	0.819	
3-Methyloctane	02216-33-3	0.88	0.20	0.174	
		Total	218.3	910.4	4.170
No MIR available, use weightedaverage of 4.1197					

Vehicle 206c - Fuel 7 psi E20 - 105°F Static - Test 7727					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	101.02	146.374	
Toluene	00108-88-3	3.93	40.80	160.133	
3-Methylnonane	05911-04-6	0.66	33.38	21.890	
2-Methylbutane (Isopentane)	00078-78-4	1.35	28.31	38.354	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	23.48	182.135	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	23.40	124.000	
n-Pentane	00109-66-0	1.21	23.00	27.949	
Benzene	00071-43-2	0.69	21.08	14.635	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	20.78	153.495	
n-Butane	00106-97-8	1.08	20.75	22.348	
n-Heptane	00142-82-5	0.97	17.77	17.164	
n-Hexane	00110-54-3	1.13	15.65	17.760	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	10.68	14.926	
t-2-Pentene	00646-04-8	10.47	10.24	107.279	
2-Methyl-2-butene	00513-35-9	14.20	10.09	143.288	
Cyclohexane	00110-82-7	1.14	9.26	10.529	
Methylcyclohexane	00108-87-2	1.56	8.87	13.801	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	8.61	37.818	
Methylcyclopentane	00096-37-7	2.05	7.14	14.629	
1,3,5-Trimethylbenzene	00108-67-8	11.75	5.95	69.896	
3-Methylpentane	00096-14-0	1.69	5.68	9.606	
c-2-Pentene	00627-20-3	10.28	4.98	51.245	
2-Methyl-1-butene	00563-46-2	6.38	4.95	31.574	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	4.70	26.061	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	4.54	53.160	
n-Octane	00111-65-9	0.80	4.54	3.615	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	4.42	5.303	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	4.32	13.780	
ortho-Xylene	00095-47-6	7.58	4.03	30.538	
2-Methylhexane	00591-76-4	1.09	3.50	3.798	
n-Propylbenzene	00103-65-1	1.96	3.45	6.759	
Ethylbenzene	00100-41-4	2.96	3.12	9.251	
t-2-Hexene	04050-45-7	8.55	3.07	26.270	
2-Methylpropane	00075-28-5	1.18	2.62	3.081	
Cyclopentane	00287-92-3	2.24	2.50	5.589	
1-Methylcyclopentene	00693-89-0	12.45	2.47	30.804	
Cyclopentene	00142-29-0	6.69	2.11	14.108	
Propane	00074-98-6	0.46	1.92	0.880	
3-Methyl-t-2-pentene	00616-12-6	11.66	1.92	22.393	
n-Nonane	00111-84-2	0.68	1.86	1.270	
1-Methyl-4-Isobutylbenzene	05161-04-6	3.82	1.85	7.054	
2,3-Dimethylbutane	00079-29-8	0.90	1.79	1.613	
2,3-Dimethylpentane	00565-59-3	1.25	1.70	2.128	
2,3,4-Trimethylpentane	00565-75-3	0.95	1.68	1.599	

Vehicle 206c - Fuel 7 psi E20 - 105°F Static - Test 7727 continued					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethylcyclohexane	01678-91-7	1.35	1.56	2.095	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	1.55	10.224	
3-Methyl-c-2-pentene	00922-62-3	12.52	1.53	19.093	
2-Methyl-2-pentene	00625-27-4	11.03	1.41	15.538	
2,4-Dimethylpentane	00108-08-7	1.46	1.40	2.040	
2,4-Dimethylhexane	00589-43-5	1.61	1.32	2.114	
c-1,3-Dimethylcyclohexane	00638-04-0	3.30	1.30	4.292	
2-Methylheptane	00592-27-8	0.97	1.28	1.233	
4-Methyloctane	02216-34-4	0.85	1.25	1.064	
c-2-Butene	00590-18-1	14.26	1.21	17.277	
t-1,2-Dimethylcyclopentane	00822-50-4	3.30	1.12	3.695	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	1.09	1.755	
3-Methylheptane	00589-81-1	1.12	1.09	1.223	
Indan	00496-11-7	3.23	1.04	3.361	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	0.91	7.255	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	0.91	0.990	
c-1,3-Dimethylcyclopentane	02532-58-3	3.30	0.69	2.281	
2,2,5-Trimethylhexane	03522-94-9	1.05	0.68	0.719	
n-Decane	00124-18-5	0.59	0.65	0.385	
t-1,4-Dimethylcyclohexane	02207-04-7	3.30	0.65	2.146	
1-MeCyHexene & 4-MeHeptane	00591-49-1+00589-53-7	3.86	0.63	2.441	
3-Methyloctane	02216-33-3	0.88	0.61	0.539	
1,3-Diethylbenzene	00141-93-5	7.08	0.56	3.990	
Isopropylbenzene (Cumene)	00098-82-8	3.30	0.55	1.813	
3 & 4-Methyl-1-Pentenes	00691-37-2+00760-20-3	5.78	0.53	3.038	
2,2-Dimethylpentane	00590-35-2	1.04	0.50	0.522	
Unknown #1		3.30	0.49	1.606	
2,2-Dimethylbutane	00075-83-2	1.11	0.49	0.540	
2-Methyl-1,3-butadiene	00078-79-5	10.48	0.48	5.006	
n-Undecane	01120-21-4	0.52	0.43	0.226	
c-2-Heptene	06443-92-1	7.08	0.38	2.676	
2-Methyl-2-Hexene & c-3-Heptene	02738-19-4+07642-10-6	7.84	0.36	2.834	
3,3-Dimethylpentane	00562-49-2	1.12	0.34	0.375	
Unknown #8		3.30	0.25	0.836	
	0.66	Total	547.2	1825.1	3.335
No MIR available, use weighted average of 3.3046					

Vehicle 206c - Fuel 7 psi E20 - Dynamic - Test 25806					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	104.62	151.590	
Toluene	00108-88-3	3.93	50.22	197.121	
2-Methylbutane (Isopentane)	00078-78-4	1.35	39.37	53.348	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	36.08	193.698	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	34.42	254.207	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	32.81	254.440	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	32.02	169.680	
n-Heptane	00142-82-5	0.97	25.41	24.542	
n-Pentane	00109-66-0	1.21	24.30	29.518	
Benzene	00071-43-2	0.69	23.79	16.519	
n-Butane	00106-97-8	1.08	21.72	23.395	
n-Hexane	00110-54-3	1.13	19.79	22.456	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	14.61	64.180	
Methylcyclohexane	00108-87-2	1.56	13.79	21.452	
Cyclohexane	00110-82-7	1.14	13.49	15.348	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	12.44	17.386	
Methylcyclopentane	00096-37-7	2.05	10.83	22.202	
1,3,5-Trimethylbenzene	00108-67-8	11.75	10.31	121.161	
2-Methyl-2-butene	00513-35-9	14.20	9.40	133.406	
t-2-Pentene	00646-04-8	10.47	8.57	89.767	
n-Octane	00111-65-9	0.80	8.56	6.816	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	8.39	46.500	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	7.98	93.368	
3-Methylpentane	00096-14-0	1.69	7.06	11.929	
n-Propylbenzene	00103-65-1	1.96	6.96	13.630	
2-Methyl-1-butene	00563-46-2	6.38	6.55	41.772	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	6.17	7.399	
Propane	00074-98-6	0.46	5.15	2.355	
ortho-Xylene	00095-47-6	7.58	5.06	38.317	
Ethylbenzene	00100-41-4	2.96	4.97	14.716	
3-Methylheptane	00589-81-1	1.12	4.80	5.394	
c-2-Pentene	00627-20-3	10.28	4.76	48.903	
2-Methylhexane	00591-76-4	1.09	4.25	4.611	
2-Methylpropane	00075-28-5	1.18	4.04	4.753	
3-Methyl-c-2-pentene	00922-62-3	12.52	4.01	50.144	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	3.83	25.283	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	3.77	12.027	
t-2-Hexene	04050-45-7	8.55	3.69	31.567	
n-Nonane	00111-84-2	0.68	3.55	2.423	
2-Methyl-2-pentene	00625-27-4	11.03	3.49	38.516	
c-1,3-Dimethylcyclohexane	00638-04-0	3.63	3.37	12.250	
Cyclopentane	00287-92-3	2.24	3.22	7.198	
2-Methylheptane	00592-27-8	0.97	3.17	3.071	
c-2-Butene	00590-18-1	14.26	2.92	41.607	

Vehicle 206c - Fuel 7 psi E20 - Dynamic - Test 25806 continued

Non Zero Mass Species Sorted By VOC

Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
4-Isopropyltoluene (p-Cymene)	00099-87-6	4.41	2.84	12.512	
1-Methylcyclopentene	00693-89-0	12.45	2.80	34.836	
Unknown #22	.	3.63	2.72	9.893	
2,4-Dimethylpentane	00108-08-7	1.46	2.72	3.967	
3-Methyl-t-2-pentene	00616-12-6	11.66	2.69	31.312	
Methane	00074-82-8	0.01	2.65	0.037	
2,3,4-Trimethylpentane	00565-75-3	0.95	2.61	2.477	
3-Methyloctane	02216-33-3	0.88	2.55	2.252	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	2.47	2.697	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	2.46	19.506	
3,5-Dimethylheptane	00926-82-9	1.42	2.35	3.341	
t-1,2-Dimethylcyclopentane	00822-50-4	3.63	2.25	8.161	
2,2,5-Trimethylhexane	03522-94-9	1.05	2.14	2.249	
Cyclopentene	00142-29-0	6.69	2.08	13.880	
4-Methyloctane	02216-34-4	0.85	1.99	1.691	
2,3,5-Trimethylhexane	01069-53-0	1.12	1.97	2.208	
2,3-Dimethylbutane	00079-29-8	0.90	1.88	1.688	
n-Decane	00124-18-5	0.59	1.68	0.994	
c-1,3-Dimethylcyclopentane	02532-58-3	3.63	1.63	5.933	
Indan	00496-11-7	3.23	1.60	5.191	
2,2-Dimethylpentane	00590-35-2	1.04	1.60	1.668	
1-MeCyHexene & 4-MeHeptane	00591-49-1+00589-53-7	3.86	1.48	5.724	
Unknown #18		3.63	1.47	5.331	
c-2-Heptene	06443-92-1	7.08	1.37	9.666	
t-1,4-Dimethylcyclohexane	02207-04-7	3.63	1.29	4.699	
2,3-Dimethylpentane	00565-59-3	1.25	1.28	1.597	
2,4-Dimethylhexane	00589-43-5	1.61	1.23	1.980	
3,3-Dimethylpentane	00562-49-2	1.12	1.03	1.150	
2-Methyl-1,3-butadiene	00078-79-5	10.48	0.96	10.062	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	0.63	1.008	
2,2-Dimethylbutane	00075-83-2	1.11	0.38	0.418	
		Total	716.5	2648.1	3.696
No MIR available, use weighted average of 3.6315					

Vehicle 206c - Fuel 7 psi E20 - 3 Day Diurnal - Test 7779					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	1155.02	1673.600	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	355.68	1884.515	
2-Methylbutane (Isopentane)	00078-78-4	1.35	319.22	432.501	
n-Butane	00106-97-8	1.08	266.99	287.520	
n-Pentane	00109-66-0	1.21	265.67	322.768	
Toluene	00108-88-3	3.93	238.49	936.067	
n-Heptane	00142-82-5	0.97	212.12	204.862	
n-Hexane	00110-54-3	1.13	185.20	210.141	
Benzene	00071-43-2	0.69	172.38	119.691	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	127.38	178.045	
Methylcyclohexane	00108-87-2	1.56	95.93	149.211	
Cyclohexane	00110-82-7	1.14	93.20	106.002	
t-2-Pentene	00646-04-8	10.47	91.37	956.959	
2-Methyl-2-butene	00513-35-9	14.20	91.20	1294.599	
Methylcyclopentane	00096-37-7	2.05	86.80	177.919	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	76.02	589.532	
3-Methylpentane	00096-14-0	1.69	68.66	116.094	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	50.76	60.867	
c-2-Pentene	00627-20-3	10.28	45.04	463.080	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	41.79	224.366	
n-Octane	00111-65-9	0.80	40.99	32.639	
2-Methyl-1-butene	00563-46-2	6.38	39.77	253.652	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	39.56	292.174	
2-Methylhexane	00591-76-4	1.09	37.89	41.114	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	37.85	120.788	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	32.04	374.998	
2,3-Dimethylbutane	00079-29-8	0.90	29.88	26.852	
t-2-Hexene	04050-45-7	8.55	26.86	229.656	
Cyclopentane	00287-92-3	2.24	23.14	51.777	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	22.63	99.453	
Propane	00074-98-6	0.46	20.85	9.531	
1-Methylcyclopentene	00693-89-0	12.45	20.30	252.816	
2,3,4-Trimethylpentane	00565-75-3	0.95	18.82	17.861	
2-Methylpropane	00075-28-5	1.18	18.54	21.813	
Cyclopentene	00142-29-0	6.69	18.30	122.352	
3-Methyl-t-2-pentene	00616-12-6	11.66	18.08	210.844	
2,4-Dimethylpentane	00108-08-7	1.46	17.18	25.071	
2,3-Dimethylpentane	00565-59-3	1.25	16.97	21.180	
2-Methylheptane	00592-27-8	0.97	16.88	16.323	
3-Methyl-c-2-pentene	00922-62-3	12.52	15.84	198.290	
c-2-Butene	00590-18-1	14.26	15.17	216.368	
1,3,5-Trimethylbenzene	00108-67-8	11.75	15.17	178.280	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	14.95	98.754	
2-Methyl-2-pentene	00625-27-4	11.03	14.93	164.767	

Vehicle 206c - Fuel 7 psi E20 - 3 Day Diurnal - Test 7779 continued					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
3-Methylheptane	00589-81-1	1.12	13.25	14.903	
2,4-Dimethylhexane	00589-43-5	1.61	13.22	21.223	
ortho-Xylene	00095-47-6	7.58	12.34	93.462	
Ethylbenzene	00100-41-4	2.96	11.70	34.667	
t-1,2-Dimethylcyclopentane	00822-50-4	2.91	10.73	31.194	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	10.46	57.984	
c-1,3-Dimethylcyclohexane	00638-04-0	2.91	10.37	30.141	
n-Propylbenzene	00103-65-1	1.96	9.78	19.157	
c-1,3-Dimethylcyclopentane	02532-58-3	2.91	9.35	27.181	
2,2-Dimethylbutane	00075-83-2	1.11	8.89	9.880	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	8.31	9.072	
n-Nonane	00111-84-2	0.68	7.34	5.008	
Ethylcyclohexane	01678-91-7	1.35	7.29	9.801	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	7.07	56.153	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	7.04	11.302	
c-2-Heptene	06443-92-1	7.08	6.29	44.542	
t-1,4-Dimethylcyclohexane	02207-04-7	2.91	5.57	16.207	
1-MeCyHexene & 4-MeHeptane	00591-49-1+00589-53-7	3.86	5.45	21.069	
3 & 4-Methyl-1-Pentenes	00691-37-2+00760-20-3	5.78	5.15	29.773	
2,2,5-Trimethylhexane	03522-94-9	1.05	4.43	4.664	
4-Methyloctane	02216-34-4	0.85	4.39	3.726	
2,2-Dimethylpentane	00590-35-2	1.04	3.87	4.039	
1,2,3-Trimethylbenzene	00526-73-8	11.94	3.19	38.096	
3-Methyloctane	02216-33-3	0.88	3.11	2.751	
Unknown #1		2.91	2.81	8.158	
3,3-Dimethylhexane	00563-16-6	1.15	2.74	3.158	
3,3-Dimethylpentane	00562-49-2	1.12	2.69	3.007	
Ethylene	00074-85-1	8.88	2.38	21.141	
1-Octene	00111-66-0	3.14	2.26	7.093	
Unknown #5		2.91	2.26	6.565	
2,4,4-Trimethyl-2-Pentene	00107-40-4	6.30	2.23	14.032	
2-Methyl-1,3-butadiene	00078-79-5	10.48	2.16	22.598	
2,2,3-Trimethylbutane	00464-06-2	1.05	2.15	2.265	
1-Butyne	00107-00-6	6.05	2.14	12.957	
t-1,3 & c-1,4-DiMeCyHexane	02207-03-6+00624-29-3	2.91	2.00	5.820	
Unknown #8		2.91	1.91	5.566	
2,3,5-Trimethylhexane	01069-53-0	1.12	1.77	1.986	
1-Nonene	00124-11-8	2.49	1.55	3.876	
Indan	00496-11-7	3.23	1.34	4.328	
2-MeOctane & 2,3-DiMeHeptane	03074-71-3+03221-61-2	0.85	1.30	1.114	
2,4-Dimethylheptane	02213-23-2	1.26	1.06	1.342	
2,4,4-TMe-1- & 2,3-DMe-2-Pentene	00107-39-1+10574-37-5	6.54	1.01	6.593	

Vehicle 206c - Fuel 7 psi E20 - 3 Day Diurnal - Test 7779 continued					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
c-1,2-Dimethylcyclohexane	02207-01-4	2.91	0.98	2.861	
Unknown #9		2.91	0.93	2.704	
t-4-Octene	14850-23-8	4.69	0.88	4.141	
Isopropylbenzene (Cumene)	00098-82-8	2.91	0.79	2.306	
3-Me-t-3-Hexene & t-2-Heptene	03899-36-3+14686-13-6	8.38	0.73	6.127	
n-Decane	00124-18-5	0.59	0.72	0.424	
2,4-DiMeOctane+AlBenz+PrCyHexane	04032-94-4+00300-57-2+	1.18	0.70	0.833	
Unknown #6	.	2.91	0.63	1.842	
t-3-Heptene	14686-14-7	6.17	0.58	3.603	
Unknown #3		2.91	0.50	1.460	
1,3-Butadiene	00106-99-0	12.45	0.50	6.187	
c- & t-4-Nonene	02198-23-4	4.42	0.39	1.719	
1-Methyl-4-Isobutylbenzene	05161-04-6	3.82	0.39	1.479	
1-Heptene	00592-76-7	4.29	0.35	1.513	
n-Undecane	01120-21-4	0.52	0.25	0.130	
3,5-Dimethylheptane	00926-82-9	1.42	0.21	0.302	
		Total	4845.4	14230.9	2.937
No MIR available, use weighted average of 2.9077					

Vehicle 208c

Test	Fuel	Test No.	Bag THC mg	GC as % of THC	GC VOC mg	Ozone mg	Reactivity	Species Present	
86° F	E20 - 9 psi	7695	39.9	65.3	26.0	95.6	3.672	41	*
Static	E20 - 7 psi	7750	38.1	181.5	69.1	213.8	3.094	57	
105° F	E20 - 9 psi	7699	80.8	119.0	96.2	291.9	3.034	56	
Static	E20 - 7 psi	7755	94.1	80.2	75.5	223.2	2.957	29	
Dynamic	E20 - 9 psi	25798	242.1	90.8	219.9	973.2	4.426	71	*
	E20 - 7 psi	25812	230.0	72.4	166.6	731.1	4.389	48	*
DHB	E20 - 9 psi	7713	1201.5	108.0	1298.1	3629.2	2.796	85	
Total	E20 - 7 psi	7817	1389.5	93.7	1301.9	3248.2	2.495	85	

* - No Ethanol

Vehicle 208c - Fuel 9 psi E20 - 86°F Static - Test 7695					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2-Methylbutane (Isopentane)	00078-78-4	1.35	3.43	4.646	
3-Me-1-Hexene	03404-61-3	4.27	1.93	8.262	
Toluene	00108-88-3	3.93	1.58	6.219	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	1.51	8.024	
n-Heptane	00142-82-5	0.97	1.46	1.414	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	1.38	7.414	
2,2-DiMeHexane	00590-73-8	0.94	1.36	1.277	
n-Pentane	00109-66-0	1.21	1.31	1.597	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	1.31	10.130	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	1.30	9.610	
Benzene	00071-43-2	0.69	1.09	0.753	
n-Butane	00106-97-8	1.08	1.01	1.090	
n-Octane	00111-65-9	0.80	0.58	0.466	
n-Hexane	00110-54-3	1.13	0.54	0.613	
2-Methylheptane	00592-27-8	0.97	0.48	0.466	
2-Methylpropane	00075-28-5	1.18	0.47	0.553	
Methylcyclopentane	00096-37-7	2.05	0.43	0.882	
n-Nonane	00111-84-2	0.68	0.41	0.277	
n-Propylbenzene	00103-65-1	1.96	0.33	0.656	
2-Methyl-2-pentene	00625-27-4	11.03	0.32	3.544	
ortho-Xylene	00095-47-6	7.58	0.30	2.297	
1,3,5-Trimethylbenzene	00108-67-8	11.75	0.27	3.199	
3-Methyl-c-2-pentene	00922-62-3	12.52	0.26	3.231	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	0.25	1.361	
t-3-Hexene & c-3-Hexene	13269-52-8+07642-09-3	7.43	0.24	1.790	
Cyclopentene	00142-29-0	6.69	0.22	1.454	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	0.21	0.673	
1,2,3-Trimethylbenzene	00526-73-8	11.94	0.21	2.457	
t-2-Hexene	04050-45-7	8.55	0.18	1.569	
3-Methyl-t-2-pentene	00616-12-6	11.66	0.18	2.140	
Ethylbenzene	00100-41-4	2.96	0.18	0.544	
t-2-Pentene	00646-04-8	10.47	0.18	1.912	
3-Methylpentane	00096-14-0	1.69	0.18	0.298	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	0.17	0.758	
2,3-Dimethylpentane	00565-59-3	1.25	0.15	0.190	
2-Methylhexane	00591-76-4	1.09	0.15	0.159	
2,4-Dimethylhexane	00589-43-5	1.61	0.13	0.203	
2-Methyl-2-butene	00513-35-9	14.20	0.11	1.589	
c-2-Butene	00590-18-1	14.26	0.09	1.344	
2,3,4-Trimethylpentane	00565-75-3	0.95	0.09	0.086	
1-Methylcyclopentene	00693-89-0	12.45	0.04	0.488	
		Total	26.0	95.6	3.672

Vehicle 208c - Fuel 9 psi E20 - 105°F Static - Test 7699					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	17.45	25.291	
2-Methylbutane (Isopentane)	00078-78-4	1.35	7.94	10.756	
n-Heptane	00142-82-5	0.97	7.69	7.424	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	6.97	9.748	
Benzene	00071-43-2	0.69	5.94	4.125	
Toluene	00108-88-3	3.93	4.61	18.075	
n-Pentane	00109-66-0	1.21	3.65	4.438	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	3.03	23.535	
n-Hexane	00110-54-3	1.13	2.87	3.251	
n-Butane	00106-97-8	1.08	2.73	2.945	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	2.64	13.981	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	2.16	11.574	
2,2-DiMeHexane	00590-73-8	0.94	1.72	1.616	
2-Methyl-2-butene	00513-35-9	14.20	1.70	24.078	
3-Me-1-Hexene	03404-61-3	4.27	1.56	6.681	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	1.47	10.850	
t-2-Pentene	00646-04-8	10.47	1.39	14.606	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	1.32	15.483	
Methylcyclopentane	00096-37-7	2.05	1.26	2.579	
Cyclopentane	00287-92-3	2.24	1.18	2.649	
n-Octane	00111-65-9	0.80	1.08	0.863	
3-Methylpentane	00096-14-0	1.69	1.08	1.823	
2,4-Dimethylpentane	00108-08-7	1.46	0.97	1.412	
2-Methylpropane	00075-28-5	1.18	0.94	1.110	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	0.94	4.116	
2,3-Dimethylpentane	00565-59-3	1.25	0.92	1.151	
c-2-Pentene	00627-20-3	10.28	0.85	8.778	
3-Methylheptane	00589-81-1	1.12	0.85	0.956	
n-Nonane	00111-84-2	0.68	0.84	0.576	
1,3,5-Trimethylbenzene	00108-67-8	11.75	0.80	9.351	
3-Methyl-t-2-pentene	00616-12-6	11.66	0.78	9.114	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	0.57	0.910	
2-Methyl-1-butene	00563-46-2	6.38	0.56	3.594	
c-2-Butene	00590-18-1	14.26	0.55	7.872	
ortho-Xylene	00095-47-6	7.58	0.51	3.872	
Methylcyclohexane	00108-87-2	1.56	0.51	0.789	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	0.48	2.666	
t-2-Hexene	04050-45-7	8.55	0.43	3.697	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	0.38	1.210	
Ethylbenzene	00100-41-4	2.96	0.36	1.067	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	0.35	0.421	
Cyclopentene	00142-29-0	6.69	0.29	1.922	
3 & 4-Methyl-1-Pentenes	00691-37-2+00760-20-3	5.78	0.27	1.579	
Ethylcyclohexane	01678-91-7	1.35	0.23	0.316	

Vehicle 208c - Fuel 9 psi E20 - 105°F Static - Test 7699 continued					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2-Methyl-2-pentene	00625-27-4	11.03	0.23	2.569	
2,2-Dimethylpentane	00590-35-2	1.04	0.22	0.230	
3-Methyl-c-2-pentene	00922-62-3	12.52	0.22	2.706	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	0.17	1.135	
c-1,3-Dimethylcyclohexane	00638-04-0	3.03	0.12	0.364	
2,2-Dimethylbutane	00075-83-2	1.11	0.10	0.117	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	0.09	0.751	
1,2,3-Trimethylbenzene	00526-73-8	11.94	0.08	0.996	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	0.04	0.045	
2-Methylhexane	00591-76-4	1.09	0.03	0.037	
t-1,2-Dimethylcyclopentane	00822-50-4	3.03	0.03	0.099	
2,3,4-Trimethylpentane	00565-75-3	0.95	0.02	0.022	
		Total	96.2	291.9	3.034
No MIR available, use weighted average of 3.029					

Vehicle 208c - Fuel 9 psi E20 - Dynamic - Test 25798					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2-Methylbutane (Isopentane)	00078-78-4	1.35	24.23	32.831	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	13.59	72.951	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	9.66	74.926	
Toluene	00108-88-3	3.93	9.64	37.835	
t-3-Heptene	14686-14-7	6.17	8.54	52.708	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	8.07	59.637	
n-Pentane	00109-66-0	1.21	7.09	8.608	
Benzene	00071-43-2	0.69	6.49	4.509	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	5.87	25.813	
1,3,5-Trimethylbenzene	00108-67-8	11.75	5.80	68.144	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	5.00	58.573	
3-Me-1-Hexene	03404-61-3	4.27	4.25	18.160	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	4.15	32.929	
2,2-DiMeHexane	00590-73-8	0.94	4.03	3.797	
2,2-Dimethylpropane	00463-82-1	0.65	3.94	2.549	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	3.91	21.656	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	3.89	5.439	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	3.73	19.788	
4-Methyl-t-2-pentene	00674-76-0	8.04	3.49	28.047	
n-Butane	00106-97-8	1.08	3.47	3.739	
n-Hexane	00110-54-3	1.13	3.46	3.922	
n-Propylbenzene	00103-65-1	1.96	3.35	6.568	
n-Octane	00111-65-9	0.80	3.27	2.601	
3-Methylpentane	00096-14-0	1.69	3.04	5.148	
4-Isopropyltoluene (p-Cymene)	00099-87-6	4.41	2.94	12.963	
2-Methylhexane	00591-76-4	1.09	2.90	3.146	
n-Butylbenzene	00104-51-8	2.29	2.79	6.386	
Isobutylbenzene	00538-93-2	4.22	2.73	11.524	
Indan	00496-11-7	3.23	2.72	8.810	
t-2-Pentene	00646-04-8	10.47	2.64	27.657	
Ethylbenzene	00100-41-4	2.96	2.57	7.618	
c-1,3-Dimethylcyclopentane	02532-58-3	4.22	2.53	10.661	
c-1,3-Dimethylcyclohexane	00638-04-0	4.22	2.38	10.033	
Methylcyclopentane	00096-37-7	2.05	2.35	4.813	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	2.31	3.705	
2-Methyl-2-butene	00513-35-9	14.20	2.23	31.617	
2,3,5-Trimethylhexane	01069-53-0	1.12	1.99	2.233	
2-Methyl-1-butene	00563-46-2	6.38	1.93	12.303	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	1.90	2.273	
n-Nonane	00111-84-2	0.68	1.87	1.276	
1,2,3-Trimethylbenzene	00526-73-8	11.94	1.68	20.083	
c-2-Pentene	00627-20-3	10.28	1.56	16.054	
t-2-Hexene	04050-45-7	8.55	1.54	13.191	
ortho-Xylene	00095-47-6	7.58	1.48	11.239	

Vehicle 208c - Fuel 9 psi E20 - Dynamic - Test 25798 continued

Non Zero Mass Species Sorted By VOC

Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
1,3-Butadiene	00106-99-0	12.45	1.45	18.006	
2-Methyl-1,3-butadiene	00078-79-5	10.48	1.38	14.498	
Methylcyclohexane	00108-87-2	1.56	1.34	2.089	
2-Methylheptane	00592-27-8	0.97	1.34	1.296	
2,2,5-Trimethylhexane	03522-94-9	1.05	1.31	1.383	
2,3-Dimethylbutane	00079-29-8	0.90	1.28	1.152	
4-Methyloctane	02216-34-4	0.85	1.27	1.079	
Unknown #5		4.22	1.13	4.773	
t-1,2-Dimethylcyclopentane	00822-50-4	4.22	1.10	4.644	
Ethylcyclohexane	01678-91-7	1.35	1.04	1.398	
1-Methylcyclopentene	00693-89-0	12.45	1.00	12.511	
2,3-Dimethylpentane	00565-59-3	1.25	0.98	1.225	
2-Methylpropane	00075-28-5	1.18	0.97	1.147	
Unknown #9		4.22	0.92	3.896	
3-Methyl-t-2-pentene	00616-12-6	11.66	0.76	8.865	
3-Methyl-c-2-pentene	00922-62-3	12.52	0.74	9.238	
2,2-Dimethylpentane	00590-35-2	1.04	0.66	0.690	
Cyclopentene	00142-29-0	6.69	0.65	4.325	
2,4,4-TMe-1- & 2,3-DMe-2-Pentene	00107-39-1+10574-37-5	6.54	0.64	4.179	
1,4-Diethylbenzene	00105-05-5	4.39	0.59	2.575	
2,4-Dimethylhexane	00589-43-5	1.61	0.52	0.828	
3-Methyloctane	02216-33-3	0.88	0.48	0.425	
Cyclopentadiene	00542-92-7	6.89	0.43	2.984	
2,3,4-Trimethylpentane	00565-75-3	0.95	0.35	0.334	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	0.30	0.947	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	0.14	0.154	
2,2-Dimethylbutane	00075-83-2	1.11	0.09	0.104	
		Total	219.9	973.2	4.426
No MIR available, use weighted average of 4.2187					

Vehicle 208c - Fuel 9 psi E20 - 3 Day Diurnal - Test 7713					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	402.69	583.488	
2-Methylbutane (Isopentane)	00078-78-4	1.35	87.60	118.685	
n-Pentane	00109-66-0	1.21	66.04	80.237	
n-Butane	00106-97-8	1.08	57.57	61.995	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	52.56	278.472	
n-Heptane	00142-82-5	0.97	50.13	48.416	
n-Hexane	00110-54-3	1.13	43.59	49.459	
Toluene	00108-88-3	3.93	41.28	162.007	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	37.28	52.108	
Benzene	00071-43-2	0.69	31.51	21.876	
Methylcyclohexane	00108-87-2	1.56	28.03	43.593	
2-Methyl-2-butene	00513-35-9	14.20	24.58	348.891	
t-2-Pentene	00646-04-8	10.47	23.91	250.449	
2-Methylpropane	00075-28-5	1.18	23.67	27.847	
Cyclohexane	00110-82-7	1.14	23.17	26.356	
Methylcyclopentane	00096-37-7	2.05	21.72	44.518	
3-Methylpentane	00096-14-0	1.69	19.42	32.835	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	15.60	121.016	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	13.33	155.966	
n-Octane	00111-65-9	0.80	12.26	9.760	
c-2-Pentene	00627-20-3	10.28	11.86	121.926	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	11.66	37.215	
2-Methyl-1-butene	00563-46-2	6.38	11.63	74.158	
2-Methylhexane	00591-76-4	1.09	11.19	12.144	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	10.89	58.469	
t-2-Hexene	04050-45-7	8.55	7.59	64.866	
2,3-Dimethylbutane	00079-29-8	0.90	7.00	6.289	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	6.75	8.090	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	6.09	44.991	
2-Methylheptane	00592-27-8	0.97	5.69	5.503	
c-2-Butene	00590-18-1	14.26	5.62	80.095	
Propane	00074-98-6	0.46	5.52	2.525	
Cyclopentane	00287-92-3	2.24	5.52	12.353	
1-Methylcyclopentene	00693-89-0	12.45	5.24	65.200	
3-Methyl-t-2-pentene	00616-12-6	11.66	5.18	60.429	
3-Methylheptane	00589-81-1	1.12	4.82	5.422	
Cyclopentene	00142-29-0	6.69	4.79	32.026	
3-Methyl-c-2-pentene	00922-62-3	12.52	4.69	58.697	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	4.28	28.308	
1,3,5-Trimethylbenzene	00108-67-8	11.75	4.25	49.955	
2-Methyl-2-pentene	00625-27-4	11.03	4.22	46.577	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	4.06	17.861	
c-1,3-Dimethylcyclohexane	00638-04-0	2.76	3.85	10.641	
c-1,3-Dimethylcyclopentane	02532-58-3	2.76	3.62	9.992	

Vehicle 208c - Fuel 9 psi E20 - 3 Day Diurnal - Test 7713 continued					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
n-Nonane	00111-84-2	0.68	3.49	2.384	
1-Butyne	00107-00-6	6.05	3.49	21.088	
t-1,2-Dimethylcyclopentane	00822-50-4	2.76	3.47	9.574	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	3.30	18.299	
2,4-Dimethylpentane	00108-08-7	1.46	3.15	4.591	
2,3-Dimethylpentane	00565-59-3	1.25	3.02	3.774	
2,4-Dimethylhexane	00589-43-5	1.61	2.99	4.801	
2,2-Dimethylbutane	00075-83-2	1.11	2.91	3.238	
Ethylcyclohexane	01678-91-7	1.35	2.81	3.777	
ortho-Xylene	00095-47-6	7.58	2.71	20.538	
n-Propylbenzene	00103-65-1	1.96	2.63	5.151	
Ethylbenzene	00100-41-4	2.96	2.38	7.052	
2,3,4-Trimethylpentane	00565-75-3	0.95	2.35	2.225	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	2.27	18.034	
4-Methyloctane	02216-34-4	0.85	2.23	1.894	
2,2-Dimethylpentane	00590-35-2	1.04	2.23	2.326	
3 & 4-Methyl-1-Pentenes	00691-37-2+00760-20-3	5.78	1.79	10.320	
t-1,4-Dimethylcyclohexane	02207-04-7	2.76	1.70	4.691	
3-Methyloctane	02216-33-3	0.88	1.54	1.363	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	1.41	2.266	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	1.40	1.531	
1,2,3-Trimethylbenzene	00526-73-8	11.94	1.23	14.730	
3,3-Dimethylhexane	00563-16-6	1.15	1.09	1.252	
Unknown #8		2.76	0.87	2.398	
2,2,5-Trimethylhexane	03522-94-9	1.05	0.86	0.906	
3,3-Dimethylpentane	00562-49-2	1.12	0.84	0.935	
1-Octene	00111-66-0	3.14	0.81	2.559	
t-1,3 & c-1,4-DiMeCyHexane	02207-03-6+00624-29-3	2.76	0.75	2.072	

Vehicle 208c - Fuel 9 psi E20 - 3 Day Diurnal - Test 7713 continued

Non Zero Mass Species Sorted By VOC

Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2,4-Dimethylheptane	02213-23-2	1.26	0.69	0.867	
Unknown #9		2.76	0.66	1.835	
Unknown #1		2.76	0.65	1.794	
2,3,5-Trimethylhexane	01069-53-0	1.12	0.63	0.707	
2-Methyl-1,3-butadiene	00078-79-5	10.48	0.63	6.559	
2-Methyl-2-Hexene & c-3-Heptene	02738-19-4+07642-10-6	7.84	0.58	4.547	
2,2,3-Trimethylbutane	00464-06-2	1.05	0.54	0.565	
n-Decane	00124-18-5	0.59	0.49	0.289	
Unknown #5		2.76	0.45	1.243	
c-2-Heptene	06443-92-1	7.08	0.40	2.835	
2-MeOctane & 2,3-DiMeHeptane	03074-71-3+03221-61-2	0.85	0.35	0.303	
3-Me-t-3-Hexene & t-2-Heptene	03899-36-3+14686-13-6	8.38	0.20	1.678	
1-Nonene	00124-11-8	2.49	0.19	0.476	
		Total	1298.1	3629.2	2.796
No MIR available, use weighted average of 2.7617					

Vehicle 208c - Fuel 7 psi E20 - 86°F Static - Test 7750					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	15.22	22.047	
Toluene	00108-88-3	3.93	3.72	14.601	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	3.51	18.850	
2-Methylbutane (Isopentane)	00078-78-4	1.35	3.48	4.714	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	3.28	25.413	
n-Butane	00106-97-8	1.08	2.52	2.718	
n-Pentane	00109-66-0	1.21	2.29	2.778	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	2.24	11.844	
n-Undecane	01120-21-4	0.52	2.08	1.088	
n-Decane	00124-18-5	0.59	2.02	1.193	
n-Heptane	00142-82-5	0.97	1.97	1.903	
n-Hexane	00110-54-3	1.13	1.45	1.643	
1-Butyne	00107-00-6	6.05	1.42	8.563	
Benzene	00071-43-2	0.69	1.36	0.943	
Cyclohexane	00110-82-7	1.14	1.17	1.336	
Methylcyclopentane	00096-37-7	2.05	1.15	2.366	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	1.11	1.547	
Methylcyclohexane	00108-87-2	1.56	1.08	1.686	
1-Methyl-4-Isobutylbenzene	05161-04-6	3.82	0.97	3.712	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	0.93	4.068	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	0.80	0.954	
3-Methylpentane	00096-14-0	1.69	0.77	1.305	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	0.77	5.689	
2-Methylpropane	00075-28-5	1.18	0.75	0.882	
n-Nonane	00111-84-2	0.68	0.72	0.492	
n-Propylbenzene	00103-65-1	1.96	0.70	1.366	
1,3,5-Trimethylbenzene	00108-67-8	11.75	0.69	8.097	
2,3,5-Trimethylhexane	01069-53-0	1.12	0.69	0.769	
2-Methyl-2-butene	00513-35-9	14.20	0.68	9.604	
2,3-Dimethylbutane	00079-29-8	0.90	0.61	0.546	
n-Octane	00111-65-9	0.80	0.60	0.475	
c-1,3-Dimethylcyclopentane	02532-58-3	3.05	0.58	1.770	
Cyclopentene	00142-29-0	6.69	0.54	3.587	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	0.53	3.527	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	0.53	0.583	
t-2-Pentene	00646-04-8	10.47	0.46	4.844	
ortho-Xylene	00095-47-6	7.58	0.44	3.308	
3-Methyl-c-2-pentene	00922-62-3	12.52	0.43	5.429	
2-Methylheptane	00592-27-8	0.97	0.42	0.408	
3-Methyl-t-2-pentene	00616-12-6	11.66	0.42	4.901	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	0.41	4.753	
2-Methyl-2-pentene	00625-27-4	11.03	0.39	4.343	
1-Methylcyclopentene	00693-89-0	12.45	0.34	4.220	
3-Methylheptane	00589-81-1	1.12	0.33	0.371	

Vehicle 208c - Fuel 7 psi E20 - 86°F Static - Test 7750 continued					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
c-2-Pentene	00627-20-3	10.28	0.30	3.052	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	0.27	1.519	
Unknown #22	.	3.05	0.27	0.835	
2-Methylhexane	00591-76-4	1.09	0.27	0.296	
2,3,4-Trimethylpentane	00565-75-3	0.95	0.24	0.227	
Ethylbenzene	00100-41-4	2.96	0.24	0.697	
2,4-Dimethylhexane	00589-43-5	1.61	0.22	0.354	
2,4-Dimethylpentane	00108-08-7	1.46	0.17	0.248	
c-1,3-Dimethylcyclohexane	00638-04-0	3.05	0.17	0.505	
2,2,5-Trimethylhexane	03522-94-9	1.05	0.16	0.170	
2,2-Dimethylbutane	00075-83-2	1.11	0.11	0.126	
2-Methyl-1-butene	00563-46-2	6.38	0.06	0.396	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	0.06	0.097	
		Total	69.1	213.8	3.094
No MIR available, use weightedaverage of 3.0488					

Vehicle 208c - Fuel 7 psi E20 - 105°F Static - Test 7755					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	18.71	27.109	
2-Methylbutane (Isopentane)	00078-78-4	1.35	7.96	10.781	
Toluene	00108-88-3	3.93	5.22	20.484	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	3.68	19.501	
n-Heptane	00142-82-5	0.97	3.65	3.521	
n-Pentane	00109-66-0	1.21	3.51	4.259	
n-Butane	00106-97-8	1.08	2.98	3.214	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	2.58	13.868	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	2.29	16.911	
Methylcyclopentane	00096-37-7	2.05	2.26	4.638	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	2.18	3.043	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	2.09	16.172	
Methylcyclohexane	00108-87-2	1.56	2.04	3.168	
Benzene	00071-43-2	0.69	1.98	1.372	
n-Hexane	00110-54-3	1.13	1.73	1.961	
1,3,5-Trimethylbenzene	00108-67-8	11.75	1.54	18.083	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	1.42	6.256	
t-2-Pentene	00646-04-8	10.47	1.26	13.202	
n-Octane	00111-65-9	0.80	1.16	0.924	
2-Methyl-2-butene	00513-35-9	14.20	1.15	16.378	
Cyclohexane	00110-82-7	1.14	1.08	1.232	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	1.02	1.218	
3-Methylpentane	00096-14-0	1.69	1.01	1.707	
2-Methylpropane	00075-28-5	1.18	0.75	0.884	
2-Methylhexane	00591-76-4	1.09	0.59	0.643	
ortho-Xylene	00095-47-6	7.58	0.54	4.058	
2-Methyl-1-butene	00563-46-2	6.38	0.53	3.361	
c-2-Pentene	00627-20-3	10.28	0.43	4.388	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	0.15	0.833	
	0.66	Total	75.5	223.2	2.957

Vehicle 208c - Fuel 7 psi E20 - Dynamic - Test 25812					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2-Methylbutane (Isopentane)	00078-78-4	1.35	22.86	30.975	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	18.54	99.567	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	12.81	94.590	
Toluene	00108-88-3	3.93	9.68	37.976	
1,3,5-Trimethylbenzene	00108-67-8	11.75	5.77	67.779	
n-Pentane	00109-66-0	1.21	5.22	6.345	
n-Heptane	00142-82-5	0.97	5.14	4.964	
Benzene	00071-43-2	0.69	5.12	3.553	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	4.86	25.725	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	4.66	20.498	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	4.57	36.324	
1,2,3-Trimethylbenzene	00526-73-8	11.94	4.40	52.580	
n-Propylbenzene	00103-65-1	1.96	4.34	8.506	
Methylcyclohexane	00108-87-2	1.56	3.85	5.994	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	3.73	28.911	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	3.59	42.067	
n-Octane	00111-65-9	0.80	3.41	2.712	
n-Hexane	00110-54-3	1.13	2.75	3.123	
n-Nonane	00111-84-2	0.68	2.71	1.848	
1,3-Butadiene	00106-99-0	12.45	2.47	30.791	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	2.46	3.436	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	2.38	13.167	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	2.37	7.567	
2-Methylheptane	00592-27-8	0.97	2.31	2.232	
2-Methyl-1-butene	00563-46-2	6.38	2.27	14.471	
c-2-Pentene	00627-20-3	10.28	2.21	22.769	
n-Butane	00106-97-8	1.08	1.94	2.085	
2,4-Dimethylhexane	00589-43-5	1.61	1.83	2.939	
Methylcyclopentane	00096-37-7	2.05	1.78	3.638	
Cyclohexane	00110-82-7	1.14	1.62	1.841	
2-Methyl-1,3-butadiene	00078-79-5	10.48	1.60	16.777	
2,3-Dimethylbutane	00079-29-8	0.90	1.50	1.345	
n-Decane	00124-18-5	0.59	1.36	0.802	
2,3,5-Trimethylhexane	01069-53-0	1.12	1.32	1.474	
3-Methylpentane	00096-14-0	1.69	1.31	2.214	
2-Methylhexane	00591-76-4	1.09	1.04	1.128	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	1.00	1.201	
t-2-Pentene	00646-04-8	10.47	0.70	7.355	
2,2-Dimethylbutane	00075-83-2	1.11	0.66	0.737	
3-Methylheptane	00589-81-1	1.12	0.66	0.741	
2-Methyl-2-butene	00513-35-9	14.20	0.59	8.434	
Cyclopentadiene	00542-92-7	6.89	0.59	4.036	
2,3,4-Trimethylpentane	00565-75-3	0.95	0.58	0.547	
Ethylbenzene	00100-41-4	2.96	0.53	1.559	

Vehicle 208c - Fuel 7 psi E20 - Dynamic - Test 25812 continued					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2,3-Dimethylpentane	00565-59-3	1.25	0.51	0.632	
2,4-Dimethylpentane	00108-08-7	1.46	0.43	0.622	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	0.34	2.242	
2-Methylpropane	00075-28-5	1.18	0.22	0.260	
		Total	166.6	731.1	4.389

Vehicle 208c - Fuel 7 psi E20 - 3 Day Diurnal - Test 7817					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	420.28	608.972	
2-Methylbutane (Isopentane)	00078-78-4	1.35	81.35	110.217	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	71.84	380.629	
n-Heptane	00142-82-5	0.97	60.80	58.717	
n-Pentane	00109-66-0	1.21	51.60	62.696	
n-Butane	00106-97-8	1.08	48.81	52.569	
Toluene	00108-88-3	3.93	41.49	162.857	
n-Hexane	00110-54-3	1.13	41.13	46.667	
Methylcyclohexane	00108-87-2	1.56	36.40	56.618	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	33.93	47.422	
Benzene	00071-43-2	0.69	26.52	18.416	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	23.50	28.181	
Cyclohexane	00110-82-7	1.14	23.09	26.264	
Methylcyclopentane	00096-37-7	2.05	20.94	42.922	
3-Methylpentane	00096-14-0	1.69	18.06	30.534	
n-Octane	00111-65-9	0.80	14.90	11.863	
2-Methyl-2-butene	00513-35-9	14.20	14.55	206.582	
t-2-Pentene	00646-04-8	10.47	14.30	149.744	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	13.71	106.345	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	13.66	43.589	
2-Methylhexane	00591-76-4	1.09	12.76	13.844	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	9.54	51.236	
2,3-Dimethylbutane	00079-29-8	0.90	9.50	8.542	
2-Methylpropane	00075-28-5	1.18	9.05	10.645	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	8.03	59.284	
2,3,4-Trimethylpentane	00565-75-3	0.95	7.95	7.545	
2-Methyl-1-butene	00563-46-2	6.38	7.64	48.753	
2-Methylheptane	00592-27-8	0.97	7.57	7.321	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	7.19	84.142	
c-2-Pentene	00627-20-3	10.28	7.17	73.741	
2,4-Dimethylpentane	00108-08-7	1.46	6.03	8.805	
3-Methylheptane	00589-81-1	1.12	5.91	6.648	
2,3-Dimethylpentane	00565-59-3	1.25	5.83	7.283	
2,4-Dimethylhexane	00589-43-5	1.61	5.59	8.975	
t-2-Hexene	04050-45-7	8.55	5.00	42.751	
c-1,3-Dimethylcyclohexane	00638-04-0	2.46	4.94	12.155	
Ethylcyclohexane	01678-91-7	1.35	4.87	6.557	
c-2-Heptene	06443-92-1	7.08	4.74	33.563	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	4.55	19.982	
1,3,5-Trimethylbenzene	00108-67-8	11.75	4.14	48.619	
Cyclopentane	00287-92-3	2.24	3.82	8.551	
n-Nonane	00111-84-2	0.68	3.68	2.512	
3-Methyl-c-2-pentene	00922-62-3	12.52	3.66	45.829	
t-1,2-Dimethylcyclopentane	00822-50-4	2.46	3.52	8.659	

Vehicle 208c - Fuel 7 psi E20 - 3 Day Diurnal - Test 7817 continued

Non Zero Mass Species Sorted By VOC

Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
3-Methyl-t-2-pentene	00616-12-6	11.66	3.47	40.413	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	3.39	5.449	
1-Butyne	00107-00-6	6.05	3.14	18.981	
c-2-Butene	00590-18-1	14.26	3.13	44.686	
c-1,3-Dimethylcyclopentane	02532-58-3	2.46	3.11	7.662	
2-Methyl-2-pentene	00625-27-4	11.03	2.98	32.930	
1-Methylcyclopentene	00693-89-0	12.45	2.98	37.091	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	2.87	15.921	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	2.74	18.130	
4-Methyloctane	02216-34-4	0.85	2.68	2.273	
ortho-Xylene	00095-47-6	7.58	2.63	19.906	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	2.55	2.788	
2,2,5-Trimethylhexane	03522-94-9	1.05	2.49	2.618	
Cyclopentene	00142-29-0	6.69	2.46	16.475	
2,2-Dimethylbutane	00075-83-2	1.11	2.35	2.609	
Propane	00074-98-6	0.46	2.34	1.071	
3-Methyloctane	02216-33-3	0.88	2.26	1.997	
Ethylbenzene	00100-41-4	2.96	2.25	6.680	
t-1,4-Dimethylcyclohexane	02207-04-7	2.46	2.25	5.523	
1-MeCyHexene & 4-MeHeptane	00591-49-1+00589-53-7	3.86	2.12	8.195	
n-Propylbenzene	00103-65-1	1.96	2.12	4.148	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	2.06	16.377	
2,2-Dimethylpentane	00590-35-2	1.04	1.84	1.918	
3,3-Dimethylhexane	00563-16-6	1.15	1.79	2.055	
2,4,4-Trimethyl-2-Pentene	00107-40-4	6.30	1.61	10.165	
3,3-Dimethylpentane	00562-49-2	1.12	1.47	1.649	
t-1,3 & c-1,4-DiMeCyHexane	02207-03-6+00624-29-3	2.46	1.45	3.555	
2,3,5-Trimethylhexane	01069-53-0	1.12	1.40	1.568	
Unknown #8		2.46	1.39	3.407	
3 & 4-Methyl-1-Pentenes	00691-37-2+00760-20-3	5.78	1.29	7.464	
2-MeOctane & 2,3-DiMeHeptane	03074-71-3+03221-61-2	0.85	1.19	1.015	

Vehicle 208c - Fuel 7 psi E20 - 3 Day Diurnal - Test 7817 continued					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
1-Octene	00111-66-0	3.14	1.05	3.295	
Unknown #9		2.46	0.86	2.117	
Unknown #5		2.46	0.83	2.051	
1,2,3-Trimethylbenzene	00526-73-8	11.94	0.71	8.531	
2,4-Dimethylheptane	02213-23-2	1.26	0.66	0.829	
2,2,3-Trimethylbutane	00464-06-2	1.05	0.65	0.686	
2-Methyl-1,3-butadiene	00078-79-5	10.48	0.58	6.030	
n-Decane	00124-18-5	0.59	0.45	0.268	
1-Nonene	00124-11-8	2.49	0.44	1.105	
Unknown #1		2.46	0.32	0.778	
		Total	1301.9	3248.2	2.495
No MIR available, use weighted average of 2.4596					

Vehicle 209c

Test	Fuel	Test No.	Bag THC mg	GC as % of THC	GC VOC mg	Ozone mg	Reactivity	Species Present	
86° F	E20 - 9 psi	7708	94.5	109.6	103.6	354.9	3.427	62	
Static	E20 - 7 psi	7806	52.3	105.9	55.4	181.8	3.284	54	
105° F	E20 - 9 psi	7710	151.0	80.3	121.2	335.1	2.765	65	
Static	E20 - 7 psi	7809	87.3	90.1	78.6	239.7	3.050	60	
Dynamic	E20 - 9 psi	25802	379.3	97.9	371.2	1383.2	3.726	62	
	E20 - 7 psi	25819	251.8	42.6	107.4	549.3	5.117	41	No Ethanol
DHB	E20 - 9 psi	7753	1110.7	87.7	974.1	2457.1	2.522	88	
Total	E20 - 7 psi	7856	1184.7	93.7	1110.2	2856.1	2.573	89	
	E20 - 7 psi	7881	1224.6	98.9	1211.1	3048.8	2.517	90	Repeat

Vehicle 209c - Fuel 9 psi E20 - 86°F Static - Test 7708					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2-Methylbutane (Isopentane)	00078-78-4	1.35	17.65	23.912	
Toluene	00108-88-3	3.93	6.08	23.884	
n-Pentane	00109-66-0	1.21	5.32	6.465	
n-Butane	00106-97-8	1.08	5.26	5.664	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	3.91	20.967	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	3.62	5.067	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	3.62	19.161	
n-Hexane	00110-54-3	1.13	3.60	4.086	
Cyclohexane	00110-82-7	1.14	3.58	4.074	
n-Heptane	00142-82-5	0.97	3.24	3.130	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	2.87	12.620	
Benzene	00071-43-2	0.69	2.27	1.573	
Methylcyclohexane	00108-87-2	1.56	2.24	3.483	
2-Methyl-2-butene	00513-35-9	14.20	2.14	30.383	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	2.13	16.507	
1,3,5-Trimethylbenzene	00108-67-8	11.75	2.03	23.814	
t-2-Pentene	00646-04-8	10.47	1.99	20.808	
3-Methylpentane	00096-14-0	1.69	1.89	3.189	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	1.76	2.108	
Methylcyclopentane	00096-37-7	2.05	1.76	3.600	
2,3-Dimethylbutane	00079-29-8	0.90	1.34	1.208	
Ethanol	00064-17-5	1.45	1.31	1.905	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	1.30	15.216	
2-Methyl-1-butene	00563-46-2	6.38	1.18	7.543	
Propane	00074-98-6	0.46	1.16	0.530	
2-Methylpropane	00075-28-5	1.18	1.12	1.317	
c-2-Pentene	00627-20-3	10.28	1.10	11.307	
c-1,3-Dimethylcyclohexane	00638-04-0	3.34	0.99	3.295	
2-Methylhexane	00591-76-4	1.09	0.97	1.052	
n-Nonane	00111-84-2	0.68	0.91	0.619	
c-2-Butene	00590-18-1	14.26	0.83	11.886	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	0.77	2.457	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	0.76	4.210	
n-Propylbenzene	00103-65-1	1.96	0.76	1.487	
2,3,4-Trimethylpentane	00565-75-3	0.95	0.70	0.660	
n-Octane	00111-65-9	0.80	0.66	0.525	
3-Methylheptane	00589-81-1	1.12	0.64	0.714	
2,2,5-Trimethylhexane	03522-94-9	1.05	0.63	0.661	
ortho-Xylene	00095-47-6	7.58	0.62	4.660	
t-2-Hexene	04050-45-7	8.55	0.57	4.874	
t-1,2-Dimethylcyclopentane	00822-50-4	3.34	0.57	1.893	
2-Methyl-2-pentene	00625-27-4	11.03	0.55	6.035	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	0.55	3.614	

Vehicle 209c - Fuel 9 psi E20 - 86°F Static - Test 7708 continued

Non Zero Mass Species Sorted By VOC

Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2,4-Dimethylhexane	00589-43-5	1.61	0.53	0.852	
3-Methyl-c-2-pentene	00922-62-3	12.52	0.51	6.343	
1-Methylcyclopentene	00693-89-0	12.45	0.48	6.023	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	0.47	3.704	
3-Methyl-t-2-pentene	00616-12-6	11.66	0.46	5.371	
Cyclopentene	00142-29-0	6.69	0.43	2.842	
c-1,3-Dimethylcyclopentane	02532-58-3	3.34	0.39	1.288	
2,3-Dimethylpentane	00565-59-3	1.25	0.38	0.477	
2,2-Dimethylbutane	00075-83-2	1.11	0.35	0.390	
4-Isopropyltoluene (p-Cymene)	00099-87-6	4.41	0.34	1.506	
4-Methyloctane	02216-34-4	0.85	0.34	0.288	
2,2-Dimethylpentane	00590-35-2	1.04	0.33	0.343	
2,4-Dimethylpentane	00108-08-7	1.46	0.29	0.420	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	0.28	0.304	
2-Methylheptane	00592-27-8	0.97	0.24	0.234	
Unknown #18		3.34	0.23	0.782	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	0.21	0.333	
Indan	00496-11-7	3.23	0.20	0.636	
Ethylbenzene	00100-41-4	2.96	0.19	0.563	
		Total	103.6	354.9	3.427
No MIR available, use weighted average of 3.3384					

Vehicle 209c - Fuel 9 psi E20 - 105°F Static - Test 7710					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	24.28	35.179	
2-Methylbutane (Isopentane)	00078-78-4	1.35	9.57	12.964	
Toluene	00108-88-3	3.93	6.89	27.059	
Cyclohexane	00110-82-7	1.14	5.75	6.535	
n-Pentane	00109-66-0	1.21	5.49	6.667	
n-Butane	00106-97-8	1.08	4.65	5.009	
n-Hexane	00110-54-3	1.13	4.38	4.971	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	4.08	5.703	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	3.72	19.707	
2,2-DiMeHexane	00590-73-8	0.94	3.35	3.152	
n-Heptane	00142-82-5	0.97	3.11	3.006	
Methylcyclopentane	00096-37-7	2.05	2.58	5.280	
3-Methylpentane	00096-14-0	1.69	2.42	4.093	
Benzene	00071-43-2	0.69	2.27	1.575	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	1.99	15.443	
2-Methyl-2-butene	00513-35-9	14.20	1.97	27.914	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	1.94	10.417	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	1.93	14.282	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	1.83	2.189	
2,3-Dimethylbutane	00079-29-8	0.90	1.66	1.491	
2-Methylpropane	00075-28-5	1.18	1.49	1.756	
2-Methylhexane	00591-76-4	1.09	1.47	1.599	
t-2-Pentene	00646-04-8	10.47	1.46	15.283	
1,3,5-Trimethylbenzene	00108-67-8	11.75	1.20	14.121	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	1.11	3.544	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	0.98	4.291	
c-2-Pentene	00627-20-3	10.28	0.97	10.021	
n-Octane	00111-65-9	0.80	0.97	0.776	
Propane	00074-98-6	0.46	0.96	0.439	
n-Nonane	00111-84-2	0.68	0.88	0.601	
2-Methyl-1-butene	00563-46-2	6.38	0.82	5.199	
Indan	00496-11-7	3.23	0.78	2.534	
c-1,3-Dimethylcyclopentane	02532-58-3	2.71	0.76	2.062	
3-Methylheptane	00589-81-1	1.12	0.76	0.853	
2,3-Dimethylpentane	00565-59-3	1.25	0.66	0.821	
4-Methyloctane	02216-34-4	0.85	0.65	0.551	
ortho-Xylene	00095-47-6	7.58	0.65	4.918	
Unknown #16		2.71	0.65	1.756	
2,3,4-Trimethylpentane	00565-75-3	0.95	0.64	0.609	
2,4-Dimethylpentane	00108-08-7	1.46	0.59	0.868	
1-Methylcyclopentene	00693-89-0	12.45	0.55	6.886	
c-1,3-Dimethylcyclohexane	00638-04-0	2.71	0.54	1.461	
n-Propylbenzene	00103-65-1	1.96	0.53	1.040	
t-2-Hexene	04050-45-7	8.55	0.52	4.414	

Vehicle 209c - Fuel 9 psi E20 - 105°F Static - Test 7710 continued

Non Zero Mass Species Sorted By VOC

Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
t-1,2-Dimethylcyclopentane	00822-50-4	2.71	0.48	1.304	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	0.42	0.670	
Ethylcyclohexane	01678-91-7	1.35	0.41	0.555	
2,2,5-Trimethylhexane	03522-94-9	1.05	0.38	0.398	
2,4-Dimethylhexane	00589-43-5	1.61	0.38	0.607	
Cyclopentene	00142-29-0	6.69	0.38	2.517	
1-Methyl-3-Propylbenzene	01074-43-7	7.08	0.37	2.653	
2,2-Dimethylbutane	00075-83-2	1.11	0.37	0.408	
3-Methyl-t-2-pentene	00616-12-6	11.66	0.36	4.207	
Ethylbenzene	00100-41-4	2.96	0.36	1.052	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	0.35	1.958	
1,2,3-Trimethylbenzene	00526-73-8	11.94	0.35	4.142	
2,2-Dimethylpentane	00590-35-2	1.04	0.34	0.355	
2-Methyl-2-pentene	00625-27-4	11.03	0.33	3.675	
2-Methylheptane	00592-27-8	0.97	0.33	0.322	
c-2-Butene	00590-18-1	14.26	0.31	4.470	
3-Methyl-c-2-pentene	00922-62-3	12.52	0.24	3.058	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	0.16	0.178	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	0.14	0.954	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	0.14	1.127	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	0.13	1.480	
		Total	121.2	335.1	2.765
No MIR available, use weighted average of 2.7110					

Vehicle 209c - Fuel 9 psi E20 - Dynamic - Test 25802					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	35.55	51.515	
Toluene	00108-88-3	3.93	20.25	79.500	
2-Methylbutane (Isopentane)	00078-78-4	1.35	20.16	27.318	
3-Me-1-Hexene	03404-61-3	4.27	17.50	74.813	
n-Heptane	00142-82-5	0.97	15.37	14.840	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	12.37	66.397	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	12.25	64.910	
n-Pentane	00109-66-0	1.21	11.78	14.313	
n-Butane	00106-97-8	1.08	11.74	12.645	
n-Hexane	00110-54-3	1.13	11.58	13.138	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	11.10	48.767	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	10.76	79.488	
2,2-DiMeHexane	00590-73-8	0.94	10.26	9.657	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	10.09	14.105	
1,3,5-Trimethylbenzene	00108-67-8	11.75	9.18	107.957	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	8.96	69.492	
Methylcyclopentane	00096-37-7	2.05	8.07	16.543	
Benzene	00071-43-2	0.69	7.91	5.491	
Propane	00074-98-6	0.46	5.52	2.523	
3-Methylpentane	00096-14-0	1.69	5.35	9.054	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	5.02	6.022	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	4.78	55.962	
2-Methyl-2-butene	00513-35-9	14.20	4.57	64.841	
Ethylene	00074-85-1	8.88	4.54	40.295	
Acetylene (Ethyne)	00074-86-2	0.95	4.52	4.280	
2-Methyl-1-butene	00563-46-2	6.38	4.48	28.551	
t-2-Pentene	00646-04-8	10.47	4.48	46.880	
n-Octane	00111-65-9	0.80	4.21	3.348	
2,2,5-Trimethylhexane	03522-94-9	1.05	4.15	4.369	
2-Methylpropane	00075-28-5	1.18	4.13	4.861	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	3.91	21.649	
c-2-Pentene	00627-20-3	10.28	3.49	35.872	
n-Propylbenzene	00103-65-1	1.96	3.46	6.786	
c-1,3-Dimethylcyclohexane	00638-04-0	3.68	3.35	12.328	
2-Methylhexane	00591-76-4	1.09	3.31	3.591	
2,3-Dimethylbutane	00079-29-8	0.90	3.20	2.879	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	3.14	24.972	
ortho-Xylene	00095-47-6	7.58	3.12	23.613	
2,4-Dimethylhexane	00589-43-5	1.61	2.78	4.460	
2,3,4-Trimethylpentane	00565-75-3	0.95	2.73	2.586	
2-Methylheptane	00592-27-8	0.97	2.65	2.568	
Ethylbenzene	00100-41-4	2.96	2.62	7.748	
t-2-Hexene	04050-45-7	8.55	2.57	21.978	

Vehicle 209c - Fuel 9 psi E20 - Dynamic - Test 25802 continued					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2,4-Dimethylpentane	00108-08-7	1.46	2.53	3.696	
2,3,5-Trimethylhexane	01069-53-0	1.12	2.32	2.600	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	2.30	7.354	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	2.22	3.560	
3-Methylheptane	00589-81-1	1.12	2.16	2.430	
2-Methyl-2-pentene	00625-27-4	11.03	2.12	23.431	
3-Methyl-t-2-pentene	00616-12-6	11.66	1.99	23.199	
n-Nonane	00111-84-2	0.68	1.89	1.292	
3-Methyl-c-2-pentene	00922-62-3	12.52	1.88	23.507	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	1.68	11.077	
1-Methylcyclopentene	00693-89-0	12.45	1.57	19.575	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	1.32	1.437	
Cyclopentene	00142-29-0	6.69	1.20	8.051	
c-2-Butene	00590-18-1	14.26	0.96	13.745	
c-1,3-Dimethylcyclopentane	02532-58-3	3.68	0.96	3.541	
1,2,3-Trimethylbenzene	00526-73-8	11.94	0.96	11.428	
2,2-Dimethylbutane	00075-83-2	1.11	0.85	0.940	
1,3-Butadiene	00106-99-0	12.45	0.70	8.700	
2,3-Dimethylpentane	00565-59-3	1.25	0.62	0.769	
		Total	371.2	1383.2	3.726
No MIR available, use weighted average of 3.6837					

Vehicle 209c - Fuel 9 psi E20 - 3 Day Diurnal - Test 7753					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	414.33	600.356	
2-Methylbutane (Isopentane)	00078-78-4	1.35	63.15	85.562	
n-Butane	00106-97-8	1.08	40.42	43.529	
n-Pentane	00109-66-0	1.21	37.98	46.147	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	29.45	156.056	
Toluene	00108-88-3	3.93	26.36	103.457	
n-Heptane	00142-82-5	0.97	26.29	25.385	
n-Hexane	00110-54-3	1.13	24.88	28.227	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	21.95	30.678	
Cyclohexane	00110-82-7	1.14	19.43	22.094	
Benzene	00071-43-2	0.69	19.23	13.349	
Methylcyclohexane	00108-87-2	1.56	18.91	29.409	
t-2-Pentene	00646-04-8	10.47	14.24	149.160	
2-Methyl-2-butene	00513-35-9	14.20	14.20	201.503	
Methylcyclopentane	00096-37-7	2.05	13.95	28.593	
3-Methylpentane	00096-14-0	1.69	12.37	20.924	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	11.27	131.952	
2-Methylpropane	00075-28-5	1.18	11.07	13.030	
2-Methyl-1-butene	00563-46-2	6.38	7.64	48.704	
c-2-Pentene	00627-20-3	10.28	7.35	75.531	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	7.15	52.823	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	6.85	21.854	
n-Octane	00111-65-9	0.80	6.74	5.365	
2-Methylhexane	00591-76-4	1.09	6.54	7.101	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	5.31	41.158	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	4.94	5.919	
Propane	00074-98-6	0.46	4.73	2.162	
2,3-Dimethylbutane	00079-29-8	0.90	4.51	4.053	
t-2-Hexene	04050-45-7	8.55	4.51	38.530	
2-Methylheptane	00592-27-8	0.97	3.63	3.510	
Cyclopentane	00287-92-3	2.24	3.46	7.753	
3-Methyl-t-2-pentene	00616-12-6	11.66	3.28	38.296	
1-Methylcyclopentene	00693-89-0	12.45	3.22	40.149	
Cyclopentene	00142-29-0	6.69	2.96	19.762	
3-Methylheptane	00589-81-1	1.12	2.90	3.262	
3-Methyl-c-2-pentene	00922-62-3	12.52	2.83	35.472	
2-Methyl-2-pentene	00625-27-4	11.03	2.79	30.766	
1,3,5-Trimethylbenzene	00108-67-8	11.75	2.65	31.191	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	2.59	11.401	
2,4-Dimethylhexane	00589-43-5	1.61	2.59	4.160	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	2.54	16.786	
2,2-Dimethylbutane	00075-83-2	1.11	2.53	2.816	
c-1,3-Dimethylcyclohexane	00638-04-0	2.49	2.50	6.216	

Vehicle 209c - Fuel 9 psi E20 - 3 Day Diurnal - Test 7753 continued

Non Zero Mass Species Sorted By VOC

Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethylcyclohexane	01678-91-7	1.35	2.44	3.278	
2,4-Dimethylpentane	00108-08-7	1.46	2.40	3.499	
c-2-Butene	00590-18-1	14.26	2.38	33.979	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	2.04	10.957	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	2.00	15.876	
t-1,2-Dimethylcyclopentane	00822-50-4	2.49	1.97	4.905	
2,3-Dimethylpentane	00565-59-3	1.25	1.94	2.426	
1-Butyne	00107-00-6	6.05	1.87	11.337	
c-1,3-Dimethylcyclopentane	02532-58-3	2.49	1.83	4.547	
2,3,4-Trimethylpentane	00565-75-3	0.95	1.82	1.730	
n-Propylbenzene	00103-65-1	1.96	1.54	3.020	
Ethylbenzene	00100-41-4	2.96	1.52	4.489	
4-Methyloctane	02216-34-4	0.85	1.49	1.267	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	1.31	7.262	
3-Methyloctane	02216-33-3	0.88	1.18	1.048	
3 & 4-Methyl-1-Pentenes	00691-37-2+00760-20-3	5.78	1.16	6.684	
3,3-Dimethylhexane	00563-16-6	1.15	1.13	1.300	
t-1,4-Dimethylcyclohexane	02207-04-7	2.49	1.12	2.797	
n-Nonane	00111-84-2	0.68	1.12	0.762	
2,2,5-Trimethylhexane	03522-94-9	1.05	1.10	1.157	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	0.99	1.080	
Unknown #22	.	2.49	0.85	2.128	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	0.85	1.359	
1-Octene	00111-66-0	3.14	0.84	2.649	
2,2-Dimethylpentane	00590-35-2	1.04	0.83	0.864	
1,2,3-Trimethylbenzene	00526-73-8	11.94	0.81	9.651	
Unknown #8		2.49	0.77	1.927	
2-Methyl-1,3-butadiene	00078-79-5	10.48	0.76	7.953	
Unknown #5		2.49	0.68	1.695	
Unknown #6	.	2.49	0.61	1.521	
3,3-Dimethylpentane	00562-49-2	1.12	0.61	0.682	
2,4-DiMeOctane+AlBenz+PrCyHexane	04032-94-4+00300-57-2+	1.18	0.57	0.679	
2,3,5-Trimethylhexane	01069-53-0	1.12	0.56	0.629	
t-1,3 & c-1,4-DiMeCyHexane	02207-03-6+00624-29-3	2.49	0.55	1.362	
4-Methyl-t-2-pentene	00674-76-0	8.04	0.55	4.393	
Unknown #1		2.49	0.54	1.355	

Vehicle 209c - Fuel 9 psi E20 - 3 Day Diurnal - Test 7753 continued

Non Zero Mass Species Sorted By VOC

Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Unknown #9		2.49	0.48	1.203	
2,4-Dimethylheptane	02213-23-2	1.26	0.40	0.508	
2-MeOctane & 2,3-DiMeHeptane	03074-71-3+03221-61-2	0.85	0.37	0.320	
ortho-Xylene	00095-47-6	7.58	0.35	2.639	
Isopropylbenzene (Cumene)	00098-82-8	2.49	0.32	0.805	
2,2,3-Trimethylbutane	00464-06-2	1.05	0.32	0.333	
1-Nonene	00124-11-8	2.49	0.31	0.771	
c-2-Heptene	06443-92-1	7.08	0.30	2.119	
1,2-Dimethyl-4-Ethylbenzene	00934-80-5	7.54	0.26	1.950	
		Total	974.1	2457.1	2.522
No MIR available, use weighted average of 2.4912					

Vehicle 209c - Fuel 7 psi E20 - 86°F Static - Test 7806					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	20.31	29.422	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	2.79	20.586	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	2.66	14.288	
Toluene	00108-88-3	3.93	2.13	8.360	
n-Heptane	00142-82-5	0.97	1.64	1.581	
2,2-DiMeHexane	00590-73-8	0.94	1.62	1.525	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	1.45	7.657	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	1.21	9.364	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	1.15	5.045	
n-Butane	00106-97-8	1.08	1.13	1.221	
1,3,5-Trimethylbenzene	00108-67-8	11.75	0.94	11.077	
Benzene	00071-43-2	0.69	0.90	0.625	
n-Octane	00111-65-9	0.80	0.87	0.696	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	0.85	1.365	
n-Pentane	00109-66-0	1.21	0.83	1.008	
Cyclohexane	00110-82-7	1.14	0.78	0.887	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	0.71	8.307	
n-Nonane	00111-84-2	0.68	0.68	0.466	
c-1,3-Dimethylcyclohexane	00638-04-0	3.24	0.67	2.190	
Ethylcyclohexane	01678-91-7	1.35	0.66	0.892	
2,4,4-TMe-1- & 2,3-DMe-2-Pentene	00107-39-1+10574-37-5	6.54	0.62	4.027	
n-Hexane	00110-54-3	1.13	0.61	0.693	
n-Propylbenzene	00103-65-1	1.96	0.60	1.176	
4-Methyloctane	02216-34-4	0.85	0.59	0.501	
Methylcyclopentane	00096-37-7	2.05	0.58	1.187	
2-Methyl-1-butene	00563-46-2	6.38	0.56	3.568	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	0.54	3.016	
t-2-Pentene	00646-04-8	10.47	0.51	5.304	
3-Methyl-c-2-pentene	00922-62-3	12.52	0.48	6.030	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	0.45	0.632	
ortho-Xylene	00095-47-6	7.58	0.44	3.371	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	0.42	0.506	
n-Decane	00124-18-5	0.59	0.42	0.246	
1-Butyne	00107-00-6	6.05	0.38	2.301	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	0.36	1.139	
2-Methyl-2-butene	00513-35-9	14.20	0.35	4.931	
2,3-Dimethylbutane	00079-29-8	0.90	0.31	0.274	
2,4-Dimethylpentane	00108-08-7	1.46	0.29	0.419	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	0.28	2.232	
c-2-Pentene	00627-20-3	10.28	0.26	2.664	
t-2-Hexene	04050-45-7	8.55	0.26	2.206	
2-Methylhexane	00591-76-4	1.09	0.26	0.279	
Ethylbenzene	00100-41-4	2.96	0.24	0.713	

Vehicle 209c - Fuel 7 psi E20 - 86°F Static - Test 7806 continued					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2,2,5-Trimethylhexane	03522-94-9	1.05	0.23	0.241	
3-Methyl-t-2-pentene	00616-12-6	11.66	0.21	2.407	
2-Methylheptane	00592-27-8	0.97	0.20	0.198	
3-Methylpentane	00096-14-0	1.69	0.20	0.337	
1-Methylcyclopentene	00693-89-0	12.45	0.18	2.301	
Cyclopentene	00142-29-0	6.69	0.16	1.071	
2,3-Dimethylpentane	00565-59-3	1.25	0.13	0.168	
3-Methylheptane	00589-81-1	1.12	0.10	0.108	
1,2,3-Trimethylbenzene	00526-73-8	11.94	0.08	0.951	
2,3,4-Trimethylpentane	00565-75-3	0.95	0.07	0.069	
n-Undecane	01120-21-4	0.52	0.03	0.017	
		Total	55.4	181.8	3.284
No MIR available, use weighted average of 3.2442					

Vehicle 209c - Fuel 7 psi E20 - 105°F Static - Test 7809					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	24.91	36.089	
2-Methylbutane (Isopentane)	00078-78-4	1.35	5.27	7.147	
Toluene	00108-88-3	3.93	3.51	13.795	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	3.28	17.601	
n-Heptane	00142-82-5	0.97	2.46	2.378	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	2.14	15.826	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	1.95	10.310	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	1.93	14.953	
n-Pentane	00109-66-0	1.21	1.81	2.205	
n-Butane	00106-97-8	1.08	1.73	1.860	
Benzene	00071-43-2	0.69	1.59	1.107	
Methylcyclohexane	00108-87-2	1.56	1.56	2.428	
n-Hexane	00110-54-3	1.13	1.28	1.449	
Propane	00074-98-6	0.46	1.23	0.563	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	1.19	5.243	
1,3,5-Trimethylbenzene	00108-67-8	11.75	1.19	13.951	
Cyclohexane	00110-82-7	1.14	1.17	1.330	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	0.97	1.356	
Methylcyclopentane	00096-37-7	2.05	0.95	1.954	
3-Methylheptane	00589-81-1	1.12	0.81	0.911	
n-Octane	00111-65-9	0.80	0.76	0.603	
3-Methylpentane	00096-14-0	1.69	0.75	1.266	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	0.73	0.876	
t-2-Pentene	00646-04-8	10.47	0.69	7.273	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	0.68	3.768	
n-Propylbenzene	00103-65-1	1.96	0.66	1.300	
2-Methyl-2-pentene	00625-27-4	11.03	0.66	7.278	
2,2,5-Trimethylhexane	03522-94-9	1.05	0.64	0.673	
2-Methyl-2-butene	00513-35-9	14.20	0.58	8.241	
2,3-Dimethylbutane	00079-29-8	0.90	0.56	0.505	
Ethylbenzene	00100-41-4	2.96	0.53	1.576	
c-2-Heptene	06443-92-1	7.08	0.53	3.746	
4-Methyloctane	02216-34-4	0.85	0.53	0.449	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	0.53	6.168	
c-1,3-Dimethylcyclohexane	00638-04-0	2.99	0.53	1.577	
Unknown #22	.	2.99	0.50	1.489	
Ethylcyclohexane	01678-91-7	1.35	0.47	0.631	
2-Methyl-1-butene	00563-46-2	6.38	0.46	2.905	
2-Methylheptane	00592-27-8	0.97	0.45	0.434	
n-Nonane	00111-84-2	0.68	0.44	0.300	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	0.44	0.705	
2,4-Dimethylhexane	00589-43-5	1.61	0.42	0.669	
2-Methylhexane	00591-76-4	1.09	0.39	0.424	

Vehicle 209c - Fuel 7 psi E20 - 105°F Static - Test 7809 continued					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
c-2-Pentene	00627-20-3	10.28	0.39	3.979	
t-2-Hexene	04050-45-7	8.55	0.38	3.270	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	0.37	0.401	
3-Methyl-t-2-pentene	00616-12-6	11.66	0.36	4.201	
ortho-Xylene	00095-47-6	7.58	0.34	2.597	
c-2-Butene	00590-18-1	14.26	0.34	4.788	
1,2,3-Trimethylbenzene	00526-73-8	11.94	0.32	3.829	
2,3,4-Trimethylpentane	00565-75-3	0.95	0.31	0.293	
3-Methyl-c-2-pentene	00922-62-3	12.52	0.30	3.747	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	0.25	0.813	
t-1,2-Dimethylcyclopentane	00822-50-4	2.99	0.25	0.735	
1-Methylcyclopentene	00693-89-0	12.45	0.24	3.034	
Cyclopentene	00142-29-0	6.69	0.22	1.479	
c-1,3-Dimethylcyclopentane	02532-58-3	2.99	0.21	0.614	
2,4-Dimethylpentane	00108-08-7	1.46	0.19	0.272	
2,3-Dimethylpentane	00565-59-3	1.25	0.13	0.162	
2,2-Dimethylbutane	00075-83-2	1.11	0.12	0.136	
	0.66	Total	78.6	239.7	3.050
No MIR available, use weighted average of 2.9941					

Vehicle 209c - Fuel 7 psi E20 - Dynamic - Test 25819					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	13.82	74.180	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	8.20	60.580	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	6.42	49.751	
2,2-DiMeHexane	00590-73-8	0.94	5.51	5.189	
Cyclohexane	00110-82-7	1.14	5.50	6.259	
n-Heptane	00142-82-5	0.97	5.03	4.856	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	4.98	26.379	
2,2,5-Trimethylhexane	03522-94-9	1.05	4.27	4.491	
1,3,5-Trimethylbenzene	00108-67-8	11.75	4.16	48.892	
n-Nonane	00111-84-2	0.68	3.99	2.724	
Ethylene	00074-85-1	8.88	3.83	33.991	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	3.66	16.103	
n-Octane	00111-65-9	0.80	3.31	2.635	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	3.03	35.496	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	2.50	13.862	
Benzene	00071-43-2	0.69	2.41	1.673	
Unknown #22	.	4.92	2.32	11.393	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	2.08	16.554	
c-1,3-Dimethylcyclohexane	00638-04-0	4.92	1.95	9.600	
3-Methyl-t-2-pentene	00616-12-6	11.66	1.94	22.609	
2,3,5-Trimethylhexane	01069-53-0	1.12	1.60	1.788	
Cyclopentene	00142-29-0	6.69	1.53	10.213	
2-Methyl-1,3-butadiene	00078-79-5	10.48	1.47	15.461	
Methylcyclopentane	00096-37-7	2.05	1.44	2.954	
1,2,3-Trimethylbenzene	00526-73-8	11.94	1.43	17.015	
3-Methyl-c-2-pentene	00922-62-3	12.52	1.15	14.432	
n-Propylbenzene	00103-65-1	1.96	1.14	2.239	
2-Methylheptane	00592-27-8	0.97	1.10	1.067	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	1.02	3.243	
1-Methylcyclopentene	00693-89-0	12.45	0.92	11.472	
Toluene	00108-88-3	3.93	0.89	3.513	
Naphthalene	00091-20-3	3.28	0.87	2.863	
t-2-Hexene	04050-45-7	8.55	0.84	7.168	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	0.81	1.306	
3-Methylpentane	00096-14-0	1.69	0.70	1.179	
ortho-Xylene	00095-47-6	7.58	0.52	3.918	
2,4-Dimethylpentane	00108-08-7	1.46	0.32	0.468	
2-Methylhexane	00591-76-4	1.09	0.32	0.348	
Ethylbenzene	00100-41-4	2.96	0.18	0.548	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	0.14	0.151	
2-Methyl-2-butene	00513-35-9	14.20	0.05	0.770	
		Total	107.4	549.3	5.117
No MIR available, use weighted average of 4.9213					

Vehicle 209c - Fuel 7 psi E20 - 3 Day Diurnal - Test 7856					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	356.70	516.847	
2-Methylbutane (Isopentane)	00078-78-4	1.35	73.57	99.680	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	43.96	232.895	
n-Heptane	00142-82-5	0.97	36.62	35.368	
n-Butane	00106-97-8	1.08	35.05	37.747	
Toluene	00108-88-3	3.93	34.92	137.050	
n-Pentane	00109-66-0	1.21	33.04	40.146	
Methylcyclohexane	00108-87-2	1.56	30.02	46.691	
n-Hexane	00110-54-3	1.13	25.99	29.485	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	22.33	31.212	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	19.49	23.366	
Cyclohexane	00110-82-7	1.14	19.25	21.900	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	18.33	98.433	
Benzene	00071-43-2	0.69	17.38	12.068	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	16.72	129.673	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	16.42	121.302	
n-Octane	00111-65-9	0.80	15.69	12.491	
Methylcyclopentane	00096-37-7	2.05	14.48	29.673	
2-Methylpropane	00075-28-5	1.18	12.56	14.781	
3-Methylpentane	00096-14-0	1.69	12.06	20.398	
2-Methyl-2-butene	00513-35-9	14.20	10.74	152.444	
2,3-Dimethylbutane	00079-29-8	0.90	10.69	9.609	
t-2-Pentene	00646-04-8	10.47	10.43	109.271	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	10.09	32.198	
2-Methylhexane	00591-76-4	1.09	8.64	9.372	
2,3,4-Trimethylpentane	00565-75-3	0.95	8.20	7.776	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	8.01	35.180	
2-Methylheptane	00592-27-8	0.97	7.87	7.608	
1,3,5-Trimethylbenzene	00108-67-8	11.75	7.63	89.741	
Propane	00074-98-6	0.46	7.57	3.460	
3-Methylheptane	00589-81-1	1.12	7.17	8.059	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	7.09	83.023	
Ethylcyclohexane	01678-91-7	1.35	6.64	8.935	
n-Nonane	00111-84-2	0.68	6.56	4.479	
c-1,3-Dimethylcyclohexane	00638-04-0	2.52	6.15	15.474	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	5.78	32.056	
c-2-Pentene	00627-20-3	10.28	5.47	56.249	
2,4-Dimethylhexane	00589-43-5	1.61	5.21	8.366	
2-Methyl-1-butene	00563-46-2	6.38	5.20	33.173	
4-Methyloctane	02216-34-4	0.85	5.02	4.255	
n-Propylbenzene	00103-65-1	1.96	4.53	8.879	
ortho-Xylene	00095-47-6	7.58	4.50	34.122	
c-2-Heptene	06443-92-1	7.08	4.45	31.484	
2,3-Dimethylpentane	00565-59-3	1.25	4.33	5.409	

Vehicle 209c - Fuel 7 psi E20 - 3 Day Diurnal - Test 7856 continued					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2,4-Dimethylpentane	00108-08-7	1.46	4.01	5.849	
2,2,5-Trimethylhexane	03522-94-9	1.05	3.93	4.139	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	3.77	4.116	
3-Methyloctane	02216-33-3	0.88	3.60	3.186	
t-2-Hexene	04050-45-7	8.55	3.39	28.984	
Ethylbenzene	00100-41-4	2.96	3.38	10.013	
2,2-Dimethylbutane	00075-83-2	1.11	3.26	3.618	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	2.86	4.594	
t-1,2-Dimethylcyclopentane	00822-50-4	2.52	2.72	6.843	
3-Methyl-t-2-pentene	00616-12-6	11.66	2.69	31.374	
1,2,3-Trimethylbenzene	00526-73-8	11.94	2.68	32.016	
c-1,3-Dimethylcyclopentane	02532-58-3	2.52	2.67	6.717	
t-1,4-Dimethylcyclohexane	02207-04-7	2.52	2.63	6.625	
2-Methyl-2-pentene	00625-27-4	11.03	2.58	28.420	
Unknown #8		2.52	2.42	6.098	
3-Methyl-c-2-pentene	00922-62-3	12.52	2.36	29.551	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	2.28	15.052	
c-2-Butene	00590-18-1	14.26	2.27	32.333	
1-Methylcyclopentene	00693-89-0	12.45	2.24	27.881	
Cyclopentene	00142-29-0	6.69	2.18	14.591	
1-Nonene	00124-11-8	2.49	2.12	5.282	
Unknown #16		2.52	2.09	5.253	
2,3,5-Trimethylhexane	01069-53-0	1.12	2.01	2.250	
t-1,3 & c-1,4-DiMeCyHexane	02207-03-6+00624-29-3	2.52	1.81	4.547	
Unknown #9		2.52	1.72	4.332	
1-Octene	00111-66-0	3.14	1.61	5.055	
2,2-Dimethylpentane	00590-35-2	1.04	1.56	1.631	
3,3-Dimethylhexane	00563-16-6	1.15	1.56	1.793	
2,4,4-Trimethyl-2-Pentene	00107-40-4	6.30	1.43	8.989	
n-Decane	00124-18-5	0.59	1.41	0.832	

Vehicle 209c - Fuel 7 psi E20 - 3 Day Diurnal - Test 7856 continued					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Indan	00496-11-7	3.23	1.26	4.071	
2-MeOctane & 2,3-DiMeHeptane	03074-71-3+03221-61-2	0.85	1.24	1.059	
2,4-Dimethylheptane	02213-23-2	1.26	1.21	1.534	
3,3-Dimethylpentane	00562-49-2	1.12	1.19	1.336	
Unknown #5		2.52	1.08	2.722	
t-4-Octene	14850-23-8	4.69	0.92	4.292	
2,2,3-Trimethylbutane	00464-06-2	1.05	0.88	0.926	
3 & 4-Methyl-1-Pentenes	00691-37-2+00760-20-3	5.78	0.80	4.595	
Unknown #10		2.52	0.74	1.873	
2,4-DiMeOctane+AlBenz+PrCyHexane	04032-94-4+00300-57-2+	1.18	0.69	0.811	
Isopropylbenzene (Cumene)	00098-82-8	2.52	0.61	1.528	
2-Methyl-1,3-butadiene	00078-79-5	10.48	0.60	6.317	
2,2-Dimethyloctane	15869-87-1	0.76	0.49	0.367	
n-Undecane	01120-21-4	0.52	0.44	0.229	
c-2-Octene	07642-04-8	2.52	0.24	0.605	
		Total	1110.2	2856.1	2.573
No MIR available, use weighted average of 2.5162					

Vehicle 209c - Fuel 7 psi E20 - 3 Day Diurnal Repeat - Test 7881					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	391.28	566.956	
2-Methylbutane (Isopentane)	00078-78-4	1.35	73.12	99.071	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	49.49	262.219	
n-Heptane	00142-82-5	0.97	41.18	39.773	
Toluene	00108-88-3	3.93	40.52	159.045	
n-Butane	00106-97-8	1.08	36.21	38.994	
n-Pentane	00109-66-0	1.21	35.67	43.335	
n-Hexane	00110-54-3	1.13	31.96	36.265	
Methylcyclohexane	00108-87-2	1.56	29.86	46.437	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	27.31	38.170	
Cyclohexane	00110-82-7	1.14	23.13	26.313	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	21.47	25.751	
Benzene	00071-43-2	0.69	20.21	14.034	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	19.75	106.018	
n-Octane	00111-65-9	0.80	17.66	14.063	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	16.99	131.791	
Methylcyclopentane	00096-37-7	2.05	16.34	33.491	
3-Methylpentane	00096-14-0	1.69	16.00	27.048	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	15.07	111.315	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	12.09	38.588	
2,3-Dimethylbutane	00079-29-8	0.90	11.86	10.659	
2-Methylhexane	00591-76-4	1.09	10.76	11.672	
2-Methyl-2-butene	00513-35-9	14.20	10.32	146.518	
t-2-Pentene	00646-04-8	10.47	9.91	103.774	
1,3,5-Trimethylbenzene	00108-67-8	11.75	9.71	114.160	
2,3,4-Trimethylpentane	00565-75-3	0.95	9.58	9.087	
Propane	00074-98-6	0.46	9.19	4.201	
2-Methylpropane	00075-28-5	1.18	8.76	10.302	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	7.93	34.823	
2,3,5-Trimethylhexane	01069-53-0	1.12	7.62	8.541	
2-Methylheptane	00592-27-8	0.97	7.59	7.340	
3-Methylheptane	00589-81-1	1.12	6.83	7.684	
n-Nonane	00111-84-2	0.68	6.77	4.621	
Ethylcyclohexane	01678-91-7	1.35	6.36	8.549	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	6.29	34.882	
2,4-Dimethylhexane	00589-43-5	1.61	6.07	9.741	
2,3-Dimethylpentane	00565-59-3	1.25	5.78	7.221	
2-Methyl-1-butene	00563-46-2	6.38	5.75	36.672	
c-1,3-Dimethylcyclohexane	00638-04-0	2.47	5.57	13.741	
4-Methyloctane	02216-34-4	0.85	5.47	4.637	
2,4-Dimethylpentane	00108-08-7	1.46	5.36	7.818	
c-2-Pentene	00627-20-3	10.28	5.23	53.797	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	5.18	60.584	

Vehicle 209c - Fuel 7 psi E20 - 3 Day Diurnal Repeat - Test 7881 continued					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
c-2-Heptene	06443-92-1	7.08	4.19	29.626	
3-Methyl-c-2-pentene	00922-62-3	12.52	3.79	47.426	
ortho-Xylene	00095-47-6	7.58	3.68	27.850	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	3.55	5.703	
2,2,5-Trimethylhexane	03522-94-9	1.05	3.50	3.686	
n-Propylbenzene	00103-65-1	1.96	3.50	6.856	
3-Methyloctane	02216-33-3	0.88	3.39	3.003	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	3.30	3.603	
t-2-Hexene	04050-45-7	8.55	3.29	28.138	
t-1,2-Dimethylcyclopentane	00822-50-4	2.47	3.07	7.578	
c-2-Butene	00590-18-1	14.26	2.90	41.290	
n-Decane	00124-18-5	0.59	2.84	1.680	
t-1,4-Dimethylcyclohexane	02207-04-7	2.47	2.81	6.923	
Ethylbenzene	00100-41-4	2.96	2.79	8.257	
c-1,3-Dimethylcyclopentane	02532-58-3	2.47	2.77	6.834	
2-Methyl-2-pentene	00625-27-4	11.03	2.72	29.956	
3-Methyl-t-2-pentene	00616-12-6	11.66	2.64	30.830	
Unknown #16		2.47	2.52	6.216	
1-Methylcyclopentene	00693-89-0	12.45	2.43	30.237	
Unknown #8		2.47	2.36	5.829	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	2.34	15.488	
Cyclopentene	00142-29-0	6.69	2.25	15.030	
2-MeOctane & 2,3-DiMeHeptane	03074-71-3+03221-61-2	0.85	2.23	1.906	
1-MeCyHexene & 4-MeHeptane	00591-49-1+00589-53-7	3.86	2.22	8.587	
t-1,3 & c-1,4-DiMeCyHexane	02207-03-6+00624-29-3	2.47	2.18	5.387	
2,4-DiMeOctane+AlBenz+PrCyHexane	04032-94-4+00300-57-2+	1.18	2.06	2.438	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	1.96	15.596	
1-Nonene	00124-11-8	2.49	1.94	4.832	
2,2-Dimethylbutane	00075-83-2	1.11	1.92	2.134	
2,2-Dimethylpentane	00590-35-2	1.04	1.78	1.857	
1-Octene	00111-66-0	3.14	1.62	5.092	

Vehicle 209c - Fuel 7 psi E20 - 3 Day Diurnal Repeat - Test 7881 continued					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
1,2,3-Trimethylbenzene	00526-73-8	11.94	1.53	18.229	
2,4,4-Trimethyl-2-Pentene	00107-40-4	6.30	1.50	9.472	
3 & 4-Methyl-1-Pentenes	00691-37-2+00760-20-3	5.78	1.48	8.546	
Unknown #9		2.47	1.47	3.619	
t-4-Octene	14850-23-8	4.69	1.46	6.841	
3,3-Dimethylhexane	00563-16-6	1.15	1.46	1.676	
2,4-Dimethylheptane	02213-23-2	1.26	1.43	1.808	
Unknown #5		2.47	1.40	3.451	
3,3-Dimethylpentane	00562-49-2	1.12	1.31	1.460	
Indan	00496-11-7	3.23	0.86	2.776	
n-Undecane	01120-21-4	0.52	0.81	0.423	
2-Methyl-1,3-butadiene	00078-79-5	10.48	0.76	8.017	
2,2,3-Trimethylbutane	00464-06-2	1.05	0.66	0.696	
2,2-Dimethyloctane	15869-87-1	0.76	0.48	0.361	
Unknown #1		2.47	0.43	1.059	
Isopropylbenzene (Cumene)	00098-82-8	2.47	0.33	0.802	
		Total	1211.1	3048.8	2.517
No MIR available, use weighted average of 2.4667					

Vehicle 210c

Test	Fuel	Test No.	Bag THC mg	GC as % of THC	GC VOC mg	Ozone mg	Reactivity	Species Present
86° F	E20 - 9 psi	7701	45.2	110.5	49.9	164.6	3.297	70
Static	E20 - 7 psi	7758	35.1	73.8	25.9	108.7	4.196	48
105° F	E20 - 9 psi	7702	68.5	160.2	109.8	375.3	3.417	56
Static	E20 - 7 psi	7761	68.7	138.3	95.1	313.8	3.302	57
Dynamic	E20 - 9 psi	25799	201.7	105.6	213.0	838.9	3.939	63
	E20 - 7 psi	25813	190.8	71.4	136.2	473.0	3.473	49
DHB	E20 - 9 psi	7725	925.0	115.7	1069.8	3132.7	2.928	106
Total	E20 - 7 psi	7826	923.3	97.8	903.0	2303.4	2.551	74

Vehicle 210c - Fuel 9 psi E20 - 86°F Static - Test 7701					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2-Methylbutane (Isopentane)	00078-78-4	1.35	9.23	12.512	
Toluene	00108-88-3	3.93	2.13	8.377	
n-Pentane	00109-66-0	1.21	2.09	2.533	
n-Butane	00106-97-8	1.08	1.95	2.100	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	1.52	6.683	
n-Heptane	00142-82-5	0.97	1.46	1.407	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	1.33	7.049	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	1.28	9.949	
2-Methylpropane	00075-28-5	1.18	1.19	1.401	
n-Hexane	00110-54-3	1.13	1.19	1.345	
Cyclohexane	00110-82-7	1.14	1.15	1.310	
Benzene	00071-43-2	0.69	1.08	0.747	
Unknown #23		3.13	1.05	3.279	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	1.04	1.458	
t-2-Pentene	00646-04-8	10.47	1.03	10.759	
n-Octane	00111-65-9	0.80	0.96	0.765	
3-Methylheptane	00589-81-1	1.12	0.93	1.050	
2-Methyl-2-butene	00513-35-9	14.20	0.88	12.443	
Methylcyclohexane	00108-87-2	1.56	0.87	1.348	
2,4,4-Trimethyl-2-Pentene	00107-40-4	6.30	0.83	5.215	
3-Methylpentane	00096-14-0	1.69	0.81	1.375	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	0.81	6.442	
4-Methyloctane	02216-34-4	0.85	0.74	0.632	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	0.71	3.827	
2,2,5-Trimethylhexane	03522-94-9	1.05	0.62	0.651	
Methylcyclopentane	00096-37-7	2.05	0.62	1.262	
c-2-Pentene	00627-20-3	10.28	0.60	6.196	
c-1,3-Dimethylcyclohexane	00638-04-0	3.13	0.56	1.759	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	0.56	0.609	
t-2-Hexene	04050-45-7	8.55	0.55	4.697	
2-Methylhexane	00591-76-4	1.09	0.52	0.565	
2-Methyl-1-butene	00563-46-2	6.38	0.45	2.839	
2-Methylheptane	00592-27-8	0.97	0.43	0.418	
2,2-Dimethylpropane	00463-82-1	0.65	0.43	0.279	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	0.42	4.947	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	0.38	2.117	
n-Nonane	00111-84-2	0.68	0.36	0.249	
n-Decane	00124-18-5	0.59	0.36	0.213	
n-Propylbenzene	00103-65-1	1.96	0.34	0.658	
t-1,2-Dimethylcyclopentane	00822-50-4	3.13	0.33	1.041	
3-Methyl-t-2-pentene	00616-12-6	11.66	0.32	3.705	
2,2-Dimethyloctane	15869-87-1	0.76	0.30	0.227	
1-MeCyHexene & 4-MeHeptane	00591-49-1+00589-53-7	3.86	0.29	1.130	
1-Methylcyclopentene	00693-89-0	12.45	0.29	3.622	

Vehicle 210c - Fuel 9 psi E20 - 86°F Static - Test 7701 continued					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	0.29	0.346	
Ethylbenzene	00100-41-4	2.96	0.27	0.810	
2-Methyl-2-pentene	00625-27-4	11.03	0.26	2.921	
t-4-Octene	14850-23-8	4.69	0.26	1.220	
2,3-Dimethylbutane	00079-29-8	0.90	0.26	0.231	
1,4-Diisopropylbenzene	00100-18-5	3.13	0.26	0.803	
ortho-Xylene	00095-47-6	7.58	0.25	1.927	
4-Methyl-t-2-pentene	00674-76-0	8.04	0.25	2.022	
c-2-Heptene	06443-92-1	7.08	0.25	1.752	
3-Methyl-c-2-pentene	00922-62-3	12.52	0.23	2.817	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	0.23	1.487	
1-Butyne	00107-00-6	6.05	0.22	1.304	
2,2-Dimethylpentane	00590-35-2	1.04	0.21	0.218	
2,3,5-Trimethylhexane	01069-53-0	1.12	0.19	0.210	
c-1,3-Dimethylcyclopentane	02532-58-3	3.13	0.19	0.581	
1,2,3,5-Tetramethylbenzene	00527-53-7	9.26	0.18	1.632	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	0.17	0.539	
Cyclopentene	00142-29-0	6.69	0.16	1.068	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	0.13	0.213	
Unknown #20		3.13	0.13	0.398	
3,5-Dimethylheptane	00926-82-9	1.42	0.12	0.168	
2,2-Dimethylbutane	00075-83-2	1.11	0.10	0.109	
2,4-Dimethylpentane	00108-08-7	1.46	0.09	0.138	
2,3-Dimethylpentane	00565-59-3	1.25	0.09	0.110	
2,4-Dimethylhexane	00589-43-5	1.61	0.09	0.138	
Unknown #14		3.13	0.08	0.265	
		Total	49.9	164.6	3.297
No MIR available, use weighted average of 3.1342					

Vehicle 210c - Fuel 9 psi E20 - 105°F Static - Test 7702					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	15.83	22.942	
2-Methylbutane (Isopentane)	00078-78-4	1.35	14.29	19.360	
Toluene	00108-88-3	3.93	6.12	24.017	
n-Pentane	00109-66-0	1.21	4.86	5.903	
n-Butane	00106-97-8	1.08	4.81	5.181	
n-Heptane	00142-82-5	0.97	3.34	3.229	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	3.22	17.055	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	3.05	23.625	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	3.03	16.280	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	2.78	3.881	
n-Hexane	00110-54-3	1.13	2.72	3.083	
Benzene	00071-43-2	0.69	2.68	1.861	
Cyclohexane	00110-82-7	1.14	2.42	2.757	
Methylcyclopentane	00096-37-7	2.05	2.15	4.403	
2-Methylheptane	00592-27-8	0.97	2.00	1.932	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	2.00	23.363	
1,3,5-Trimethylbenzene	00108-67-8	11.75	1.74	20.415	
t-2-Pentene	00646-04-8	10.47	1.71	17.927	
2-Methylpropane	00075-28-5	1.18	1.69	1.990	
2-Methyl-2-butene	00513-35-9	14.20	1.66	23.544	
3-Methylpentane	00096-14-0	1.69	1.54	2.608	
Methylcyclohexane	00108-87-2	1.56	1.45	2.258	
c-2-Pentene	00627-20-3	10.28	1.39	14.324	
2-Methyl-1-butene	00563-46-2	6.38	1.35	8.633	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	1.33	5.848	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	1.25	3.989	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	1.20	6.627	
c-1,3-Dimethylcyclohexane	00638-04-0	3.38	1.03	3.471	
3-Methyl-c-2-pentene	00922-62-3	12.52	0.96	11.960	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	0.95	1.140	
2,3-Dimethylbutane	00079-29-8	0.90	0.94	0.843	
3-Methylheptane	00589-81-1	1.12	0.90	1.017	
t-2-Hexene	04050-45-7	8.55	0.83	7.126	
2,4,4-Trimethyl-2-Pentene	00107-40-4	6.30	0.80	5.052	
Ethylbenzene	00100-41-4	2.96	0.78	2.298	
n-Octane	00111-65-9	0.80	0.76	0.607	
ortho-Xylene	00095-47-6	7.58	0.76	5.752	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	0.76	0.825	
2-Methylhexane	00591-76-4	1.09	0.69	0.746	
2-Methyl-2-pentene	00625-27-4	11.03	0.69	7.570	
n-Nonane	00111-84-2	0.68	0.68	0.463	
3-Methyl-t-2-pentene	00616-12-6	11.66	0.66	7.701	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	0.63	4.152	
2,4-Dimethylpentane	00108-08-7	1.46	0.63	0.917	

Vehicle 210c - Fuel 9 psi E20 - 105°F Static - Test 7702 continued					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2,4-Dimethylhexane	00589-43-5	1.61	0.57	0.908	
c-2-Butene	00590-18-1	14.26	0.56	7.952	
1-Methylcyclopentene	00693-89-0	12.45	0.53	6.628	
n-Propylbenzene	00103-65-1	1.96	0.47	0.917	
Cyclopentene	00142-29-0	6.69	0.44	2.973	
4-Isopropyltoluene (p-Cymene)	00099-87-6	4.41	0.43	1.893	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	0.40	0.650	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	0.37	2.956	
2,2-Dimethylbutane	00075-83-2	1.11	0.35	0.385	
c-1,3-Dimethylcyclopentane	02532-58-3	3.38	0.27	0.910	
2,3-Dimethylpentane	00565-59-3	1.25	0.23	0.286	
2,3,4-Trimethylpentane	00565-75-3	0.95	0.16	0.154	
		Total	109.8	375.3	3.417
No MIR available, use weighted average of 3.3773					

Vehicle 210c - Fuel 9 psi E20 - Dynamic - Test 25799					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2-Methylbutane (Isopentane)	00078-78-4	1.35	20.99	28.438	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	15.58	83.654	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	15.21	66.820	
Cyclohexane	00110-82-7	1.14	8.30	9.437	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	7.72	59.889	
Toluene	00108-88-3	3.93	7.35	28.842	
n-Pentane	00109-66-0	1.21	6.35	7.720	
n-Butane	00106-97-8	1.08	6.05	6.519	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	5.84	30.953	
n-Heptane	00142-82-5	0.97	5.82	5.618	
Benzene	00071-43-2	0.69	5.79	4.019	
1-Methylcyclopentene	00693-89-0	12.45	5.53	68.845	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	5.45	30.212	
1,3,5-Trimethylbenzene	00108-67-8	11.75	5.28	62.060	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	4.53	5.431	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	4.18	5.843	
2,2-Dimethylpropane	00463-82-1	0.65	4.08	2.638	
3-Methylpentane	00096-14-0	1.69	4.00	6.755	
n-Propylbenzene	00103-65-1	1.96	3.72	7.293	
2-Methylhexane	00591-76-4	1.09	3.61	3.923	
n-Octane	00111-65-9	0.80	3.59	2.859	
Unknown #22	.	3.82	3.15	12.033	
n-Hexane	00110-54-3	1.13	2.99	3.392	
Methylcyclohexane	00108-87-2	1.56	2.85	4.432	
t-2-Butene	00624-64-6	15.20	2.80	42.605	
4-Methyl-t-2-pentene	00674-76-0	8.04	2.64	21.197	
n-Decane	00124-18-5	0.59	2.41	1.427	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	2.30	15.199	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	2.30	7.325	
Cyclopentene	00142-29-0	6.69	2.18	14.592	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	2.08	16.551	
c-1,3-Dimethylcyclopentane	02532-58-3	3.82	1.99	7.598	
Propane	00074-98-6	0.46	1.93	0.881	
ortho-Xylene	00095-47-6	7.58	1.77	13.425	
2,4-Dimethylhexane	00589-43-5	1.61	1.68	2.703	
Methylcyclopentane	00096-37-7	2.05	1.68	3.444	
2,3,5-Trimethylhexane	01069-53-0	1.12	1.63	1.824	
Ethylbenzene	00100-41-4	2.96	1.62	4.786	
2-Methyl-2-butene	00513-35-9	14.20	1.60	22.779	
4-Isopropyltoluene (p-Cymene)	00099-87-6	4.41	1.53	6.741	
4-Methyloctane	02216-34-4	0.85	1.45	1.233	
2,4,4-Trimethyl-2-Pentene	00107-40-4	6.30	1.35	8.498	
t-2-Hexene	04050-45-7	8.55	1.34	11.491	
2-Methyl-1,3-butadiene	00078-79-5	10.48	1.33	13.890	

Vehicle 210c - Fuel 9 psi E20 - Dynamic - Test 25799 continued

Non Zero Mass Species Sorted By VOC

Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2,3-Dimethylbutane	00079-29-8	0.90	1.32	1.189	
2-Methyl-2-pentene	00625-27-4	11.03	1.29	14.259	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	1.22	1.954	
2,3-Dimethylpentane	00565-59-3	1.25	1.21	1.515	
n-Nonane	00111-84-2	0.68	1.20	0.820	
2,2-Dimethylbutane	00075-83-2	1.11	1.15	1.278	
2-Methylheptane	00592-27-8	0.97	1.14	1.105	
3-Methylheptane	00589-81-1	1.12	1.09	1.224	
3-Methyl-t-2-pentene	00616-12-6	11.66	0.96	11.152	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	0.95	1.040	
1-MeCyHexene & 4-MeHeptane	00591-49-1+00589-53-7	3.86	0.92	3.573	
c-1,3-Dimethylcyclohexane	00638-04-0	3.82	0.91	3.469	
2-Methyl-1-butene	00563-46-2	6.38	0.80	5.118	
3-Methyl-c-2-pentene	00922-62-3	12.52	0.80	10.031	
Unknown #18		3.82	0.72	2.733	
t-2-Pentene	00646-04-8	10.47	0.56	5.882	
t-3-Hexene & c-3-Hexene	13269-52-8+07642-09-3	7.43	0.49	3.649	
2,3,4-Trimethylpentane	00565-75-3	0.95	0.49	0.465	
c-2-Butene	00590-18-1	14.26	0.19	2.640	
		Total	213.0	838.9	3.939
No MIR available, use weighted average of 3.8173					

Vehicle 210c - Fuel 9 psi E20 - 3 Day Diurnal - Test 7725					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	316.96	459.267	
2-Methylbutane (Isopentane)	00078-78-4	1.35	67.28	91.162	
n-Pentane	00109-66-0	1.21	52.02	63.200	
n-Butane	00106-97-8	1.08	47.42	51.062	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	43.07	228.210	
Toluene	00108-88-3	3.93	39.38	154.553	
n-Heptane	00142-82-5	0.97	37.96	36.662	
n-Hexane	00110-54-3	1.13	36.16	41.031	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	30.81	43.059	
Benzene	00071-43-2	0.69	27.16	18.860	
Methylcyclohexane	00108-87-2	1.56	24.65	38.348	
Cyclohexane	00110-82-7	1.14	21.78	24.768	
2-Methyl-2-butene	00513-35-9	14.20	20.23	287.182	
t-2-Pentene	00646-04-8	10.47	19.45	203.758	
Methylcyclopentane	00096-37-7	2.05	17.73	36.335	
3-Methylpentane	00096-14-0	1.69	16.93	28.633	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	12.24	143.229	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	11.99	92.970	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	11.70	62.832	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	11.58	85.522	
c-2-Pentene	00627-20-3	10.28	9.91	101.902	
2-Methyl-1-butene	00563-46-2	6.38	9.37	59.771	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	9.01	28.757	
n-Octane	00111-65-9	0.80	8.91	7.098	
2-Methylhexane	00591-76-4	1.09	8.87	9.631	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	8.76	10.510	
2-Methylpropane	00075-28-5	1.18	7.86	9.244	
t-2-Hexene	04050-45-7	8.55	6.35	54.264	
2,3-Dimethylbutane	00079-29-8	0.90	6.01	5.401	
c-2-Butene	00590-18-1	14.26	5.46	77.832	
Cyclopentane	00287-92-3	2.24	4.76	10.644	
3-Methyl-t-2-pentene	00616-12-6	11.66	4.57	53.303	
1-Methylcyclopentene	00693-89-0	12.45	4.15	51.645	
2-Methylheptane	00592-27-8	0.97	4.12	3.986	
1,3,5-Trimethylbenzene	00108-67-8	11.75	4.10	48.165	
Cyclopentene	00142-29-0	6.69	4.06	27.162	
3-Methyl-c-2-pentene	00922-62-3	12.52	3.81	47.688	
2-Methyl-2-pentene	00625-27-4	11.03	3.78	41.721	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	3.71	16.323	
2,3,4-Trimethylpentane	00565-75-3	0.95	3.62	3.435	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	3.49	23.059	
3-Methylheptane	00589-81-1	1.12	3.41	3.833	
2,4-Dimethylpentane	00108-08-7	1.46	3.37	4.924	
2,3-Dimethylpentane	00565-59-3	1.25	3.02	3.769	

Vehicle 210c - Fuel 9 psi E20 - 3 Day Diurnal - Test 7725 continued

Non Zero Mass Species Sorted By VOC

Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
c-1,3-Dimethylcyclohexane	00638-04-0	2.89	2.85	8.220	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	2.84	15.737	
t-1,2-Dimethylcyclopentane	00822-50-4	2.89	2.79	8.045	
2,4-Dimethylhexane	00589-43-5	1.61	2.77	4.444	
Ethylcyclohexane	01678-91-7	1.35	2.60	3.501	
1,2,3-Trimethylbenzene	00526-73-8	11.94	2.59	30.883	
2,2-Dimethylbutane	00075-83-2	1.11	2.54	2.820	
n-Nonane	00111-84-2	0.68	2.46	1.676	
ortho-Xylene	00095-47-6	7.58	2.41	18.230	
c-1,3-Dimethylcyclopentane	02532-58-3	2.89	2.06	5.939	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	2.05	16.262	
Ethylbenzene	00100-41-4	2.96	1.81	5.360	
3 & 4-Methyl-1-Pentenes	00691-37-2+00760-20-3	5.78	1.73	9.971	
Propane	00074-98-6	0.46	1.69	0.774	
n-Propylbenzene	00103-65-1	1.96	1.68	3.302	
2,3,5-Trimethylhexane	01069-53-0	1.12	1.66	1.856	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	1.58	2.532	
t-1,4-Dimethylcyclohexane	02207-04-7	2.89	1.37	3.959	
4-Methyloctane	02216-34-4	0.85	1.37	1.163	
1-MeCyHexene & 4-MeHeptane	00591-49-1+00589-53-7	3.86	1.37	5.276	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	1.32	1.440	
2,2,5-Trimethylhexane	03522-94-9	1.05	1.26	1.324	
2,2-Dimethylpentane	00590-35-2	1.04	1.21	1.259	
Indan	00496-11-7	3.23	1.20	3.878	
3,3-Dimethylpentane	00562-49-2	1.12	1.14	1.280	
3-Methyloctane	02216-33-3	0.88	1.12	0.989	
1,4-Diethylbenzene	00105-05-5	4.39	0.98	4.322	
3,3-Dimethylhexane	00563-16-6	1.15	0.95	1.092	
3-Me-t-3-Hexene & t-2-Heptene	03899-36-3+14686-13-6	8.38	0.93	7.808	
n-Undecane	01120-21-4	0.52	0.93	0.483	
1,1-Dimethylcyclohexane	00590-66-9	1.12	0.87	0.974	
Unknown #9		2.89	0.85	2.456	
Unknown #22	.	2.89	0.85	2.454	
Unknown #8		2.89	0.83	2.389	
Unknown #16		2.89	0.81	2.340	
t-1,3 & c-1,4-DiMeCyHexane	02207-03-6+00624-29-3	2.89	0.72	2.072	
2-Methyl-2-Hexene & c-3-Heptene	02738-19-4+07642-10-6	7.84	0.65	5.100	
2,2,3-Trimethylbutane	00464-06-2	1.05	0.63	0.669	
1,2,3,5-Tetramethylbenzene	00527-53-7	9.26	0.63	5.854	
2,4-Dimethylheptane	02213-23-2	1.26	0.62	0.788	
t-4-Octene	14850-23-8	4.69	0.62	2.903	
n-Decane	00124-18-5	0.59	0.61	0.363	

Vehicle 210c - Fuel 9 psi E20 - 3 Day Diurnal - Test 7725 continued

Non Zero Mass Species Sorted By VOC

Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Unknown #5		2.89	0.57	1.654	
Unknown #1		2.89	0.57	1.645	
c-2-Heptene	06443-92-1	7.08	0.56	3.942	
1-Methyl-4-Isobutylbenzene	05161-04-6	3.82	0.55	2.100	
4-Methyl-t-2-pentene	00674-76-0	8.04	0.48	3.873	
2-Methyl-1,3-butadiene	00078-79-5	10.48	0.47	4.921	
1-Heptene	00592-76-7	4.29	0.40	1.703	
t-3-Heptene	14686-14-7	6.17	0.35	2.178	
2,4-DiMeOctane+AlBenz+PrCyHexane	04032-94-4+00300-57-2+	1.18	0.34	0.398	
Cyclopentadiene	00542-92-7	6.89	0.33	2.280	
1-Nonene	00124-11-8	2.49	0.33	0.811	
1-Methyl-3-Propylbenzene	01074-43-7	7.08	0.31	2.215	
c- & t-4-Nonene	02198-23-4	4.42	0.29	1.282	
Isobutylbenzene	00538-93-2	2.89	0.27	0.791	
1,4-Dimethyl-2-Ethylbenzene	01758-88-9	7.54	0.27	2.050	
Isopropylbenzene (Cumene)	00098-82-8	2.89	0.23	0.651	
2-MeOctane & 2,3-DiMeHeptane	03074-71-3+03221-61-2	0.85	0.22	0.190	
1-Methyl-2-Propylbenzene	01074-17-5	5.43	0.17	0.919	
1,3-Butadiene	00106-99-0	12.45	0.14	1.729	
t-2-Octene & t-1,2-DiMeCyHexane	13389-42-9+06876-23-9	5.92	0.08	0.480	
		Total	1069.8	3132.7	2.928
No MIR available, use weighted average of 2.8884					

Vehicle 210c - Fuel 7 psi E20 - 86°F Static - Test 7758					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2-Methylbutane (Isopentane)	00078-78-4	1.35	4.47	6.051	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	1.62	11.934	
Toluene	00108-88-3	3.93	1.29	5.070	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	1.18	9.142	
n-Butane	00106-97-8	1.08	1.14	1.229	
n-Heptane	00142-82-5	0.97	1.06	1.019	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	1.02	5.380	
Benzene	00071-43-2	0.69	0.94	0.655	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	0.85	9.963	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	0.83	1.156	
c-2-Butene	00590-18-1	14.26	0.72	10.220	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	0.63	3.370	
Methylcyclohexane	00108-87-2	1.56	0.58	0.901	
2-Methyl-1-butene	00563-46-2	6.38	0.57	3.627	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	0.55	2.435	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	0.55	0.664	
n-Pentane	00109-66-0	1.21	0.54	0.651	
1,3,5-Trimethylbenzene	00108-67-8	11.75	0.53	6.279	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	0.52	3.431	
Cyclohexane	00110-82-7	1.14	0.49	0.558	
n-Hexane	00110-54-3	1.13	0.40	0.449	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	0.37	2.072	
n-Octane	00111-65-9	0.80	0.37	0.294	
Methylcyclopentane	00096-37-7	2.05	0.34	0.698	
3-Methylpentane	00096-14-0	1.69	0.32	0.549	
n-Propylbenzene	00103-65-1	1.96	0.30	0.591	
3-Methylheptane	00589-81-1	1.12	0.28	0.314	
t-2-Hexene	04050-45-7	8.55	0.28	2.367	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	0.27	2.148	
2-Methylheptane	00592-27-8	0.97	0.25	0.246	
n-Nonane	00111-84-2	0.68	0.23	0.160	
1,2,3-Trimethylbenzene	00526-73-8	11.94	0.23	2.790	
2-Methylhexane	00591-76-4	1.09	0.22	0.243	
3-Methyl-t-2-pentene	00616-12-6	11.66	0.21	2.489	
Cyclopentene	00142-29-0	6.69	0.18	1.231	
1-Methylcyclopentene	00693-89-0	12.45	0.17	2.175	

Vehicle 210c - Fuel 7 psi E20 - 86°F Static - Test 7758 continued					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
c-1,3-Dimethylcyclopentane	02532-58-3	4.17	0.17	0.721	
2,4-Dimethylhexane	00589-43-5	1.61	0.16	0.260	
2,3,4-Trimethylpentane	00565-75-3	0.95	0.15	0.144	
2-Methyl-2-butene	00513-35-9	14.20	0.15	2.102	
2,3-Dimethylbutane	00079-29-8	0.90	0.15	0.133	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	0.14	0.451	
ortho-Xylene	00095-47-6	7.58	0.12	0.934	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	0.12	0.186	
Ethylbenzene	00100-41-4	2.96	0.11	0.325	
t-2-Pentene	00646-04-8	10.47	0.08	0.869	
2,4-Dimethylpentane	00108-08-7	1.46	0.03	0.043	
2,3-Dimethylpentane	00565-59-3	1.25	0.01	0.015	
		Total	25.9	108.7	4.196
No MIR available, use weighted average of 4.1780					

Vehicle 210c - Fuel 7 psi E20 - 105°F Static - Test 7761					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	23.84	34.537	
2-Methylbutane (Isopentane)	00078-78-4	1.35	8.62	11.675	
Toluene	00108-88-3	3.93	3.99	15.668	
n-Pentane	00109-66-0	1.21	3.71	4.510	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	3.68	19.768	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	3.63	26.812	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	3.62	19.185	
n-Heptane	00142-82-5	0.97	3.09	2.980	
n-Butane	00106-97-8	1.08	2.99	3.222	
n-Hexane	00110-54-3	1.13	2.46	2.791	
Benzene	00071-43-2	0.69	2.33	1.614	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	1.91	2.674	
Methylcyclohexane	00108-87-2	1.56	1.90	2.955	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	1.59	12.311	
t-2-Pentene	00646-04-8	10.47	1.48	15.551	
Cyclohexane	00110-82-7	1.14	1.46	1.657	
Methylcyclopentane	00096-37-7	2.05	1.24	2.542	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	1.24	1.485	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	1.22	5.345	
1,3,5-Trimethylbenzene	00108-67-8	11.75	1.18	13.846	
2-Methyl-2-butene	00513-35-9	14.20	1.15	16.375	
c-2-Pentene	00627-20-3	10.28	1.13	11.626	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	1.12	13.085	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	1.04	3.315	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	1.04	5.743	
3-Methylpentane	00096-14-0	1.69	1.03	1.742	
n-Octane	00111-65-9	0.80	1.00	0.796	
2-Methyl-1-butene	00563-46-2	6.38	0.83	5.318	
c-1,3-Dimethylcyclopentane	02532-58-3	3.24	0.78	2.523	
t-2-Hexene	04050-45-7	8.55	0.62	5.278	
3-Methyl-c-2-pentene	00922-62-3	12.52	0.61	7.658	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	0.58	3.858	
3-Methylheptane	00589-81-1	1.12	0.54	0.611	
t-1,2-Dimethylcyclopentane	00822-50-4	3.24	0.53	1.703	
1,2,3-Trimethylbenzene	00526-73-8	11.94	0.52	6.224	
2-Methylhexane	00591-76-4	1.09	0.51	0.548	
ortho-Xylene	00095-47-6	7.58	0.48	3.648	
Ethylbenzene	00100-41-4	2.96	0.47	1.400	
n-Propylbenzene	00103-65-1	1.96	0.47	0.921	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	0.45	0.491	
2,4-Dimethylhexane	00589-43-5	1.61	0.42	0.671	
3-Methyl-t-2-pentene	00616-12-6	11.66	0.41	4.734	
2,2,5-Trimethylhexane	03522-94-9	1.05	0.40	0.424	
c-1,3-Dimethylcyclohexane	00638-04-0	3.24	0.39	1.265	

Vehicle 210c - Fuel 7 psi E20 - 105°F Static - Test 7761 continued					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2-Methyl-2-pentene	00625-27-4	11.03	0.39	4.295	
Cyclopentane	00287-92-3	2.24	0.38	0.856	
2,2-Dimethylbutane	00075-83-2	1.11	0.33	0.370	
2,3,4-Trimethylpentane	00565-75-3	0.95	0.32	0.305	
2,3-Dimethylpentane	00565-59-3	1.25	0.30	0.376	
1-Methylcyclopentene	00693-89-0	12.45	0.30	3.720	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	0.30	0.474	
n-Nonane	00111-84-2	0.68	0.23	0.155	
2,3-Dimethylbutane	00079-29-8	0.90	0.22	0.200	
Cyclopentene	00142-29-0	6.69	0.18	1.224	
2,4-Dimethylpentane	00108-08-7	1.46	0.16	0.240	
Unknown #22	.	3.24	0.13	0.423	
2-Methylheptane	00592-27-8	0.97	0.12	0.113	
		Total	95.1	313.8	3.302
No MIR available, use weighted average of 3.2395					

Vehicle 210c - Fuel 7 psi E20 - Dynamic - Test 25813					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	45.16	65.430	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	12.34	91.139	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	7.00	54.262	
2-Methylbutane (Isopentane)	00078-78-4	1.35	5.90	8.000	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	5.14	27.234	
Toluene	00108-88-3	3.93	5.07	19.903	
Unknown #22	.	3.33	4.00	13.307	
n-Butane	00106-97-8	1.08	3.81	4.104	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	3.44	18.490	
n-Heptane	00142-82-5	0.97	2.94	2.844	
Propane	00074-98-6	0.46	2.78	1.272	
Benzene	00071-43-2	0.69	2.71	1.880	
2-Methylheptane	00592-27-8	0.97	2.42	2.337	
n-Pentane	00109-66-0	1.21	2.33	2.835	
n-Hexane	00110-54-3	1.13	2.26	2.566	
2,2,5-Trimethylhexane	03522-94-9	1.05	2.25	2.365	
c-2-Butene	00590-18-1	14.26	1.99	28.382	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	1.93	8.483	
c-1,3-Dimethylcyclohexane	00638-04-0	3.33	1.86	6.200	
n-Nonane	00111-84-2	0.68	1.71	1.171	
1,3,5-Trimethylbenzene	00108-67-8	11.75	1.33	15.640	
2,2-Dimethylpentane	00590-35-2	1.04	1.20	1.248	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	1.17	7.745	
c-2-Pentene	00627-20-3	10.28	1.11	11.423	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	1.11	8.776	
Methylcyclopentane	00096-37-7	2.05	0.95	1.941	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	0.90	0.983	
n-Octane	00111-65-9	0.80	0.85	0.679	
Cyclohexane	00110-82-7	1.14	0.81	0.923	
2-Methyl-2-butene	00513-35-9	14.20	0.81	11.500	
2-Methyl-1-butene	00563-46-2	6.38	0.81	5.168	
2,3,5-Trimethylhexane	01069-53-0	1.12	0.80	0.900	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	0.76	1.064	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	0.76	4.193	
2-Methyl-2-pentene	00625-27-4	11.03	0.68	7.461	
3-Methylheptane	00589-81-1	1.12	0.64	0.719	

Vehicle 210c - Fuel 7 psi E20 - Dynamic - Test 25813 continued

Non Zero Mass Species Sorted By VOC

Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
t-2-Pentene	00646-04-8	10.47	0.62	6.546	
Methylcyclohexane	00108-87-2	1.56	0.60	0.932	
ortho-Xylene	00095-47-6	7.58	0.53	4.033	
1-Methylcyclopentene	00693-89-0	12.45	0.53	6.580	
3-Methyl-c-2-pentene	00922-62-3	12.52	0.47	5.926	
Ethylbenzene	00100-41-4	2.96	0.43	1.269	
2-Methylpropane	00075-28-5	1.18	0.38	0.446	
2,4-Dimethylpentane	00108-08-7	1.46	0.28	0.403	
Cyclopentene	00142-29-0	6.69	0.22	1.503	
t-2-Hexene	04050-45-7	8.55	0.14	1.156	
3-Methyl-t-2-pentene	00616-12-6	11.66	0.11	1.314	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	0.09	0.294	
2,3-Dimethylbutane	00079-29-8	0.90	0.05	0.041	
		Total	136.2	473.0	3.473
No MIR available, use weighted average of 3.3300					

Vehicle 213c

Test	Fuel	Test No.	Bag THC mg	GC as % of THC	GC VOC mg	Ozone mg	Reactivity	Species Present
86° F	E20 - 9 psi	7744	65.4	77.1	50.4	195.9	3.887	39
Static	E20 - 7 psi	7828	47.2	108.7	51.3	147.1	2.864	49
105° F	E20 - 9 psi	7746	148.0	116.0	171.6	539.8	3.145	65
Static	E20 - 7 psi	7830	129.2	80.0	103.3	253.0	2.449	53
Dynamic	E20 - 9 psi	25816	226.8	44.8	101.6	446.4	4.392	23
	E20 - 7 psi	25821	139.4	126.9	176.8	614.3	3.474	57
DHB	E20 - 9 psi	7803	1634.2	99.1	1619.0	3929.0	2.427	92
Total	E20 - 7 psi	7872	1586.4	89.1	1412.8	3350.4	2.371	82

Vehicle 213c - Fuel 9 psi E20 - 86°F Static - Test 7744					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	9.14	13.240	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	5.24	28.156	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	4.55	33.606	
n-Heptane	00142-82-5	0.97	3.20	3.090	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	2.80	21.714	
1,3,5-Trimethylbenzene	00108-67-8	11.75	2.18	25.584	
Methylcyclohexane	00108-87-2	1.56	2.07	3.213	
n-Octane	00111-65-9	0.80	1.90	1.516	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	1.67	9.228	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	1.53	8.088	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	1.48	6.515	
2-Methylheptane	00592-27-8	0.97	1.48	1.433	
3,5-Dimethylheptane	00926-82-9	1.42	1.25	1.780	
2-Methylpropane	00075-28-5	1.18	1.18	1.392	
Toluene	00108-88-3	3.93	1.03	4.047	
n-Nonane	00111-84-2	0.68	0.99	0.674	
4-Isopropyltoluene (p-Cymene)	00099-87-6	4.41	0.84	3.723	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	0.78	9.144	
3-Methylheptane	00589-81-1	1.12	0.72	0.810	
Benzene	00071-43-2	0.69	0.72	0.497	
1-MeCyHexene & 4-MeHeptane	00591-49-1+00589-53-7	3.86	0.71	2.755	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	0.60	1.929	
Ethylbenzene	00100-41-4	2.96	0.54	1.611	
n-Propylbenzene	00103-65-1	1.96	0.51	0.994	
Indan	00496-11-7	3.23	0.46	1.487	
Unknown #8		3.80	0.44	1.655	
4-Methyloctane	02216-34-4	0.85	0.31	0.266	
c-1,3-Dimethylcyclohexane	00638-04-0	3.80	0.31	1.189	
ortho-Xylene	00095-47-6	7.58	0.25	1.916	
2-Methylhexane	00591-76-4	1.09	0.25	0.270	
3-Methyloctane	02216-33-3	0.88	0.22	0.195	
t-2-Hexene	04050-45-7	8.55	0.22	1.856	
n-Decane	00124-18-5	0.59	0.20	0.120	
t-1,2-Dimethylcyclopentane	00822-50-4	3.80	0.19	0.714	
c-1,3-Dimethylcyclopentane	02532-58-3	3.80	0.13	0.475	
2,4-Dimethylhexane	00589-43-5	1.61	0.10	0.159	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	0.09	0.138	
Unknown #18		3.80	0.08	0.320	
1-Methylcyclopentene	00693-89-0	12.45	0.03	0.400	
		Total	50.4	195.9	3.887
No MIR available, use weighted average of 3.8011					

Vehicle 213c - Fuel 9 psi E20 - 105°F Static - Test 7746					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	53.50	77.523	
2-Methylbutane (Isopentane)	00078-78-4	1.35	9.92	13.440	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	8.15	43.778	
Toluene	00108-88-3	3.93	7.10	27.869	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	6.77	50.004	
n-Heptane	00142-82-5	0.97	5.57	5.384	
n-Pentane	00109-66-0	1.21	5.07	6.163	
Methylcyclohexane	00108-87-2	1.56	4.55	7.077	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	4.53	35.114	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	4.37	23.175	
n-Butane	00106-97-8	1.08	4.12	4.441	
Benzene	00071-43-2	0.69	3.97	2.757	
n-Hexane	00110-54-3	1.13	3.24	3.679	
1,3,5-Trimethylbenzene	00108-67-8	11.75	3.17	37.318	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	2.89	12.689	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	2.70	3.775	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	2.55	14.131	
Methylcyclopentane	00096-37-7	2.05	1.98	4.054	
n-Octane	00111-65-9	0.80	1.90	1.517	
2-Methyl-2-butene	00513-35-9	14.20	1.85	26.255	
Cyclohexane	00110-82-7	1.14	1.77	2.018	
2-Methylpropane	00075-28-5	1.18	1.61	1.890	
t-2-Pentene	00646-04-8	10.47	1.57	16.410	
3-Methylpentane	00096-14-0	1.69	1.53	2.584	
n-Propylbenzene	00103-65-1	1.96	1.30	2.552	
Ethylcyclohexane	01678-91-7	1.35	1.17	1.576	
n-Nonane	00111-84-2	0.68	1.05	0.717	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	1.01	11.875	
2-Methylhexane	00591-76-4	1.09	0.98	1.068	
Propane	00074-98-6	0.46	0.95	0.435	
ortho-Xylene	00095-47-6	7.58	0.95	7.180	
2-Methyl-1-butene	00563-46-2	6.38	0.91	5.809	
c-2-Pentene	00627-20-3	10.28	0.87	8.898	
3-Methyloctane	02216-33-3	0.88	0.83	0.732	
c-1,3-Dimethylcyclohexane	00638-04-0	3.09	0.82	2.549	
2-Methylheptane	00592-27-8	0.97	0.82	0.789	
4-Methyloctane	02216-34-4	0.85	0.82	0.692	
Cyclopentene	00142-29-0	6.69	0.79	5.254	
Cyclopentane	00287-92-3	2.24	0.74	1.658	
Ethylbenzene	00100-41-4	2.96	0.71	2.105	
n-Decane	00124-18-5	0.59	0.65	0.381	
3-Methylheptane	00589-81-1	1.12	0.63	0.710	
3-Methyl-t-2-pentene	00616-12-6	11.66	0.63	7.322	
2,4-Dimethylhexane	00589-43-5	1.61	0.62	1.002	

Vehicle 213c - Fuel 9 psi E20 - 105°F Static - Test 7746 continued					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
1-Methylcyclopentene	00693-89-0	12.45	0.62	7.704	
3-Methyl-c-2-pentene	00922-62-3	12.52	0.61	7.585	
t-1,2-Dimethylcyclopentane	00822-50-4	3.09	0.60	1.844	
t-1,4-Dimethylcyclohexane	02207-04-7	3.09	0.59	1.810	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	0.58	1.848	
2,2-Dimethylbutane	00075-83-2	1.11	0.57	0.637	
t-2-Hexene	04050-45-7	8.55	0.56	4.804	
c-1,3-Dimethylcyclopentane	02532-58-3	3.09	0.56	1.720	
2-Methyl-2-pentene	00625-27-4	11.03	0.54	5.956	
4-Isopropyltoluene (p-Cymene)	00099-87-6	4.41	0.53	2.317	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	0.49	3.239	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	0.48	0.580	
2,2-Dimethylpentane	00590-35-2	1.04	0.48	0.504	
Unknown #18		3.09	0.46	1.407	
c-2-Butene	00590-18-1	14.26	0.41	5.887	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	0.41	0.656	
1-MeCyHexene & 4-MeHeptane	00591-49-1+00589-53-7	3.86	0.35	1.364	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	0.32	2.564	
2,3-Dimethylpentane	00565-59-3	1.25	0.32	0.400	
2,4-Dimethylpentane	00108-08-7	1.46	0.30	0.435	
2,3-Dimethylbutane	00079-29-8	0.90	0.23	0.203	
		Total	171.6	539.8	3.145
No MIR available, use weighted average of 3.0906					

Vehicle 213c - Fuel 9 psi E20 - Dynamic - Test 25816					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	20.93	154.593	
Ethanol	00064-17-5	1.45	14.15	20.503	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	13.45	72.203	
1,3,5-Trimethylbenzene	00108-67-8	11.75	5.16	60.668	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	4.64	20.410	
n-Heptane	00142-82-5	0.97	4.57	4.411	
n-Nonane	00111-84-2	0.68	4.18	2.857	
n-Octane	00111-65-9	0.80	3.91	3.117	
n-Propylbenzene	00103-65-1	1.96	3.90	7.648	
2,2-Dimethylpropane	00463-82-1	0.65	3.78	2.443	
2,3,5-Trimethylhexane	01069-53-0	1.12	3.72	4.163	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	3.12	24.231	
Methylcyclohexane	00108-87-2	1.56	2.85	4.429	
Unknown #22	.	4.29	2.41	10.343	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	2.24	12.394	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	2.22	11.770	
Toluene	00108-88-3	3.93	1.38	5.398	
1,2,3-Trimethylbenzene	00526-73-8	11.94	1.12	13.350	
Ethylbenzene	00100-41-4	2.96	1.07	3.162	
Benzene	00071-43-2	0.69	1.06	0.733	
ortho-Xylene	00095-47-6	7.58	0.86	6.504	
2-Methylhexane	00591-76-4	1.09	0.53	0.572	
2,3-Dimethylpentane	00565-59-3	1.25	0.40	0.494	
		Total	101.6	446.4	4.392
No MIR available, use weighted average of 4.2903					

Vehicle 213c - Fuel 9 psi E20 - 3 Day Diurnal - Test 7803					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	800.88	1160.459	
2-Methylbutane (Isopentane)	00078-78-4	1.35	77.37	104.827	
n-Pentane	00109-66-0	1.21	48.22	58.590	
n-Heptane	00142-82-5	0.97	47.35	45.729	
n-Butane	00106-97-8	1.08	44.15	47.543	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	42.17	223.434	
Toluene	00108-88-3	3.93	38.50	151.113	
Methylcyclohexane	00108-87-2	1.56	35.83	55.723	
n-Hexane	00110-54-3	1.13	34.08	38.671	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	30.68	42.885	
Benzene	00071-43-2	0.69	30.32	21.056	
Methylcyclopentane	00096-37-7	2.05	19.01	38.976	
2-Methyl-2-butene	00513-35-9	14.20	18.79	266.753	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	18.59	144.144	
t-2-Pentene	00646-04-8	10.47	18.56	194.423	
Cyclohexane	00110-82-7	1.14	18.03	20.503	
3-Methylpentane	00096-14-0	1.69	17.10	28.914	
n-Octane	00111-65-9	0.80	15.52	12.360	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	15.28	82.058	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	13.14	97.049	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	11.83	37.751	
2-Methylhexane	00591-76-4	1.09	11.17	12.118	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	9.55	111.822	
2-Methyl-1-butene	00563-46-2	6.38	9.11	58.131	
c-2-Pentene	00627-20-3	10.28	9.07	93.216	
2-Methylpropane	00075-28-5	1.18	7.79	9.171	
2-Methylheptane	00592-27-8	0.97	7.09	6.862	
1-Butyne	00107-00-6	6.05	6.63	40.082	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	6.50	28.567	
3-Methylheptane	00589-81-1	1.12	6.44	7.246	
t-2-Hexene	04050-45-7	8.55	6.37	54.462	
1,3,5-Trimethylbenzene	00108-67-8	11.75	6.00	70.486	
c-1,3-Dimethylcyclohexane	00638-04-0	2.39	5.57	13.342	
2,3-Dimethylbutane	00079-29-8	0.90	5.50	4.945	
3-Methyl-c-2-pentene	00922-62-3	12.52	5.39	67.459	
3,5-Dimethylheptane	00926-82-9	1.42	4.94	7.036	
n-Nonane	00111-84-2	0.68	4.74	3.235	
Cyclopentane	00287-92-3	2.24	4.59	10.278	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	4.53	25.112	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	4.37	5.237	
1-Methylcyclopentene	00693-89-0	12.45	4.35	54.154	
3-Methyl-t-2-pentene	00616-12-6	11.66	4.06	47.372	
2-Methyl-2-pentene	00625-27-4	11.03	3.76	41.453	
Cyclopentene	00142-29-0	6.69	3.70	24.726	

Vehicle 213c - Fuel 9 psi E20 - 3 Day Diurnal - Test 7803 continued

Non Zero Mass Species Sorted By VOC

Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	3.60	23.793	
ortho-Xylene	00095-47-6	7.58	3.54	26.855	
4-Methyloctane	02216-34-4	0.85	3.54	3.006	
c-2-Butene	00590-18-1	14.26	3.44	49.033	
t-1,2-Dimethylcyclopentane	00822-50-4	2.39	3.17	7.600	
2,3-Dimethylpentane	00565-59-3	1.25	3.07	3.835	
Ethylbenzene	00100-41-4	2.96	3.01	8.929	
n-Propylbenzene	00103-65-1	1.96	3.01	5.890	
3-Methyloctane	02216-33-3	0.88	2.95	2.606	
2,2-Dimethylbutane	00075-83-2	1.11	2.89	3.213	
2,4-Dimethylhexane	00589-43-5	1.61	2.85	4.569	
2,4-Dimethylpentane	00108-08-7	1.46	2.74	3.999	
c-1,3-Dimethylcyclopentane	02532-58-3	2.39	2.65	6.336	
t-1,4-Dimethylcyclohexane	02207-04-7	2.39	2.39	5.729	
Propane	00074-98-6	0.46	2.34	1.071	
1-MeCyHexene & 4-MeHeptane	00591-49-1+00589-53-7	3.86	2.18	8.404	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	2.14	16.982	
3,3-Dimethylpentane	00562-49-2	1.12	2.12	2.376	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	2.09	3.356	
4-Isopropyltoluene (p-Cymene)	00099-87-6	4.41	1.73	7.644	
2-MeOctane & 2,3-DiMeHeptane	03074-71-3+03221-61-2	0.85	1.72	1.465	
Unknown #8		2.39	1.66	3.975	
Unknown #9		2.39	1.61	3.846	
2,2-Dimethylpentane	00590-35-2	1.04	1.61	1.675	
1,1-Dimethylcyclohexane	00590-66-9	1.12	1.57	1.754	
3 & 4-Methyl-1-Pentenes	00691-37-2+00760-20-3	5.78	1.46	8.433	
2,3,4-Trimethylpentane	00565-75-3	0.95	1.37	1.298	
3,3-Dimethylhexane	00563-16-6	1.15	1.27	1.462	
t-1,3 & c-1,4-DiMeCyHexane	02207-03-6+00624-29-3	2.39	1.21	2.897	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	1.10	1.203	
2,3,5-Trimethylhexane	01069-53-0	1.12	1.00	1.116	

Vehicle 213c - Fuel 9 psi E20 - 3 Day Diurnal - Test 7803 continued					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
n-Decane	00124-18-5	0.59	0.97	0.572	
2,4-Dimethylheptane	02213-23-2	1.26	0.92	1.166	
2,2,3-Trimethylbutane	00464-06-2	1.05	0.92	0.965	
c- & t-4-Nonene	02198-23-4	4.42	0.81	3.581	
c-2-Heptene	06443-92-1	7.08	0.79	5.569	
Unknown #1		2.39	0.75	1.804	
t-4-Octene	14850-23-8	4.69	0.75	3.530	
2-Methyl-1,3-butadiene	00078-79-5	10.48	0.75	7.877	
2,2,5-Trimethylhexane	03522-94-9	1.05	0.66	0.690	
Unknown #18		2.39	0.65	1.559	
Unknown #5		2.39	0.60	1.448	
Unknown #14		2.39	0.55	1.326	
Isopropylbenzene (Cumene)	00098-82-8	2.39	0.50	1.200	
1-Nonene	00124-11-8	2.49	0.48	1.191	
2,4-DiMeOctane+AlBenz+PrCyHexane	04032-94-4+00300-57-2+	1.18	0.46	0.549	
c-1,2-Dimethylcyclohexane	02207-01-4	2.39	0.44	1.062	
Indan	00496-11-7	3.23	0.34	1.102	
		Total	1619.0	3929.0	2.427
No MIR available, use weighted average of 2.3946					

Vehicle 213c - Fuel 7 psi E20 - 86°F Static - Test 7828					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	19.93	28.873	
2-Methylbutane (Isopentane)	00078-78-4	1.35	3.02	4.089	
Toluene	00108-88-3	3.93	2.13	8.354	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	1.70	8.988	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	1.38	10.685	
n-Butane	00106-97-8	1.08	1.30	1.400	
n-Pentane	00109-66-0	1.21	1.29	1.569	
n-Heptane	00142-82-5	0.97	1.23	1.191	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	1.20	1.442	
n-Hexane	00110-54-3	1.13	1.16	1.316	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	1.05	1.468	
t-2-Butene	00624-64-6	15.20	0.98	14.909	
Methylcyclohexane	00108-87-2	1.56	0.95	1.478	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	0.93	4.995	
Benzene	00071-43-2	0.69	0.89	0.619	
3-Methylheptane	00589-81-1	1.12	0.80	0.904	
t-2-Pentene	00646-04-8	10.47	0.78	8.210	
Methylcyclopentane	00096-37-7	2.05	0.62	1.278	
4-Isopropyltoluene (p-Cymene)	00099-87-6	4.41	0.58	2.540	
3-Methylpentane	00096-14-0	1.69	0.56	0.952	
2,4-Dimethylpentane	00108-08-7	1.46	0.53	0.769	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	0.51	3.793	
Unknown #18		2.82	0.48	1.351	
4-Methyloctane	02216-34-4	0.85	0.47	0.400	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	0.47	0.509	
2-Methyl-2-butene	00513-35-9	14.20	0.46	6.499	
2-Methylhexane	00591-76-4	1.09	0.43	0.468	
c-2-Pentene	00627-20-3	10.28	0.42	4.351	
t-2-Hexene	04050-45-7	8.55	0.41	3.497	
Cyclohexane	00110-82-7	1.14	0.36	0.412	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	0.36	1.570	
c-2-Heptene	06443-92-1	7.08	0.35	2.475	
2-Methyl-1-butene	00563-46-2	6.38	0.35	2.212	
n-Octane	00111-65-9	0.80	0.33	0.264	
2,3-Dimethylbutane	00079-29-8	0.90	0.32	0.284	
2,2-Dimethylpentane	00590-35-2	1.04	0.31	0.321	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	0.30	0.474	
1,3,5-Trimethylbenzene	00108-67-8	11.75	0.25	2.975	
c-1,3-Dimethylcyclopentane	02532-58-3	2.82	0.25	0.701	
3-Methyl-t-2-pentene	00616-12-6	11.66	0.23	2.658	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	0.23	0.721	
n-Nonane	00111-84-2	0.68	0.22	0.148	
3-Methyl-c-2-pentene	00922-62-3	12.52	0.19	2.434	
1-MeCyHexene & 4-MeHeptane	00591-49-1+00589-53-7	3.86	0.16	0.627	

Vehicle 213c - Fuel 7 psi E20 - 86°F Static - Test 7828 continued					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Cyclopentene	00142-29-0	6.69	0.14	0.946	
2,3,4-Trimethylpentane	00565-75-3	0.95	0.13	0.121	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	0.11	0.619	
n-Propylbenzene	00103-65-1	1.96	0.08	0.160	
2,4-Dimethylhexane	00589-43-5	1.61	0.03	0.043	
		Total	51.3	147.1	2.864
No MIR available, use weighted average of 2.8240					

Vehicle 213c - Fuel 7 psi E20 - 105°F Static - Test 7830					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	44.19	64.033	
2-Methylbutane (Isopentane)	00078-78-4	1.35	9.91	13.428	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	3.31	17.514	
Toluene	00108-88-3	3.93	3.27	12.821	
n-Heptane	00142-82-5	0.97	3.17	3.058	
n-Pentane	00109-66-0	1.21	2.98	3.615	
n-Butane	00106-97-8	1.08	2.92	3.145	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	2.43	3.396	
Methylcyclohexane	00108-87-2	1.56	2.28	3.541	
n-Hexane	00110-54-3	1.13	2.02	2.297	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	2.00	15.534	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	1.98	10.630	
Benzene	00071-43-2	0.69	1.76	1.224	
Methylcyclopentane	00096-37-7	2.05	1.44	2.955	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	1.35	1.617	
3-Methylpentane	00096-14-0	1.69	1.28	2.170	
Cyclohexane	00110-82-7	1.14	1.21	1.373	
t-2-Pentene	00646-04-8	10.47	1.08	11.335	
n-Octane	00111-65-9	0.80	1.04	0.832	
2,3-Dimethylbutane	00079-29-8	0.90	0.93	0.839	
2-Methyl-2-butene	00513-35-9	14.20	0.88	12.506	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	0.75	5.552	
c-2-Pentene	00627-20-3	10.28	0.65	6.705	
2-Methylheptane	00592-27-8	0.97	0.65	0.628	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	0.62	1.987	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	0.61	2.682	
2-Methyl-1-butene	00563-46-2	6.38	0.60	3.850	
ortho-Xylene	00095-47-6	7.58	0.58	4.432	
2-Methylhexane	00591-76-4	1.09	0.53	0.572	
3-Methylheptane	00589-81-1	1.12	0.44	0.500	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	0.43	2.392	
1,2,3-Trimethylbenzene	00526-73-8	11.94	0.42	5.065	
Ethylcyclohexane	01678-91-7	1.35	0.42	0.560	
2-Methyl-2-pentene	00625-27-4	11.03	0.41	4.512	
Cyclopentene	00142-29-0	6.69	0.40	2.703	
n-Nonane	00111-84-2	0.68	0.40	0.272	
c-1,3-Dimethylcyclohexane	00638-04-0	2.44	0.39	0.945	
n-Propylbenzene	00103-65-1	1.96	0.34	0.666	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	0.33	0.362	
1,3,5-Trimethylbenzene	00108-67-8	11.75	0.32	3.762	
c-2-Heptene	06443-92-1	7.08	0.32	2.242	
c-2-Butene	00590-18-1	14.26	0.30	4.304	
3-Methyl-t-2-pentene	00616-12-6	11.66	0.27	3.205	
2,3-Dimethylpentane	00565-59-3	1.25	0.26	0.325	

Vehicle 213c - Fuel 7 psi E20 - 105°F Static - Test 7830 continued					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethylbenzene	00100-41-4	2.96	0.24	0.701	
2,4-Dimethylhexane	00589-43-5	1.61	0.20	0.324	
t-2-Hexene	04050-45-7	8.55	0.19	1.605	
1-Methylcyclopentene	00693-89-0	12.45	0.18	2.202	
c-1,3-Dimethylcyclopentane	02532-58-3	2.44	0.17	0.425	
2,2-Dimethylbutane	00075-83-2	1.11	0.16	0.174	
2,4-Dimethylpentane	00108-08-7	1.46	0.14	0.200	
3-Methyl-c-2-pentene	00922-62-3	12.52	0.10	1.259	
2,3,4-Trimethylpentane	00565-75-3	0.95	0.07	0.067	
		Total	103.3	253.0	2.449
No MIR available, use weighted average of 2.4354					

Vehicle 213c - Fuel 7 psi E20 - Dynamic - Test 25821					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	59.63	86.398	
2-Methylbutane (Isopentane)	00078-78-4	1.35	10.80	14.631	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	8.63	63.729	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	8.54	45.862	
Toluene	00108-88-3	3.93	5.71	22.420	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	5.36	41.568	
1,3,5-Trimethylbenzene	00108-67-8	11.75	5.04	59.223	
n-Pentane	00109-66-0	1.21	4.55	5.531	
2,2-Dimethylpropane	00463-82-1	0.65	3.87	2.502	
Propane	00074-98-6	0.46	3.24	1.482	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	3.16	13.868	
Methylcyclohexane	00108-87-2	1.56	3.08	4.792	
Methylcyclopentane	00096-37-7	2.05	2.90	5.935	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	2.86	33.509	
Benzene	00071-43-2	0.69	2.54	1.767	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	2.51	3.016	
n-Heptane	00142-82-5	0.97	2.46	2.379	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	2.13	6.797	
t-2-Pentene	00646-04-8	10.47	2.11	22.048	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	2.10	16.702	
c-2-Butene	00590-18-1	14.26	1.95	27.782	
Ethylbenzene	00100-41-4	2.96	1.68	4.985	
2-Methyl-1-butene	00563-46-2	6.38	1.65	10.501	
n-Hexane	00110-54-3	1.13	1.63	1.848	
ortho-Xylene	00095-47-6	7.58	1.52	11.495	
Cyclohexane	00110-82-7	1.14	1.36	1.543	
c-2-Pentene	00627-20-3	10.28	1.32	13.597	
2,3,5-Trimethylhexane	01069-53-0	1.12	1.31	1.473	
2-Methyl-2-butene	00513-35-9	14.20	1.30	18.389	
n-Octane	00111-65-9	0.80	1.29	1.027	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	1.26	1.379	
3-Methylheptane	00589-81-1	1.12	1.15	1.296	
2,2-Dimethylbutane	00075-83-2	1.11	1.13	1.259	
n-Butane	00106-97-8	1.08	1.11	1.191	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	1.10	6.097	
3-Methylpentane	00096-14-0	1.69	0.99	1.670	
2,4-Dimethylpentane	00108-08-7	1.46	0.99	1.438	
3-Methyl-t-2-pentene	00616-12-6	11.66	0.97	11.253	
n-Nonane	00111-84-2	0.68	0.93	0.635	
c-1,3-Dimethylcyclohexane	00638-04-0	3.44	0.92	3.157	
2,3-Dimethylbutane	00079-29-8	0.90	0.91	0.816	
2-Methylheptane	00592-27-8	0.97	0.91	0.876	
Styrene	00100-42-5	1.66	0.85	1.415	
n-Propylbenzene	00103-65-1	1.96	0.85	1.659	

Vehicle 213c - Fuel 7 psi E20 - Dynamic - Test 25821 continued

Non Zero Mass Species Sorted By VOC

Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	0.70	3.732	
2,4-Dimethylhexane	00589-43-5	1.61	0.68	1.091	
Isobutylbenzene	00538-93-2	3.44	0.67	2.305	
c-2-Heptene	06443-92-1	7.08	0.67	4.724	
Cyclopentene	00142-29-0	6.69	0.58	3.856	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	0.56	0.784	
2,3-Dimethylpentane	00565-59-3	1.25	0.51	0.632	
1-Methylcyclopentene	00693-89-0	12.45	0.48	6.027	
t-2-Hexene	04050-45-7	8.55	0.47	4.014	
3-Methyl-c-2-pentene	00922-62-3	12.52	0.42	5.224	
2,3,4-Trimethylpentane	00565-75-3	0.95	0.30	0.287	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	0.29	0.461	
2-Methylhexane	00591-76-4	1.09	0.24	0.260	
		Total	176.8	614.3	3.474
No MIR available, use weighted average of 3.4430					

Vehicle 213c - Fuel 7 psi E20 - 3 Day Diurnal - Test 7872					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	557.23	807.411	
2-Methylbutane (Isopentane)	00078-78-4	1.35	84.87	114.996	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	66.51	352.412	
n-Heptane	00142-82-5	0.97	59.81	57.761	
n-Pentane	00109-66-0	1.21	45.02	54.693	
n-Butane	00106-97-8	1.08	39.84	42.902	
n-Hexane	00110-54-3	1.13	37.82	42.912	
Methylcyclohexane	00108-87-2	1.56	37.68	58.603	
Toluene	00108-88-3	3.93	37.60	147.573	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	31.76	44.389	
Benzene	00071-43-2	0.69	25.73	17.862	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	21.40	25.664	
Cyclohexane	00110-82-7	1.14	21.21	24.121	
Methylcyclopentane	00096-37-7	2.05	19.68	40.331	
t-1,2-Dimethylcyclopentane	00822-50-4	2.31	19.47	45.038	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	17.72	56.537	
3-Methylpentane	00096-14-0	1.69	17.46	29.526	
2-Methylhexane	00591-76-4	1.09	15.23	16.530	
n-Octane	00111-65-9	0.80	13.70	10.905	
2-Methyl-2-butene	00513-35-9	14.20	13.32	189.048	
t-2-Pentene	00646-04-8	10.47	12.91	135.259	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	12.56	97.415	
2,3-Dimethylbutane	00079-29-8	0.90	9.14	8.215	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	7.75	90.745	
2-Methyl-1-butene	00563-46-2	6.38	7.24	46.184	
2,3,4-Trimethylpentane	00565-75-3	0.95	6.89	6.534	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	6.79	50.156	
c-2-Pentene	00627-20-3	10.28	6.54	67.284	
2,3-Dimethylpentane	00565-59-3	1.25	6.31	7.876	
1-Butyne	00107-00-6	6.05	6.26	37.845	
2-Methylheptane	00592-27-8	0.97	5.98	5.783	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	5.88	31.578	
2,4-Dimethylpentane	00108-08-7	1.46	5.83	8.506	
3-Methylheptane	00589-81-1	1.12	5.75	6.461	
2,4-Dimethylhexane	00589-43-5	1.61	5.69	9.133	
3-Methyl-c-2-pentene	00922-62-3	12.52	5.20	65.089	
c-1,3-Dimethylcyclohexane	00638-04-0	2.31	5.13	11.859	
2,3,5-Trimethylhexane	01069-53-0	1.12	4.97	5.563	
t-2-Hexene	04050-45-7	8.55	4.63	39.550	
c-2-Heptene	06443-92-1	7.08	4.49	31.804	
n-Decane	00124-18-5	0.59	4.19	2.479	
Ethylcyclohexane	01678-91-7	1.35	4.09	5.504	
Cyclopentane	00287-92-3	2.24	3.95	8.835	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	3.50	5.615	

Vehicle 213c - Fuel 7 psi E20 - 3 Day Diurnal - Test 7872 continued

Non Zero Mass Species Sorted By VOC

Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	3.42	15.033	
c-2-Butene	00590-18-1	14.26	3.36	47.937	
3-Methyl-t-2-pentene	00616-12-6	11.66	3.35	39.014	
1,3,5-Trimethylbenzene	00108-67-8	11.75	3.28	38.516	
c-1,3-Dimethylcyclopentane	02532-58-3	2.31	3.20	7.412	
2-Methyl-2-pentene	00625-27-4	11.03	2.98	32.843	
1-Methylcyclopentene	00693-89-0	12.45	2.85	35.439	
4-Methyloctane	02216-34-4	0.85	2.82	2.390	
n-Nonane	00111-84-2	0.68	2.76	1.883	
Cyclopentene	00142-29-0	6.69	2.74	18.349	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	2.69	17.799	
2,2-Dimethylbutane	00075-83-2	1.11	2.62	2.916	
2,2-Dimethylpentane	00590-35-2	1.04	2.54	2.651	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	2.51	2.746	
t-1,4-Dimethylcyclohexane	02207-04-7	2.31	2.46	5.694	
1-MeCyHexene & 4-MeHeptane	00591-49-1+00589-53-7	3.86	2.31	8.912	
3-Methyloctane	02216-33-3	0.88	2.27	2.006	
3,3-Dimethylhexane	00563-16-6	1.15	2.17	2.497	
3,3-Dimethylpentane	00562-49-2	1.12	2.09	2.341	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	2.05	11.341	
2,2,5-Trimethylhexane	03522-94-9	1.05	1.99	2.097	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	1.91	15.199	
ortho-Xylene	00095-47-6	7.58	1.85	13.998	
Ethylbenzene	00100-41-4	2.96	1.81	5.358	
2,4,4-Trimethyl-2-Pentene	00107-40-4	6.30	1.58	9.932	
n-Propylbenzene	00103-65-1	1.96	1.47	2.880	
3 & 4-Methyl-1-Pentenes	00691-37-2+00760-20-3	5.78	1.30	7.498	
2,2,3-Trimethylbutane	00464-06-2	1.05	1.27	1.335	
1,1-Dimethylcyclohexane	00590-66-9	1.12	1.16	1.297	
Unknown #8		2.31	1.12	2.592	
t-1,3 & c-1,4-DiMeCyHexane	02207-03-6+00624-29-3	2.31	1.11	2.572	
Unknown #16		2.31	1.11	2.561	
Unknown #5		2.31	1.01	2.336	
2,4-Dimethylheptane	02213-23-2	1.26	0.98	1.243	
c- & t-4-Nonene	02198-23-4	4.42	0.96	4.265	
2-MeOctane & 2,3-DiMeHeptane	03074-71-3+03221-61-2	0.85	0.88	0.749	
Unknown #9		2.31	0.85	1.963	
2-Methyl-1,3-butadiene	00078-79-5	10.48	0.81	8.462	
Unknown #1		2.31	0.36	0.824	
1,2,3-Trimethylbenzene	00526-73-8	11.94	0.08	0.987	
		Total	1412.8	3350.4	2.371
No MIR available, use weighted average of 2.3128					

Vehicle 221c

Test	Fuel	Test No.	Bag THC mg	GC as % of THC	GC VOC mg	Ozone mg	Reactivity	Species Present
86° F	E20 - 9 psi	7840	649.6	108.3	703.3	2050.0	2.915	69
Static	E20 - 7 psi	7875	539.4	87.3	471.0	1151.2	2.444	67
105° F	E20 - 9 psi	7838	1146.9	90.7	1040.8	2648.3	2.545	68
Static	E20 - 7 psi	7877	851.0	101.8	866.4	2110.0	2.435	72
Dynamic	E20 - 9 psi	25824	137.2	117.0	160.6	572.0	3.562	55
	E20 - 7 psi	25828	91.4	53.5	48.9	210.8	4.309	20
DHB	E20 - 9 psi	7859	1900.4	94.0	1787.4	4885.5	2.733	81
Total	E20 - 7 psi	7906	1860.2	99.9	1859.0	4927.8	2.651	94

Vehicle 221c - Fuel 9 psi E20 - 86°F Static - Test 7840					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2-Methylbutane (Isopentane)	00078-78-4	1.35	122.72	166.277	
n-Butane	00106-97-8	1.08	83.24	89.644	
2-Methylpropane	00075-28-5	1.18	75.88	89.275	
Ethanol	00064-17-5	1.45	51.74	74.976	
n-Pentane	00109-66-0	1.21	49.57	60.220	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	24.09	33.673	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	19.51	103.396	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	19.19	103.053	
n-Hexane	00110-54-3	1.13	17.82	20.226	
2-Methyl-2-butene	00513-35-9	14.20	14.95	212.177	
Propane	00074-98-6	0.46	13.78	6.301	
t-2-Pentene	00646-04-8	10.47	13.21	138.329	
Toluene	00108-88-3	3.93	13.20	51.799	
3-Methylpentane	00096-14-0	1.69	12.91	21.833	
3-Me-1-Hexene	03404-61-3	4.27	10.81	46.189	
Methylcyclopentane	00096-37-7	2.05	9.75	19.992	
t-3-Heptene	14686-14-7	6.17	9.63	59.431	
2-Methyl-1-butene	00563-46-2	6.38	8.94	57.049	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	7.78	57.444	
Benzene	00071-43-2	0.69	7.28	5.053	
c-2-Pentene	00627-20-3	10.28	7.04	72.389	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	6.83	79.930	
2,3-Dimethylbutane	00079-29-8	0.90	6.34	5.698	
2,2-DiMeHexane	00590-73-8	0.94	6.23	5.866	
2-MeOctane & 2,3-DiMeHeptane	03074-71-3+03221-61-2	0.85	5.77	4.927	
1,3,5-Trimethylbenzene	00108-67-8	11.75	5.61	65.966	
2-Methylhexane	00591-76-4	1.09	3.93	4.266	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	3.91	12.464	
c-2-Butene	00590-18-1	14.26	3.85	54.865	
1-Methyl-4-Isobutylbenzene	05161-04-6	3.82	3.83	14.643	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	3.65	4.382	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	3.24	17.974	
2,2-Dimethylbutane	00075-83-2	1.11	3.12	3.465	
Cyclopentane	00287-92-3	2.24	3.01	6.725	
t-2-Hexene	04050-45-7	8.55	2.83	24.189	
1,4-Diethylbenzene	00105-05-5	4.39	2.46	10.796	
Indan	00496-11-7	3.23	2.35	7.603	
Cyclopentene	00142-29-0	6.69	2.22	14.854	
3-Methyl-t-2-pentene	00616-12-6	11.66	2.18	25.428	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	2.17	3.482	
3-Methyl-c-2-pentene	00922-62-3	12.52	2.16	27.097	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	2.00	15.887	
2-Methylheptane	00592-27-8	0.97	1.87	1.812	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	1.77	11.677	

Vehicle 221c - Fuel 9 psi E20 - 86°F Static - Test 7840 continued					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2-Methyl-2-pentene	00625-27-4	11.03	1.73	19.052	
n-Octane	00111-65-9	0.80	1.66	1.321	
2,4-Dimethylpentane	00108-08-7	1.46	1.64	2.391	
n-Propylbenzene	00103-65-1	1.96	1.60	3.132	
ortho-Xylene	00095-47-6	7.58	1.56	11.834	
2,3-Dimethylpentane	00565-59-3	1.25	1.56	1.942	
1-Methylcyclopentene	00693-89-0	12.45	1.51	18.832	
1-Methyl-3-Propylbenzene	01074-43-7	7.08	1.49	10.557	
Ethylbenzene	00100-41-4	2.96	1.41	4.174	
3 & 4-Methyl-1-Pentenes	00691-37-2+00760-20-3	5.78	1.34	7.740	
t-1,2-Dimethylcyclopentane	00822-50-4	2.90	1.17	3.382	
1,2-Dimethyl-4-Ethylbenzene	00934-80-5	7.54	1.17	8.795	
1,2,3,5-Tetramethylbenzene	00527-53-7	9.26	1.15	10.688	
Unknown #5		2.90	1.13	3.275	
2,3,4-Trimethylpentane	00565-75-3	0.95	1.05	0.999	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	1.01	1.101	
c-1,3-Dimethylcyclohexane	00638-04-0	2.90	1.00	2.894	
2,2-Dimethylpentane	00590-35-2	1.04	0.99	1.036	
1,4-Dimethyl-2-Ethylbenzene	01758-88-9	7.54	0.93	6.978	
c-1,3-Dimethylcyclopentane	02532-58-3	2.90	0.92	2.678	
1,3-Dimethyl-4-Ethylbenzene	00874-41-9	7.54	0.77	5.831	
2,2,3-Trimethylbutane	00464-06-2	1.05	0.63	0.663	
2-Methyl-1,3-butadiene	00078-79-5	10.48	0.58	6.072	
3,3-Dimethylpentane	00562-49-2	1.12	0.48	0.537	
Naphthalene	00091-20-3	3.28	0.42	1.374	
		Total	703.3	2050.0	2.915
No MIR available, use weighted average of 2.8975					

Vehicle 221c - Fuel 9 psi E20 - 105°F Static - Test 7838					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2-Methylbutane (Isopentane)	00078-78-4	1.35	188.10	254.856	
n-Butane	00106-97-8	1.08	132.20	142.369	
2-Methylpropane	00075-28-5	1.18	119.88	141.051	
Ethanol	00064-17-5	1.45	92.34	133.801	
n-Pentane	00109-66-0	1.21	83.02	100.866	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	40.96	57.258	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	36.71	194.479	
n-Hexane	00110-54-3	1.13	27.67	31.394	
2-Methyl-2-butene	00513-35-9	14.20	24.54	348.276	
t-2-Pentene	00646-04-8	10.47	21.45	224.611	
Propane	00074-98-6	0.46	20.99	9.596	
3-Methylpentane	00096-14-0	1.69	20.86	35.279	
n-Heptane	00142-82-5	0.97	17.82	17.211	
Methylcyclopentane	00096-37-7	2.05	16.58	33.981	
Cyclohexane	00110-82-7	1.14	15.16	17.244	
2-Methyl-1-butene	00563-46-2	6.38	14.47	92.328	
2,2-DiMeHexane	00590-73-8	0.94	13.92	13.105	
c-2-Pentene	00627-20-3	10.28	11.94	122.782	
Toluene	00108-88-3	3.93	11.00	43.170	
Benzene	00071-43-2	0.69	10.87	7.545	
2,3-Dimethylbutane	00079-29-8	0.90	10.32	9.271	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	8.57	100.363	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	6.59	21.040	
2-Methylhexane	00591-76-4	1.09	6.03	6.543	
2,2-Dimethylbutane	00075-83-2	1.11	5.70	6.332	
c-2-Butene	00590-18-1	14.26	5.11	72.813	
Cyclopentane	00287-92-3	2.24	4.91	10.983	
t-2-Hexene	04050-45-7	8.55	4.37	37.393	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	3.67	28.495	
Cyclopentene	00142-29-0	6.69	3.67	24.548	
n-Octane	00111-65-9	0.80	3.64	2.897	
3-Methyl-t-2-pentene	00616-12-6	11.66	3.39	39.475	
2-Methyl-2-pentene	00625-27-4	11.03	3.26	35.978	
3-Methyl-c-2-pentene	00922-62-3	12.52	3.25	40.724	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	3.09	20.414	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	2.66	21.098	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	2.50	2.994	
1-Methylcyclopentene	00693-89-0	12.45	2.43	30.289	
2,4-Dimethylpentane	00108-08-7	1.46	2.26	3.304	
3 & 4-Methyl-1-Pentenes	00691-37-2+00760-20-3	5.78	2.11	12.187	
2,3-Dimethylpentane	00565-59-3	1.25	2.05	2.559	
c-1,3-Dimethylcyclohexane	00638-04-0	2.53	2.03	5.122	
Unknown #22	.	2.53	2.01	5.089	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	1.94	14.297	

Vehicle 221c - Fuel 9 psi E20 - 105°F Static - Test 7838 continued					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
t-1,2-Dimethylcyclopentane	00822-50-4	2.53	1.75	4.421	
3-Methylheptane	00589-81-1	1.12	1.70	1.906	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	1.64	8.799	
c-1,3-Dimethylcyclopentane	02532-58-3	2.53	1.63	4.130	
2,2-Dimethylpentane	00590-35-2	1.04	1.46	1.525	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	1.26	5.535	
2,4-Dimethylhexane	00589-43-5	1.61	1.26	2.020	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	1.24	1.996	
2,3,4-Trimethylpentane	00565-75-3	0.95	1.16	1.105	
2-Methylheptane	00592-27-8	0.97	1.04	1.010	
n-Propylbenzene	00103-65-1	1.96	0.99	1.936	
ortho-Xylene	00095-47-6	7.58	0.97	7.318	
n-Nonane	00111-84-2	0.68	0.92	0.630	
3,3-Dimethylpentane	00562-49-2	1.12	0.88	0.987	
1,3,5-Trimethylbenzene	00108-67-8	11.75	0.87	10.234	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	0.86	0.944	
2-Methyl-1,3-butadiene	00078-79-5	10.48	0.85	8.864	
3,3-Dimethylhexane	00563-16-6	1.15	0.74	0.847	
2,2,5-Trimethylhexane	03522-94-9	1.05	0.71	0.747	
Ethylbenzene	00100-41-4	2.96	0.67	1.991	
Ethylcyclohexane	01678-91-7	1.35	0.61	0.826	
1-Octene	00111-66-0	3.14	0.55	1.718	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	0.54	3.008	
2,2,3-Trimethylbutane	00464-06-2	1.05	0.41	0.427	
		Total	1040.8	2648.3	2.545
No MIR available, use weighted average of 2.5266					

Vehicle 221c - Fuel 9 psi E20 - Dynamic - Test 25824					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	21.91	31.752	
2-Methylbutane (Isopentane)	00078-78-4	1.35	12.05	16.326	
n-Butane	00106-97-8	1.08	10.06	10.833	
n-Pentane	00109-66-0	1.21	7.47	9.080	
Toluene	00108-88-3	3.93	7.01	27.531	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	6.69	49.408	
Unknown #22	.	3.28	6.60	21.624	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	5.66	29.965	
Benzene	00071-43-2	0.69	4.89	3.398	
2-Methylpropane	00075-28-5	1.18	4.38	5.148	
t-2-Pentene	00646-04-8	10.47	4.13	43.247	
n-Heptane	00142-82-5	0.97	4.01	3.869	
2-Methyl-2-butene	00513-35-9	14.20	3.65	51.798	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	3.58	5.000	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	3.47	18.632	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	3.24	37.935	
Propane	00074-98-6	0.46	3.09	1.412	
c-1,3-Dimethylcyclopentane	02532-58-3	3.28	3.05	9.999	
t-1,2-Dimethylcyclopentane	00822-50-4	3.28	2.63	8.611	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	2.59	8.278	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	2.57	17.002	
Cyclohexane	00110-82-7	1.14	2.57	2.927	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	2.52	2.748	
n-Octane	00111-65-9	0.80	2.31	1.837	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	1.73	13.749	
Ethylcyclohexane	01678-91-7	1.35	1.72	2.310	
c-2-Pentene	00627-20-3	10.28	1.66	17.113	
c-1,3-Dimethylcyclohexane	00638-04-0	3.28	1.61	5.291	
2,3,5-Trimethylhexane	01069-53-0	1.12	1.60	1.797	
n-Hexane	00110-54-3	1.13	1.50	1.697	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	1.40	10.867	
Methylcyclopentane	00096-37-7	2.05	1.40	2.866	
ortho-Xylene	00095-47-6	7.58	1.39	10.527	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	1.38	7.646	
2,2,5-Trimethylhexane	03522-94-9	1.05	1.36	1.432	
c-2-Butene	00590-18-1	14.26	1.30	18.467	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	1.25	5.511	
2,2-Dimethylpentane	00590-35-2	1.04	1.20	1.252	
1,3-Butadiene	00106-99-0	12.45	1.13	14.026	
Ethylbenzene	00100-41-4	2.96	1.09	3.230	
t-2-Hexene	04050-45-7	8.55	0.98	8.420	
2-Methyl-1-butene	00563-46-2	6.38	0.90	5.717	
2-Methylhexane	00591-76-4	1.09	0.78	0.845	
2,3-Dimethylbutane	00079-29-8	0.90	0.75	0.672	

Vehicle 221c - Fuel 9 psi E20 - Dynamic - Test 25824 continued					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2,2-DiMeHexane	00590-73-8	0.94	0.69	0.650	
2-Methyl-2-pentene	00625-27-4	11.03	0.54	5.959	
2-Methylheptane	00592-27-8	0.97	0.52	0.507	
3-Methyl-t-2-pentene	00616-12-6	11.66	0.51	5.927	
2,4-Dimethylpentane	00108-08-7	1.46	0.49	0.710	
3-Methylpentane	00096-14-0	1.69	0.46	0.770	
1-Methylcyclopentene	00693-89-0	12.45	0.28	3.477	
3-Methylheptane	00589-81-1	1.12	0.24	0.275	
Cyclopentene	00142-29-0	6.69	0.22	1.455	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	0.21	0.338	
n-Nonane	00111-84-2	0.68	0.19	0.129	
		Total	160.6	572.0	3.562
No MIR available, use weighted average of 3.2782					

Vehicle 221c - Fuel 9 psi E20 - 3 Day Diurnal - Test 7859					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	547.09	792.723	
2-Methylbutane (Isopentane)	00078-78-4	1.35	146.22	198.105	
n-Butane	00106-97-8	1.08	109.17	117.569	
n-Pentane	00109-66-0	1.21	92.72	112.649	
2-Methylpropane	00075-28-5	1.18	72.25	85.005	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	70.31	372.541	
Toluene	00108-88-3	3.93	62.83	246.616	
n-Hexane	00110-54-3	1.13	49.95	56.676	
n-Heptane	00142-82-5	0.97	46.59	44.994	
Benzene	00071-43-2	0.69	46.52	32.302	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	45.18	63.154	
2-Methyl-2-butene	00513-35-9	14.20	36.75	521.667	
t-2-Pentene	00646-04-8	10.47	36.31	380.251	
3-Methylpentane	00096-14-0	1.69	27.79	46.981	
2,2-DiMeHexane	00590-73-8	0.94	27.73	26.105	
Cyclohexane	00110-82-7	1.14	27.71	31.519	
Methylcyclopentane	00096-37-7	2.05	24.10	49.402	
c-2-Pentene	00627-20-3	10.28	19.43	199.760	
2-Methyl-1-butene	00563-46-2	6.38	18.34	117.003	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	18.07	140.149	
Propane	00074-98-6	0.46	16.60	7.588	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	15.83	185.298	
2-Methylhexane	00591-76-4	1.09	11.07	12.010	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	10.50	33.520	
n-Octane	00111-65-9	0.80	10.36	8.250	
2,3,5-Trimethylhexane	01069-53-0	1.12	9.82	11.001	
t-2-Hexene	04050-45-7	8.55	9.54	81.525	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	9.31	68.751	
2,3-Dimethylbutane	00079-29-8	0.90	8.60	7.730	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	8.24	44.253	
Cyclopentane	00287-92-3	2.24	7.48	16.744	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	6.87	8.242	
c-2-Butene	00590-18-1	14.26	6.80	97.022	
3-Methyl-t-2-pentene	00616-12-6	11.66	6.66	77.705	
Cyclopentene	00142-29-0	6.69	6.65	44.433	
1-Methylcyclopentene	00693-89-0	12.45	5.93	73.872	
2,2-Dimethylbutane	00075-83-2	1.11	5.74	6.383	
3-Methyl-c-2-pentene	00922-62-3	12.52	5.48	68.650	
2-Methyl-2-pentene	00625-27-4	11.03	5.19	57.206	
2-Methylheptane	00592-27-8	0.97	5.15	4.981	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	5.09	33.633	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	4.61	20.246	
1-Butyne	00107-00-6	6.05	4.36	26.373	
3-Methylheptane	00589-81-1	1.12	4.03	4.535	

Vehicle 221c - Fuel 9 psi E20 - 3 Day Diurnal - Test 7859 continued

Non Zero Mass Species Sorted By VOC

Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2,4-Dimethylpentane	00108-08-7	1.46	3.76	5.485	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	3.58	28.460	
ortho-Xylene	00095-47-6	7.58	3.45	26.142	
c-1,3-Dimethylcyclohexane	00638-04-0	2.71	3.43	9.290	
t-1,2-Dimethylcyclopentane	00822-50-4	2.71	3.35	9.074	
2,3-Dimethylpentane	00565-59-3	1.25	3.04	3.790	
1,3,5-Trimethylbenzene	00108-67-8	11.75	3.01	35.419	
c-1,3-Dimethylcyclopentane	02532-58-3	2.71	2.98	8.084	
Ethylbenzene	00100-41-4	2.96	2.92	8.644	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	2.91	16.124	
2,4-Dimethylhexane	00589-43-5	1.61	2.89	4.646	
3 & 4-Methyl-1-Pentenes	00691-37-2+00760-20-3	5.78	2.85	16.488	
2,2-Dimethylpropane	00463-82-1	0.65	2.73	1.767	
n-Nonane	00111-84-2	0.68	2.34	1.599	
2,3,4-Trimethylpentane	00565-75-3	0.95	2.19	2.078	
n-Propylbenzene	00103-65-1	1.96	1.98	3.881	
2-Methyl-1,3-butadiene	00078-79-5	10.48	1.96	20.585	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	1.95	3.129	
4-Methyloctane	02216-34-4	0.85	1.93	1.641	
Ethylcyclohexane	01678-91-7	1.35	1.85	2.494	
t-1,4-Dimethylcyclohexane	02207-04-7	2.71	1.75	4.748	
Unknown #1		2.71	1.71	4.641	
3,3-Dimethylhexane	00563-16-6	1.15	1.59	1.833	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	1.56	1.701	
3,3-Dimethylpentane	00562-49-2	1.12	1.32	1.474	
2,2-Dimethylpentane	00590-35-2	1.04	1.27	1.324	
1,2,3-Trimethylbenzene	00526-73-8	11.94	1.25	14.957	
2,2,5-Trimethylhexane	03522-94-9	1.05	1.07	1.128	
n-Undecane	01120-21-4	0.52	0.79	0.415	
3-Methyloctane	02216-33-3	0.88	0.79	0.703	
Unknown #5		2.71	0.76	2.052	
1-Octene	00111-66-0	3.14	0.65	2.057	
2,2,3-Trimethylbutane	00464-06-2	1.05	0.64	0.677	
t-1,3 & c-1,4-DiMeCyHexane	02207-03-6+00624-29-3	2.71	0.63	1.706	
2,4-Dimethylheptane	02213-23-2	1.26	0.55	0.699	
2-MeOctane & 2,3-DiMeHeptane	03074-71-3+03221-61-2	0.85	0.55	0.471	
Unknown #8		2.71	0.35	0.945	
		Total	1787.4	4885.5	2.733
No MIR available, use weighted average of 2.7107					

Vehicle 221c - Fuel 7 psi E20 - 86°F Static - Test 7875					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	81.98	118.785	
n-Butane	00106-97-8	1.08	71.83	77.353	
2-Methylbutane (Isopentane)	00078-78-4	1.35	64.62	87.557	
n-Pentane	00109-66-0	1.21	35.95	43.676	
2-Methylpropane	00075-28-5	1.18	27.66	32.545	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	25.47	134.971	
Propane	00074-98-6	0.46	21.37	9.770	
n-Hexane	00110-54-3	1.13	10.47	11.875	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	9.91	13.846	
n-Heptane	00142-82-5	0.97	9.12	8.810	
t-2-Pentene	00646-04-8	10.47	8.30	86.907	
2-Methyl-2-butene	00513-35-9	14.20	8.14	115.599	
Methylcyclohexane	00108-87-2	1.56	7.07	10.993	
2,3-Dimethylbutane	00079-29-8	0.90	5.56	4.999	
Methylcyclopentane	00096-37-7	2.05	5.47	11.206	
Benzene	00071-43-2	0.69	5.30	3.683	
2-Methyl-1-butene	00563-46-2	6.38	5.07	32.336	
Toluene	00108-88-3	3.93	5.03	19.740	
3-Methylpentane	00096-14-0	1.69	4.72	7.984	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	4.40	51.543	
c-2-Pentene	00627-20-3	10.28	3.93	40.363	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	2.99	3.584	
c-2-Butene	00590-18-1	14.26	2.77	39.443	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	2.45	7.814	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	2.42	18.767	
2,2-Dimethylbutane	00075-83-2	1.11	2.14	2.380	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	2.10	15.494	
2-Methylheptane	00592-27-8	0.97	1.80	1.739	
t-2-Hexene	04050-45-7	8.55	1.78	15.211	
n-Octane	00111-65-9	0.80	1.72	1.368	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	1.67	7.355	
2,2,5-Trimethylhexane	03522-94-9	1.05	1.67	1.759	
2-Methylhexane	00591-76-4	1.09	1.61	1.748	
c-1,3-Dimethylcyclohexane	00638-04-0	2.43	1.56	3.787	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	1.54	8.248	
c-2-Heptene	06443-92-1	3.82	1.46	5.572	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	1.41	11.175	
2,4-Dimethylpentane	00108-08-7	1.46	1.38	2.015	
Cyclopentene	00142-29-0	6.69	1.29	8.640	
3-Methyl-t-2-pentene	00616-12-6	11.66	1.16	13.518	
3 & 4-Methyl-1-Pentenes	00691-37-2+00760-20-3	5.78	1.05	6.046	
Cyclohexane	00110-82-7	1.14	0.92	1.044	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	0.88	5.798	
n-Nonane	00111-84-2	0.68	0.87	0.593	

Vehicle 221c - Fuel 7 psi E20 - 86°F Static - Test 7875 continued					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
3-Methylheptane	00589-81-1	1.12	0.86	0.966	
2-Methyl-2-pentene	00625-27-4	11.03	0.81	8.971	
2,2-Dimethylpentane	00590-35-2	1.04	0.81	0.840	
2,2,3-Trimethylbutane	00464-06-2	1.05	0.80	0.840	
2,4-Dimethylhexane	00589-43-5	1.61	0.78	1.247	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	0.72	3.993	
1-MeCyHexene & 4-MeHeptane	00591-49-1+00589-53-7	3.86	0.67	2.600	
1-Methylcyclopentene	00693-89-0	12.45	0.62	7.735	
t-1,2-Dimethylcyclopentane	00822-50-4	2.43	0.61	1.473	
3,3-Dimethylpentane	00562-49-2	1.12	0.58	0.653	
2,3-Dimethylpentane	00565-59-3	1.25	0.53	0.667	
2,4,4-Trimethyl-2-Pentene	00107-40-4	6.30	0.53	3.346	
n-Propylbenzene	00103-65-1	1.96	0.48	0.949	
Ethylcyclohexane	01678-91-7	1.35	0.35	0.468	
3,3-Dimethylhexane	00563-16-6	1.15	0.31	0.359	
c-1,3-Dimethylcyclopentane	02532-58-3	2.43	0.31	0.744	
3-Methyl-c-2-pentene	00922-62-3	12.52	0.27	3.427	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	0.26	0.280	
1,3,5-Trimethylbenzene	00108-67-8	11.75	0.20	2.366	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	0.20	0.318	
Ethylbenzene	00100-41-4	2.96	0.18	0.528	
ortho-Xylene	00095-47-6	7.58	0.10	0.721	
2,3,4-Trimethylpentane	00565-75-3	0.95	0.08	0.076	
		Total	471.0	1151.2	2.444
No MIR available, use weighted average of 2.4312					

Vehicle 221c - Fuel 7 psi E20 - 105°F Static - Test 7877					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	151.80	219.955	
2-Methylbutane (Isopentane)	00078-78-4	1.35	132.25	179.190	
n-Butane	00106-97-8	1.08	97.50	104.997	
n-Pentane	00109-66-0	1.21	55.14	66.989	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	41.49	219.832	
2-Methylpropane	00075-28-5	1.18	36.09	42.461	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	29.10	40.678	
n-Hexane	00110-54-3	1.13	25.52	28.959	
Propane	00074-98-6	0.46	25.06	11.455	
n-Heptane	00142-82-5	0.97	18.66	18.025	
3-Methylpentane	00096-14-0	1.69	16.24	27.461	
2,3-Dimethylbutane	00079-29-8	0.90	14.13	12.703	
2-Methyl-2-butene	00513-35-9	14.20	13.76	195.359	
Toluene	00108-88-3	3.93	13.40	52.581	
Cyclohexane	00110-82-7	1.14	13.07	14.870	
Methylcyclohexane	00108-87-2	1.56	13.07	20.325	
Methylcyclopentane	00096-37-7	2.05	12.42	25.451	
t-2-Pentene	00646-04-8	10.47	11.80	123.585	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	11.40	13.672	
Benzene	00071-43-2	0.69	9.65	6.703	
2-Methyl-1-butene	00563-46-2	6.38	8.78	56.009	
c-2-Pentene	00627-20-3	10.28	6.35	65.238	
2-Methylhexane	00591-76-4	1.09	6.32	6.855	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	6.19	19.749	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	6.11	32.781	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	5.62	65.747	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	5.61	41.443	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	5.23	40.538	
2,2-Dimethylbutane	00075-83-2	1.11	3.70	4.115	
2,4-Dimethylpentane	00108-08-7	1.46	3.59	5.244	
n-Octane	00111-65-9	0.80	3.46	2.755	
2,3-Dimethylpentane	00565-59-3	1.25	3.43	4.287	
c-2-Butene	00590-18-1	14.26	3.36	47.966	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	3.25	14.296	
c-2-Heptene	06443-92-1	7.08	2.60	18.411	
t-2-Hexene	04050-45-7	8.55	2.49	21.269	
2,4-Dimethylhexane	00589-43-5	1.61	2.34	3.765	
1,3,5-Trimethylbenzene	00108-67-8	11.75	2.34	27.473	
2,3,4-Trimethylpentane	00565-75-3	0.95	2.30	2.180	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	2.26	17.951	
c-1,3-Dimethylcyclohexane	00638-04-0	2.42	2.17	5.258	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	2.04	13.491	
3-Methyl-t-2-pentene	00616-12-6	11.66	2.01	23.444	
2-Methyl-2-pentene	00625-27-4	11.03	2.00	22.011	

Vehicle 221c - Fuel 7 psi E20 - 105°F Static - Test 7877 continued					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2-Methylheptane	00592-27-8	0.97	1.93	1.865	
3-Methylheptane	00589-81-1	1.12	1.88	2.119	
Cyclopentene	00142-29-0	6.69	1.80	12.031	
2,2-Dimethylpentane	00590-35-2	1.04	1.62	1.691	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	1.62	8.958	
n-Propylbenzene	00103-65-1	1.96	1.57	3.073	
3-Methyl-c-2-pentene	00922-62-3	12.52	1.46	18.216	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	1.33	2.138	
1-Methylcyclopentene	00693-89-0	12.45	1.31	16.366	
c-1,3-Dimethylcyclopentane	02532-58-3	2.42	1.29	3.123	
ortho-Xylene	00095-47-6	7.58	1.29	9.739	
t-1,2-Dimethylcyclopentane	00822-50-4	2.42	1.27	3.077	
3 & 4-Methyl-1-Pentenes	00691-37-2+00760-20-3	5.78	1.15	6.649	
Ethylcyclohexane	01678-91-7	1.35	1.07	1.433	
Ethylbenzene	00100-41-4	2.96	1.01	3.002	
t-1,4-Dimethylcyclohexane	02207-04-7	2.42	0.93	2.250	
1-MeCyHexene & 4-MeHeptane	00591-49-1+00589-53-7	3.86	0.90	3.491	
2,2,5-Trimethylhexane	03522-94-9	1.05	0.88	0.923	
n-Nonane	00111-84-2	0.68	0.85	0.583	
2,4,4-Trimethyl-2-Pentene	00107-40-4	6.30	0.85	5.359	
3,3-Dimethylpentane	00562-49-2	1.12	0.82	0.920	
4-Methyloctane	02216-34-4	0.85	0.82	0.694	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	0.75	0.818	
2-Methyl-1,3-butadiene	00078-79-5	10.48	0.68	7.144	
3,3-Dimethylhexane	00563-16-6	1.15	0.67	0.767	
n-Decane	00124-18-5	0.59	0.66	0.389	
2,2,3-Trimethylbutane	00464-06-2	1.05	0.47	0.497	
1,2,3-Trimethylbenzene	00526-73-8	11.94	0.43	5.162	
		Total	866.4	2110.0	2.435
No MIR available, use weighted average of 2.4195					

Vehicle 221c - Fuel 7 psi E20 - Dynamic - Test 25828					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	17.32	25.089	
2-Methylbutane (Isopentane)	00078-78-4	1.35	5.88	7.964	
Benzene	00071-43-2	0.69	4.52	3.139	
c-2-Butene	00590-18-1	14.26	3.76	53.628	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	3.70	28.669	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	3.63	19.495	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	2.67	14.126	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	1.53	12.150	
1,2,3-Trimethylbenzene	00526-73-8	11.94	0.98	11.689	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	0.86	4.748	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	0.72	8.460	
c-2-Pentene	00627-20-3	10.28	0.72	7.386	
n-Heptane	00142-82-5	0.97	0.59	0.568	
n-Propylbenzene	00103-65-1	1.96	0.48	0.947	
Ethylbenzene	00100-41-4	2.96	0.45	1.322	
1,3,5-Trimethylbenzene	00108-67-8	11.75	0.41	4.795	
2-Methyl-2-butene	00513-35-9	14.20	0.25	3.547	
t-2-Hexene	04050-45-7	8.55	0.22	1.855	
ortho-Xylene	00095-47-6	7.58	0.15	1.110	
n-Octane	00111-65-9	0.80	0.10	0.081	
		Total	48.9	210.8	4.309

Vehicle 221c - Fuel 7 psi E20 - 3 Day Diurnal - Test 7906					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	513.82	744.509	
2-Methylbutane (Isopentane)	00078-78-4	1.35	133.89	181.408	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	91.48	484.707	
n-Butane	00106-97-8	1.08	89.82	96.733	
n-Pentane	00109-66-0	1.21	69.97	85.011	
Toluene	00108-88-3	3.93	67.11	263.404	
n-Heptane	00142-82-5	0.97	66.80	64.513	
n-Hexane	00110-54-3	1.13	50.30	57.075	
Methylcyclohexane	00108-87-2	1.56	43.78	68.094	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	43.61	60.959	
Benzene	00071-43-2	0.69	40.22	27.924	
Cyclohexane	00110-82-7	1.14	32.79	37.292	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	30.44	36.498	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	28.45	152.753	
Methylcyclopentane	00096-37-7	2.05	25.70	52.680	
2-Methylpropane	00075-28-5	1.18	25.57	30.086	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	24.57	190.587	
Propane	00074-98-6	0.46	24.32	11.116	
3-Methylpentane	00096-14-0	1.69	24.16	40.845	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	22.46	165.859	
n-Octane	00111-65-9	0.80	21.94	17.472	
2-Methyl-2-butene	00513-35-9	14.20	21.03	298.453	
t-2-Pentene	00646-04-8	10.47	20.86	218.459	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	16.11	51.416	
2-Methylhexane	00591-76-4	1.09	15.26	16.559	
2,3-Dimethylbutane	00079-29-8	0.90	13.74	12.350	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	12.78	149.621	
1,3,5-Trimethylbenzene	00108-67-8	11.75	12.25	143.952	
2-Methyl-1-butene	00563-46-2	6.38	11.91	75.982	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	11.61	51.025	
2,3,4-Trimethylpentane	00565-75-3	0.95	11.60	11.007	
c-2-Pentene	00627-20-3	10.28	11.05	113.644	
2-Methylheptane	00592-27-8	0.97	10.23	9.893	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	9.17	50.827	
3-Methylheptane	00589-81-1	1.12	9.06	10.183	
c-1,3-Dimethylcyclohexane	00638-04-0	2.61	7.75	20.200	
2,3-Dimethylpentane	00565-59-3	1.25	7.75	9.675	
2,4-Dimethylpentane	00108-08-7	1.46	7.65	11.169	
Ethylcyclohexane	01678-91-7	1.35	7.55	10.156	
2,4-Dimethylhexane	00589-43-5	1.61	6.98	11.203	
c-2-Heptene	06443-92-1	7.08	6.67	47.214	
n-Nonane	00111-84-2	0.68	6.63	4.525	
t-2-Hexene	04050-45-7	8.55	6.48	55.398	
ortho-Xylene	00095-47-6	7.58	5.48	41.492	

Vehicle 221c - Fuel 7 psi E20 - 3 Day Diurnal - Test 7906 continued					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Cyclopentane	00287-92-3	2.24	5.12	11.458	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	5.11	5.585	
n-Propylbenzene	00103-65-1	1.96	4.99	9.784	
4-Methyloctane	02216-34-4	0.85	4.97	4.216	
3-Methyl-t-2-pentene	00616-12-6	11.66	4.85	56.599	
3-Methyl-c-2-pentene	00922-62-3	12.52	4.56	57.109	
c-2-Butene	00590-18-1	14.26	4.44	63.356	
t-1,2-Dimethylcyclopentane	00822-50-4	2.61	4.34	11.307	
Cyclopentene	00142-29-0	6.69	4.16	27.787	
1-Methylcyclopentene	00693-89-0	12.45	4.13	51.451	
c-1,3-Dimethylcyclopentane	02532-58-3	2.61	4.11	10.713	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	4.06	6.517	
2,2,5-Trimethylhexane	03522-94-9	1.05	4.06	4.270	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	4.04	26.699	
Ethylbenzene	00100-41-4	2.96	3.89	11.519	
2,2-Dimethylbutane	00075-83-2	1.11	3.78	4.206	
2-Methyl-2-pentene	00625-27-4	11.03	3.58	39.448	
Unknown #16		2.61	3.56	9.264	
t-1,4-Dimethylcyclohexane	02207-04-7	2.61	3.46	9.022	
1-MeCyHexene & 4-MeHeptane	00591-49-1+00589-53-7	3.86	3.44	13.283	
3-Methyloctane	02216-33-3	0.88	3.39	3.003	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	2.94	23.330	
1,2,3-Trimethylbenzene	00526-73-8	11.94	2.85	33.977	
2,3,5-Trimethylhexane	01069-53-0	1.12	2.68	2.999	
1-Nonene	00124-11-8	2.49	2.56	6.374	
1-Butyne	00107-00-6	6.05	2.51	15.194	
Ethylene	00074-85-1	8.88	2.50	22.216	
2,2-Dimethylpentane	00590-35-2	1.04	2.45	2.555	
Unknown #8		2.61	2.34	6.089	
t-1,3 & c-1,4-DiMeCyHexane	02207-03-6+00624-29-3	2.61	2.24	5.822	
3,3-Dimethylhexane	00563-16-6	1.15	2.13	2.449	
2-MeOctane & 2,3-DiMeHeptane	03074-71-3+03221-61-2	0.85	2.07	1.770	
3,3-Dimethylpentane	00562-49-2	1.12	2.06	2.307	
2,4,4-Trimethyl-2-Pentene	00107-40-4	6.30	1.98	12.476	
1-Octene	00111-66-0	3.14	1.95	6.137	
3 & 4-Methyl-1-Pentenes	00691-37-2+00760-20-3	5.78	1.87	10.797	
Unknown #9		2.61	1.54	4.022	
n-Undecane	01120-21-4	0.52	1.54	0.805	
n-Decane	00124-18-5	0.59	1.52	0.896	
Unknown #5		2.61	1.42	3.689	
2-Methyl-1,3-butadiene	00078-79-5	10.48	1.31	13.767	
Indan	00496-11-7	3.23	1.31	4.230	

Vehicle 221c - Fuel 7 psi E20 - 3 Day Diurnal - Test 7906 continued					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Unknown #6	.	2.61	1.31	3.400	
2,4-Dimethylheptane	02213-23-2	1.26	1.26	1.589	
Styrene	00100-42-5	1.66	1.05	1.738	
2,4-DiMeOctane+AlBenz+PrCyHexane	04032-94-4+00300-57-2+	1.18	0.77	0.909	
2,2,3-Trimethylbutane	00464-06-2	1.05	0.65	0.688	
Unknown #1		2.61	0.52	1.367	
3-Me-t-3-Hexene & t-2-Heptene	03899-36-3+14686-13-6	8.38	0.49	4.115	
1-Methyl-4-Isobutylbenzene	05161-04-6	3.82	0.40	1.522	
		Total	1859.0	4927.8	2.651
No MIR available, use weighted average of 2.6050					

Vehicle 222c

Test	Fuel	Test No.	Bag THC mg	GC as % of THC	GC VOC mg	Ozone mg	Reactivity	Species Present
86° F	E20 - 9 psi	7843	11.1	0.0	0.0	0.0	0.000	0
Static	E20 - 7 psi	7898	10.5	0.0	0.0	0.0	0.000	0
105° F	E20 - 9 psi	7847	15.3	0.0	0.0	0.0	0.000	0
Static	E20 - 7 psi	7901	14.8	0.0	0.0	0.0	0.000	0
Dynamic	E20 - 9 psi	25827	51.2	95.0	48.6	222.2	4.570	28
	E20 - 7 psi	25830	38.0	0.0	0.0	0.0	0.000	0
DHB	E20 - 9 psi	7871	165.1	88.9	146.8	393.2	2.678	12
Total	E20 - 7 psi	7916	147.7	81.9	121.1	232.5	1.920	12

Vehicle 222c - Fuel 9 psi E20 - 86°F Static - Test 7843					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
		Total	0.0	0.0	0.000

Vehicle 222c - Fuel 9 psi E20 - 105°F Static - Test 7847					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
		Total	0.0	0.0	0.000

Vehicle 222c - Fuel 9 psi E20 - Dynamic - Test 25827					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Naphthalene	00091-20-3	3.28	7.74	25.406	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	4.82	6.743	
t-2-Butene	00624-64-6	15.20	3.71	56.453	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	3.13	36.688	
n-Butane	00106-97-8	1.08	2.85	3.072	
2,3-Dimethylbutane	00079-29-8	0.90	2.48	2.230	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	2.25	2.694	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	1.91	15.142	
Toluene	00108-88-3	3.93	1.90	7.444	
2-Methylpropane	00075-28-5	1.18	1.66	1.951	
2-Methylheptane	00592-27-8	0.97	1.57	1.514	
3-Methyl-t-2-pentene	00616-12-6	11.66	1.31	15.309	
n-Heptane	00142-82-5	0.97	1.30	1.251	
2,3,4-Trimethylpentane	00565-75-3	0.95	1.21	1.151	
3-Methylpentane	00096-14-0	1.69	1.17	1.981	
2,4-Dimethylhexane	00589-43-5	1.61	1.11	1.786	
2,4-Dimethylpentane	00108-08-7	1.46	1.10	1.605	
n-Hexane	00110-54-3	1.13	1.00	1.134	
Methylcyclopentane	00096-37-7	2.05	0.91	1.863	
2,2-Dimethylbutane	00075-83-2	1.11	0.82	0.916	
Ethylbenzene	00100-41-4	2.96	0.77	2.293	
t-2-Pentene	00646-04-8	10.47	0.75	7.833	
Cyclohexane	00110-82-7	1.14	0.74	0.842	
c-2-Butene	00590-18-1	14.26	0.74	10.503	
3-Methyl-c-2-pentene	00922-62-3	12.52	0.71	8.850	
ortho-Xylene	00095-47-6	7.58	0.68	5.178	
n-Pentane	00109-66-0	1.21	0.21	0.252	
Methylcyclohexane	00108-87-2	1.56	0.07	0.110	
		Total	48.6	222.2	4.570

Vehicle 222c - Fuel 9 psi E20 - 3 Day Diurnal - Test 7871					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	46.28	67.056	
3-Methylpentane	00096-14-0	1.69	15.07	25.484	
Methylcyclohexane	00108-87-2	1.46	12.63	18.432	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	11.05	58.547	
n-Butane	00106-97-8	1.08	11.01	11.855	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	10.82	12.972	
Toluene	00108-88-3	3.93	10.66	41.860	
3-Methyl-c-2-pentene	00922-62-3	12.52	10.66	133.427	
n-Pentane	00109-66-0	1.21	9.35	11.363	
2-Methylbutane (Isopentane)	00078-78-4	1.35	5.76	7.811	
n-Hexane	00110-54-3	1.13	2.10	2.385	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	1.42	1.987	
		Total	146.8	393.2	2.678

Vehicle 222c - Fuel 7 psi E20 - 86°F Static - Test 7898					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
		Total	0.0	0.0	0.000

Vehicle 222c - Fuel 7 psi E20 - 105°F Static - Test 7901					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
		Total	0.0	0.0	0.000

Vehicle 222c - Fuel 7 psi E20 - Dynamic - Test 25830					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
		Total	0.0	0.0	0.000

Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	49.26	71.372	
2-Methylbutane (Isopentane)	00078-78-4	1.35	16.13	21.853	
Toluene	00108-88-3	3.93	11.15	43.746	
3-Methylpentane	00096-14-0	1.69	7.62	12.888	
n-Butane	00106-97-8	1.08	7.25	7.805	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	6.37	7.641	
n-Hexane	00110-54-3	1.13	6.11	6.931	
n-Pentane	00109-66-0	1.21	5.83	7.083	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	3.67	19.457	
Methylcyclohexane	00108-87-2	1.46	3.54	5.172	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	2.08	2.913	
3-Methyl-c-2-pentene	00922-62-3	12.52	2.05	25.608	
		Total	121.1	232.5	1.920

Vehicle 207c

Test	Fuel	Leak	Test No.	Bag THC mg	GC as % of THC	GC VOC mg	Ozone mg	Reactivity	Species Present
86° F	E10 - 10 psi	Tank Top	7661			1392.3	3707.2	2.663	71
Static	E10 - 7 psi	Tank Top	7693			873.7	2526.9	2.892	70
	E10 - 10 psi	Can. Inlet	7781			742.7	2016.4	2.715	65
	E10 - 7 psi	Can. Inlet	7819			341.5	859.7	2.517	18
Dynamic	E10 - 10 psi	Tank Top	25805			3247.6	8987.6	2.767	99
	E10 - 7 psi	Tank Top	25801			3440.5	11624.4	3.379	76
	E10 - 10 psi	Can. Inlet	25817			1806.6	5152.1	2.852	71
	E10 - 7 psi	Can. Inlet	25820			1396.2	4836.1	3.464	90
DHB	E10 - 10 psi	Tank Top	7672			6195.8	15590.0	2.516	104
Total	E10 - 7 psi	Tank Top	7741			7698.7	22774.1	2.958	107
	E10 - 10 psi	Can. Inlet	7794			8632.1	20792.7	2.409	94
	E10 - 7 psi	Can. Inlet	7844			6858.2	20043.6	2.923	97

Vehicle 207c - Fuel 10 psi E10 - 86°F Static - Test 7661					
0.020 Leak at Tank Top					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2-Methylbutane (Isopentane)	00078-78-4	1.35	388.73	526.686	
n-Butane	00106-97-8	1.08	315.34	339.592	
Ethanol	00064-17-5	1.45	154.33	223.618	
n-Pentane	00109-66-0	1.21	45.75	55.584	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	45.54	63.653	
Toluene	00108-88-3	3.93	41.03	161.061	
n-Hexane	00110-54-3	1.13	39.24	44.527	
2-Methyl-2-butene	00513-35-9	14.20	38.11	540.999	
t-2-Pentene	00646-04-8	10.47	32.08	335.977	
3-Methylpentane	00096-14-0	1.69	28.10	47.513	
2-Methyl-1-butene	00563-46-2	6.38	22.86	145.822	
2,3-Dimethylbutane	00079-29-8	0.90	21.94	19.722	
c-2-Pentene	00627-20-3	10.28	17.36	178.523	
Methylcyclopentane	00096-37-7	2.05	15.80	32.396	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	15.23	18.265	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	13.93	163.032	
c-2-Butene	00590-18-1	14.26	13.49	192.427	
Benzene	00071-43-2	0.69	11.77	8.169	
Cyclohexane	00110-82-7	1.14	10.82	12.310	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	8.06	63.986	
Methylcyclohexane	00108-87-2	1.56	7.48	11.631	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	6.55	34.717	
2,4-Dimethylpentane	00108-08-7	1.46	6.11	8.923	
t-2-Hexene	04050-45-7	8.55	5.85	50.036	
2-Methylhexane	00591-76-4	1.09	5.80	6.299	
Cyclopentene	00142-29-0	6.69	5.25	35.095	
n-Heptane	00142-82-5	0.97	5.24	5.057	
3-Methyl-t-2-pentene	00616-12-6	11.66	4.74	55.209	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	4.67	14.899	
2-Methyl-2-pentene	00625-27-4	11.03	4.32	47.686	
3-Methyl-c-2-pentene	00922-62-3	12.52	4.08	51.020	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	3.36	22.194	
1-Methylcyclopentene	00693-89-0	12.45	3.32	41.341	
2,3,4-Trimethylpentane	00565-75-3	0.95	3.23	3.069	
2,2-Dimethylbutane	00075-83-2	1.11	3.22	3.582	
2,3-Dimethylpentane	00565-59-3	1.25	3.05	3.813	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	2.98	23.089	
3 & 4-Methyl-1-Pentenes	00691-37-2+00760-20-3	5.78	2.91	16.800	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	2.83	12.447	
2,4-Dimethylhexane	00589-43-5	1.61	2.13	3.412	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	2.03	10.899	
n-Octane	00111-65-9	0.80	1.59	1.266	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	1.54	11.367	

Vehicle 207c - Fuel 10 psi E10 - 86°F Static - Test 7661 continued

0.020 Leak at Tank Top

Non Zero Mass Species Sorted By VOC

Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2,2-Dimethylpentane	00590-35-2	1.04	1.44	1.501	
t-1,2-Dimethylcyclopentane	00822-50-4	2.66	1.34	3.552	
2-Methylheptane	00592-27-8	0.97	1.31	1.270	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	1.28	2.056	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	1.19	1.303	
2-Methyl-2-Hexene & c-3-Heptene	02738-19-4+07642-10-6	7.84	1.17	9.154	
3-Methylheptane	00589-81-1	1.12	1.16	1.307	
2,2,3-Trimethylbutane	00464-06-2	1.05	1.13	1.190	
2,2,5-Trimethylhexane	03522-94-9	1.05	0.96	1.007	
c-1,3-Dimethylcyclohexane	00638-04-0	2.66	0.92	2.452	
t-3-Heptene	14686-14-7	6.17	0.83	5.119	
3,3-Dimethylpentane	00562-49-2	1.12	0.79	0.884	
ortho-Xylene	00095-47-6	7.58	0.79	5.957	
2-Methyl-1,3-butadiene	00078-79-5	10.48	0.77	8.032	
c-1,3-Dimethylcyclopentane	02532-58-3	2.66	0.75	1.994	
1-MeCyHexene & 4-MeHeptane	00591-49-1+00589-53-7	3.86	0.55	2.118	
n-Decane	00124-18-5	2.49	0.54	1.339	
Ethylcyclohexane	01678-91-7	1.35	0.51	0.693	
2,3,5-Trimethylhexane	01069-53-0	1.12	0.50	0.559	
t-1,4-Dimethylcyclohexane	02207-04-7	2.66	0.50	1.320	
Ethylbenzene	00100-41-4	2.96	0.49	1.460	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	0.44	2.426	
Unknown #1		2.66	0.34	0.906	
3,3-Dimethylhexane	00563-16-6	1.15	0.30	0.344	
n-Propylbenzene	00103-65-1	1.96	0.28	0.542	
n-Nonane	00111-84-2	0.68	0.15	0.101	
1,3,5-Trimethylbenzene	00108-67-8	11.75	0.06	0.702	
4-Methyl-t-2-pentene	00674-76-0	8.04	0.02	0.184	
		Total	1392.3	3707.2	2.663
No MIR available, use weighted average of 2.655					

Vehicle 207c - Fuel 10 psi E10 - Dynamic - Test 25805					
0.020 Leak at Tank Top					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
n-Butane	00106-97-8	1.08	793.69	854.739	
2-Methylbutane (Isopentane)	00078-78-4	1.35	449.94	609.624	
Ethanol	00064-17-5	1.45	381.51	552.793	
Toluene	00108-88-3	3.93	165.80	650.783	
n-Hexane	00110-54-3	1.13	136.05	154.368	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	109.42	152.947	
3-Methylpentane	00096-14-0	1.69	76.54	129.419	
n-Pentane	00109-66-0	1.21	73.81	89.678	
2-Methyl-2-butene	00513-35-9	14.20	64.66	917.894	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	53.99	64.740	
t-2-Pentene	00646-04-8	10.47	52.45	549.380	
2,3-Dimethylbutane	00079-29-8	0.90	50.99	45.823	
Benzene	00071-43-2	0.69	41.57	28.862	
Methylcyclopentane	00096-37-7	2.05	41.45	84.963	
Cyclohexane	00110-82-7	1.14	37.28	42.398	
2-Methyl-1-butene	00563-46-2	6.38	36.81	234.792	
Ethylene	00074-85-1	8.88	32.44	288.174	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	31.63	370.224	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	30.20	223.089	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	29.71	159.543	
c-2-Pentene	00627-20-3	10.28	29.00	298.147	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	27.43	217.856	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	23.45	181.864	
Ethane	00074-84-0	0.26	22.42	5.893	
Methylcyclohexane	00108-87-2	1.56	20.47	31.838	
c-2-Butene	00590-18-1	14.26	18.64	265.834	
2-Methylhexane	00591-76-4	1.09	18.01	19.546	
n-Heptane	00142-82-5	0.97	17.89	17.277	
2,4-Dimethylpentane	00108-08-7	1.46	17.46	25.487	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	16.65	53.114	
2,3,4-Trimethylpentane	00565-75-3	0.95	14.98	14.213	
2-Methylpropane	00075-28-5	1.18	13.12	15.435	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	12.98	68.793	
t-2-Hexene	04050-45-7	8.55	12.92	110.422	
1-Butyne	00107-00-6	6.05	12.88	77.894	
Propane	00074-98-6	0.46	12.12	5.539	
2,3-Dimethylpentane	00565-59-3	1.25	10.68	13.331	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	10.43	57.799	
3-Methyl-t-2-pentene	00616-12-6	11.66	10.06	117.309	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	9.94	43.673	
Cyclopentene	00142-29-0	6.69	9.70	64.866	
1,3,5-Trimethylbenzene	00108-67-8	11.75	9.53	111.979	
2-Methyl-2-pentene	00625-27-4	11.03	9.53	105.093	

Vehicle 207c - Fuel 10 psi E10 - Dynamic - Test 25805 continued

0.020 Leak at Tank Top

Non Zero Mass Species Sorted By VOC

Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
3-Methyl-c-2-pentene	00922-62-3	12.52	8.43	105.557	
n-Octane	00111-65-9	0.80	8.04	6.403	
2,4-Dimethylhexane	00589-43-5	1.61	7.47	11.988	
3 & 4-Methyl-1-Pentenes	00691-37-2+00760-20-3	5.78	7.31	42.218	
1-Methylcyclopentene	00693-89-0	12.45	7.12	88.716	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	7.03	46.426	
1,3-Butadiene	00106-99-0	12.45	6.83	85.018	
ortho-Xylene	00095-47-6	7.58	6.20	46.937	
2,2-Dimethylbutane	00075-83-2	1.11	6.14	6.826	
2,2,5-Trimethylhexane	03522-94-9	1.05	5.94	6.257	
Ethylbenzene	00100-41-4	2.96	5.64	16.718	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	5.39	8.649	
n-Propylbenzene	00103-65-1	1.96	5.27	10.333	
t-1,2-Dimethylcyclopentane	00822-50-4	2.75	4.99	13.694	
2,2-Dimethylpentane	00590-35-2	1.04	4.94	5.154	
1-Methyl-3-Propylbenzene	01074-43-7	7.08	4.80	34.000	
3,3-Dimethylpentane	00562-49-2	1.12	4.78	5.350	
2,3,5-Trimethylhexane	01069-53-0	1.12	4.68	5.241	
1,2,3-Trimethylbenzene	00526-73-8	11.94	4.29	51.163	
2-Methylheptane	00592-27-8	0.97	4.27	4.127	
2-Methyl-1,3-butadiene	00078-79-5	10.48	4.25	44.554	
3-Methylheptane	00589-81-1	1.12	4.20	4.718	
2-Methyl-2-Hexene & c-3-Heptene	02738-19-4+07642-10-6	7.84	4.17	32.697	
1,4-Diethylbenzene	00105-05-5	4.39	4.16	18.237	
n-Decane	00124-18-5	0.59	4.01	2.372	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	4.01	4.378	
c-1,3-Dimethylcyclohexane	00638-04-0	2.75	3.27	8.983	
Unknown #16		2.75	3.25	8.937	
2,2,3-Trimethylbutane	00464-06-2	1.05	3.19	3.360	
Cyclopentadiene	00542-92-7	6.89	2.92	20.090	
Methane	00074-82-8	0.01	2.81	0.039	
c-1,3-Dimethylcyclopentane	02532-58-3	2.75	2.74	7.537	
n-Nonane	00111-84-2	0.68	2.34	1.599	
Styrene	00100-42-5	1.66	2.34	3.891	
Ethylcyclohexane	01678-91-7	1.35	2.19	2.943	
1,4-Dimethyl-2-Ethylbenzene	01758-88-9	7.54	1.93	14.560	
4-Methyl-t-2-pentene	00674-76-0	8.04	1.87	15.065	
n-Undecane	01120-21-4	0.52	1.86	0.970	
4-Methyloctane	02216-34-4	0.85	1.70	1.442	
1-MeCyHexene & 4-MeHeptane	00591-49-1+00589-53-7	3.86	1.59	6.158	
c-2-Heptene	06443-92-1	7.08	1.49	10.568	
Unknown #8		2.75	1.47	4.049	

Vehicle 207c - Fuel 10 psi E10 - Dynamic - Test 25805 continued					
0.020 Leak at Tank Top					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Unknown #1		2.75	1.44	3.964	
Unknown #22	.	2.75	1.43	3.926	
sec-Butylbenzene	00135-98-8	2.29	1.40	3.211	
Unknown #5		2.75	1.29	3.543	
t-1,4-Dimethylcyclohexane	02207-04-7	2.75	1.22	3.353	
Isopropylbenzene (Cumene)	00098-82-8	2.75	1.21	3.328	
Unknown #13		2.75	1.18	3.236	
3,3-Dimethylhexane	00563-16-6	1.15	1.16	1.338	
1-Nonene	00124-11-8	2.49	1.13	2.820	
t-1,3 & c-1,4-DiMeCyHexane	02207-03-6+00624-29-3	2.75	1.01	2.784	
3-Methyloctane	02216-33-3	0.88	1.01	0.889	
3-Me-1-Hexene	03404-61-3	4.27	0.96	4.100	
1-Methyl-4-Isobutylbenzene	05161-04-6	3.82	0.91	3.484	
Indan	00496-11-7	3.23	0.71	2.300	
		Total	3247.6	8987.6	2.767
No MIR available, use weighted average of 2.7467					

Vehicle 207c - Fuel 10 psi E10 - 1 Day Diurnal - Test 7672					
0.020 Leak at Tank Top					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
n-Butane	00106-97-8	1.08	1722.74	1855.242	
2-Methylbutane (Isopentane)	00078-78-4	1.35	1209.09	1638.183	
Ethanol	00064-17-5	1.45	691.65	1002.190	
2-Methylpropane	00075-28-5	1.18	219.41	258.154	
n-Hexane	00110-54-3	1.13	204.56	232.106	
Toluene	00108-88-3	3.93	198.83	780.424	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	194.82	272.312	
n-Pentane	00109-66-0	1.21	171.00	207.749	
2-Methyl-2-butene	00513-35-9	14.20	145.41	2064.164	
t-2-Pentene	00646-04-8	10.47	125.30	1312.315	
3-Methylpentane	00096-14-0	1.69	124.14	209.911	
2,3-Dimethylbutane	00079-29-8	0.90	89.96	80.848	
2-Methyl-1-butene	00563-46-2	6.38	83.14	530.308	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	70.71	84.790	
c-2-Pentene	00627-20-3	10.28	67.03	689.128	
Methylcyclopentane	00096-37-7	2.05	66.21	135.715	
Benzene	00071-43-2	0.69	57.31	39.795	
c-2-Butene	00590-18-1	14.26	55.22	787.420	
Cyclohexane	00110-82-7	1.14	55.20	62.783	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	52.80	617.975	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	30.13	239.229	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	28.33	150.112	
n-Heptane	00142-82-5	0.97	27.63	26.680	
Methylcyclohexane	00108-87-2	1.56	26.36	41.007	
2,4-Dimethylpentane	00108-08-7	1.46	26.14	38.145	
2-Methylhexane	00591-76-4	1.09	25.96	28.167	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	23.86	76.145	
t-2-Hexene	04050-45-7	8.55	23.03	196.844	
Cyclopentene	00142-29-0	6.69	20.24	135.325	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	19.15	148.535	
2,3,4-Trimethylpentane	00565-75-3	0.95	18.99	18.015	
t-1,2-Dimethylcyclopentane	00822-50-4	2.50	18.68	46.689	
3-Methyl-t-2-pentene	00616-12-6	11.66	18.18	211.970	
2-Methyl-2-pentene	00625-27-4	11.03	16.51	182.150	
1-Methylcyclopentene	00693-89-0	12.45	15.41	191.930	
3-Methyl-c-2-pentene	00922-62-3	12.52	15.09	188.858	
2,3-Dimethylpentane	00565-59-3	1.25	14.12	17.625	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	13.54	89.424	
2,2-Dimethylbutane	00075-83-2	1.11	12.89	14.328	
Propane	00074-98-6	0.46	12.86	5.880	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	11.57	62.101	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	11.33	83.702	
3 & 4-Methyl-1-Pentenes	00691-37-2+00760-20-3	5.78	10.35	59.792	

Vehicle 207c - Fuel 10 psi E10 - 1 Day Diurnal - Test 7672 continued					
0.020 Leak at Tank Top					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2,4-Dimethylhexane	00589-43-5	1.61	9.65	15.494	
n-Octane	00111-65-9	0.80	8.67	6.901	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	7.16	11.491	
2,2-Dimethylpentane	00590-35-2	1.04	6.90	7.193	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	6.61	29.057	
2,2,5-Trimethylhexane	03522-94-9	1.05	6.38	6.719	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	5.46	5.960	
2-Methylheptane	00592-27-8	0.97	5.13	4.960	
Ethylbenzene	00100-41-4	2.96	5.09	15.068	
ortho-Xylene	00095-47-6	7.58	5.00	37.892	
3-Methylheptane	00589-81-1	1.12	4.93	5.541	
1,3,5-Trimethylbenzene	00108-67-8	11.75	4.76	55.938	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	4.56	25.258	
c-1,3-Dimethylcyclopentane	02532-58-3	2.50	4.28	10.701	
Ethylcyclohexane	01678-91-7	1.35	3.67	4.941	
c-1,3-Dimethylcyclohexane	00638-04-0	2.50	3.65	9.124	
2,2,3-Trimethylbutane	00464-06-2	1.05	3.48	3.664	
3,3-Dimethylpentane	00562-49-2	1.12	2.93	3.282	
n-Propylbenzene	00103-65-1	1.96	2.78	5.444	
4-Methyl-t-2-pentene	00674-76-0	8.04	2.68	21.529	
Unknown #16		2.50	2.36	5.907	
n-Nonane	00111-84-2	0.68	2.28	1.557	
2,4,4-Trimethyl-2-Pentene	00107-40-4	6.30	2.12	13.348	
2-Methyl-2-Hexene & c-3-Heptene	02738-19-4+07642-10-6	7.84	2.10	16.422	
2-Methyl-1,3-butadiene	00078-79-5	10.48	1.89	19.859	
1-MeCyHexene & 4-MeHeptane	00591-49-1+00589-53-7	3.86	1.85	7.164	
c-2-Heptene	06443-92-1	7.08	1.80	12.724	
2,4-Dimethylheptane	02213-23-2	1.26	1.70	2.155	
t-1,4-Dimethylcyclohexane	02207-04-7	2.50	1.67	4.179	
4-Methyloctane	02216-34-4	0.85	1.59	1.351	
1,2,3-Trimethylbenzene	00526-73-8	11.94	1.58	18.886	
Unknown #5		2.50	1.46	3.658	
3,3-Dimethylhexane	00563-16-6	1.15	1.45	1.668	
Unknown #13		2.50	1.38	3.462	
Indan	00496-11-7	5.65	1.35	7.640	
t-1,3 & c-1,4-DiMeCyHexane	02207-03-6+00624-29-3	2.50	1.34	3.355	
1-Octene	00111-66-0	3.14	1.34	4.197	
Isopropylbenzene (Cumene)	00098-82-8	2.50	1.30	3.240	
Unknown #8		2.50	1.28	3.196	
1,4-Dimethyl-2-Ethylbenzene	01758-88-9	7.54	1.27	9.585	
1-Methyl-3-Propylbenzene	01074-43-7	7.08	1.22	8.631	
2,3,5-Trimethylhexane	01069-53-0	1.12	1.22	1.362	

Vehicle 207c - Fuel 10 psi E10 - 1 Day Diurnal - Test 7672 continued					
0.020 Leak at Tank Top					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
t-4-Octene	14850-23-8	4.69	1.13	5.317	
n-Decane	00124-18-5	0.59	1.02	0.604	
1,4-Diethylbenzene	00105-05-5	4.39	0.92	4.032	
3-Methyloctane	02216-33-3	0.88	0.83	0.734	
1-Nonene	00124-11-8	2.49	0.82	2.036	
Unknown #9		2.50	0.82	2.039	
t-3-Heptene	14686-14-7	6.17	0.74	4.560	
Unknown #3		2.50	0.72	1.807	
n-Undecane	01120-21-4	0.52	0.61	0.317	
1-Heptene	00592-76-7	4.29	0.60	2.554	
2,4-DiMeOctane+AlBenz+PrCyHexane	04032-94-4+00300-57-2+	1.18	0.55	0.654	
1-Methyl-4-Isobutylbenzene	05161-04-6	3.82	0.48	1.850	
Unknown #12		2.50	0.46	1.154	
3-Me-t-3-Hexene & t-2-Heptene	03899-36-3+14686-13-6	8.38	0.44	3.696	
2,4,4-TMe-1- & 2,3-DMe-2-Pentene	00107-39-1+10574-37-5	6.54	0.39	2.527	
t-2-Nonene	06434-78-2	2.50	0.36	0.888	
2-MeOctane & 2,3-DiMeHeptane	03074-71-3+03221-61-2	0.85	0.32	0.277	
c-2-Octene	07642-04-8	2.50	0.26	0.651	
Unknown #14		2.50	0.18	0.459	
		Total	6195.8	15590.0	2.516
No MIR available, use weighted average of 2.5000					

Vehicle 207c - Fuel 7 psi E10 - 86°F Static - Test 7693					
0.020 Leak at Tank Top					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2-Methylbutane (Isopentane)	00078-78-4	1.35	207.42	281.036	
Ethanol	00064-17-5	1.45	117.15	169.746	
n-Butane	00106-97-8	1.08	80.56	86.757	
n-Hexane	00110-54-3	1.13	46.67	52.958	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	38.21	53.411	
2,3-Dimethylbutane	00079-29-8	0.90	36.24	32.566	
Toluene	00108-88-3	3.93	35.74	140.274	
2-Methyl-2-butene	00513-35-9	14.20	27.21	386.293	
3-Methylpentane	00096-14-0	1.69	26.86	45.414	
n-Pentane	00109-66-0	1.21	26.59	32.300	
t-2-Pentene	00646-04-8	10.47	22.91	239.970	
2-Methyl-1-butene	00563-46-2	6.38	16.15	103.023	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	16.07	19.276	
Methylcyclopentane	00096-37-7	2.05	13.52	27.722	
Cyclohexane	00110-82-7	1.14	13.25	15.069	
2-Methylpropane	00075-28-5	1.18	12.61	14.840	
c-2-Pentene	00627-20-3	10.28	12.25	125.951	
Benzene	00071-43-2	0.69	10.02	6.959	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	9.88	115.689	
c-2-Butene	00590-18-1	14.26	9.84	140.348	
2,4-Dimethylpentane	00108-08-7	1.46	5.79	8.450	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	5.59	44.420	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	5.17	16.499	
2-Methylhexane	00591-76-4	1.09	4.97	5.389	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	4.81	25.505	
Methylcyclohexane	00108-87-2	1.56	4.52	7.038	
t-2-Hexene	04050-45-7	8.55	4.36	37.281	
n-Heptane	00142-82-5	0.97	3.90	3.765	
Cyclopentene	00142-29-0	6.69	3.77	25.223	
2,3,4-Trimethylpentane	00565-75-3	0.95	3.57	3.388	
3-Methyl-t-2-pentene	00616-12-6	11.66	3.42	39.822	
2-Methyl-2-pentene	00625-27-4	11.03	3.23	35.657	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	3.23	25.022	
3-Methyl-c-2-pentene	00922-62-3	12.52	2.94	36.799	
2,3-Dimethylpentane	00565-59-3	1.25	2.74	3.424	
1-Methylcyclopentene	00693-89-0	12.45	2.59	32.197	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	2.57	16.999	
2,4-Dimethylhexane	00589-43-5	1.61	2.13	3.421	
3 & 4-Methyl-1-Pentenes	00691-37-2+00760-20-3	5.78	2.03	11.729	
n-Octane	00111-65-9	0.80	1.85	1.477	
2,2,3-Trimethylbutane	00464-06-2	1.05	1.70	1.788	
2,2-Dimethylpentane	00590-35-2	1.04	1.68	1.757	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	1.44	2.305	

Vehicle 207c - Fuel 7 psi E10 - 86°F Static - Test 7693 continued

0.020 Leak at Tank Top

Non Zero Mass Species Sorted By VOC

Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2,2-Dimethylbutane	00075-83-2	1.11	1.41	1.566	
2,2,5-Trimethylhexane	03522-94-9	1.05	1.18	1.247	
c-1,3-Dimethylcyclohexane	00638-04-0	2.88	1.17	3.357	
Propane	00074-98-6	0.46	1.13	0.517	
t-1,2-Dimethylcyclopentane	00822-50-4	2.88	0.96	2.763	
c-1,3-Dimethylcyclopentane	02532-58-3	2.88	0.95	2.740	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	0.72	0.789	
ortho-Xylene	00095-47-6	7.58	0.64	4.881	
Ethylcyclohexane	01678-91-7	1.35	0.60	0.804	
4-Methyl-t-2-pentene	00674-76-0	8.04	0.60	4.791	
2-Methyl-1,3-butadiene	00078-79-5	10.48	0.58	6.112	
n-Decane	00124-18-5	0.59	0.57	0.338	
2-Methylheptane	00592-27-8	0.97	0.55	0.536	
2-Methyl-2-Hexene & c-3-Heptene	02738-19-4+07642-10-6	7.84	0.54	4.244	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	0.54	2.360	
Ethylbenzene	00100-41-4	2.96	0.53	1.579	
3-Methylheptane	00589-81-1	1.12	0.52	0.582	
2,4,4-Trimethyl-2-Pentene	00107-40-4	6.30	0.49	3.093	
Unknown #5		2.88	0.46	1.329	
4-Methyloctane	02216-34-4	0.85	0.43	0.365	
3,3-Dimethylpentane	00562-49-2	1.12	0.42	0.471	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	0.40	2.242	
3,3-Dimethylhexane	00563-16-6	1.15	0.37	0.423	
3-Methyloctane	02216-33-3	0.88	0.32	0.283	
n-Nonane	00111-84-2	0.68	0.23	0.155	
n-Propylbenzene	00103-65-1	1.96	0.15	0.294	
1-MeCyHexene & 4-MeHeptane	00591-49-1+00589-53-7	3.86	0.02	0.093	
		Total	873.7	2526.9	2.892
No MIR available, use weightedaverage	of 2.8806				

Vehicle 207c - Fuel 7 psi E10 - Dynamic - Test 25801					
0.020 Leak at Tank Top					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	353.89	512.774	
Benzene	00071-43-2	0.69	48.16	33.438	
Methane	00074-82-8	0.01	2.00	0.028	
Ethane	00074-84-0	0.26	16.02	4.210	
Acetylene (Ethyne)	00074-86-2	0.95	26.13	24.713	
Propane	00074-98-6	0.46	11.31	5.168	
2-Methylpropane	00075-28-5	1.18	23.69	27.872	
2,2-Dimethylbutane	00075-83-2	1.11	9.86	10.951	
2-Methylbutane (Isopentane)	00078-78-4	1.35	775.14	1050.231	
2-Methyl-1,3-butadiene	00078-79-5	10.48	3.76	39.440	
2,3-Dimethylbutane	00079-29-8	0.90	79.61	71.544	
ortho-Xylene	00095-47-6	7.58	6.45	48.887	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	28.25	151.671	
3-Methylpentane	00096-14-0	1.69	118.61	200.561	
Methylcyclopentane	00096-37-7	2.05	56.49	115.785	
4-Isopropyltoluene (p-Cymene)	00099-87-6	4.41	5.69	25.068	
Ethylbenzene	00100-41-4	2.96	4.95	14.670	
n-Propylbenzene	00103-65-1	1.96	5.38	10.537	
n-Butane	00106-97-8	1.08	205.73	221.556	
1,3-Butadiene	00106-99-0	12.45	6.57	81.767	
2,4-Dimethylpentane	00108-08-7	1.46	25.21	36.784	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	22.05	170.980	
1,3,5-Trimethylbenzene	00108-67-8	11.75	10.39	122.103	
Methylcyclohexane	00108-87-2	1.56	28.20	43.856	
Toluene	00108-88-3	3.93	164.97	647.513	
n-Pentane	00109-66-0	1.21	129.43	157.255	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	48.40	566.449	
n-Hexane	00110-54-3	1.13	192.50	218.427	
Cyclohexane	00110-82-7	1.14	53.21	60.521	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	21.78	69.509	
n-Octane	00111-65-9	0.80	6.92	5.511	
n-Nonane	00111-84-2	0.68	3.09	2.108	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	34.32	272.518	
n-Decane	00124-18-5	0.59	3.01	1.780	
Cyclopentene	00142-29-0	6.69	14.53	97.125	
n-Heptane	00142-82-5	0.97	18.31	17.681	
2,2,3-Trimethylbutane	00464-06-2	1.05	2.28	2.405	
2-Methyl-2-butene	00513-35-9	14.20	100.75	1430.132	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	11.94	71.95	859.008	
Cyclopentadiene	00542-92-7	6.89	2.18	15.027	
3,3-Dimethylpentane	00562-49-2	1.12	2.95	3.295	
2-Methyl-1-butene	00563-46-2	6.38	62.77	400.401	
2,3-Dimethylpentane	00565-59-3	1.25	13.21	16.494	

Vehicle 207c - Fuel 7 psi E10 - Dynamic - Test 25801 continued					
0.020 Leak at Tank Top					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2,3,4-Trimethylpentane	00565-75-3	0.95	19.34	18.351	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	4.60	5.019	
2,4-Dimethylhexane	00589-43-5	1.61	10.65	17.101	
3-Methylheptane	00589-81-1	1.12	5.12	5.752	
c-2-Butene	00590-18-1	14.26	41.41	590.493	
2,2-Dimethylpentane	00590-35-2	1.04	8.09	8.441	
1-MeCyHexene & 4-MeHeptane	00591-49-1+00589-53-7	3.86	1.78	6.869	
2-Methylhexane	00591-76-4	1.09	21.97	23.841	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	7.45	11.957	
2-Methylheptane	00592-27-8	0.97	5.12	4.948	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	17.26	91.453	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	7.33	40.615	
3-Methyl-t-2-pentene	00616-12-6	11.66	13.47	156.999	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	49.54	365.912	
2-Methyl-2-pentene	00625-27-4	11.03	12.53	138.231	
c-2-Pentene	00627-20-3	10.28	47.01	483.353	
c-1,3-Dimethylcyclohexane	00638-04-0	3.35	3.71	12.441	
t-2-Pentene	00646-04-8	10.47	85.04	890.689	
3 & 4-Methyl-1-Pentenes	00691-37-2+00760-20-3	5.78	10.44	60.293	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	162.60	227.274	
1-Methylcyclopentene	00693-89-0	12.45	10.31	128.348	
t-1,2-Dimethylcyclopentane	00822-50-4	3.35	6.04	20.255	
3-Methyl-c-2-pentene	00922-62-3	12.52	11.85	148.379	
3,5-Dimethylheptane	00926-82-9	1.42	2.57	3.653	
2,3,5-Trimethylhexane	01069-53-0	1.12	2.81	3.150	
t-1,4-Dimethylcyclohexane	02207-04-7	3.35	1.64	5.499	
c-1,3-Dimethylcyclopentane	02532-58-3	3.35	7.62	25.548	
2-Methyl-2-Hexene & c-3-Heptene	02738-19-4+07642-10-6	7.84	3.20	25.060	
2,2,5-Trimethylhexane	03522-94-9	1.05	7.15	7.531	
t-2-Hexene	04050-45-7	8.55	16.25	138.889	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	10.66	70.412	
Unknown #16		3.35	3.52	11.791	
Unknown #1		3.35	2.42	8.119	
		Total	3440.5	11624.4	3.379
No MIR available, use weighted average of 3.3544					

Vehicle 207c - Fuel 7 psi E10 - 1 Day Diurnal - Test 7741					
0.020 Leak at Tank Top					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2-Methylbutane (Isopentane)	00078-78-4	1.35	1924.32	2607.233	
Ethanol	00064-17-5	1.45	1128.68	1635.432	
n-Butane	00106-97-8	1.08	581.58	626.316	
n-Hexane	00110-54-3	1.13	446.46	506.591	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	378.49	529.047	
n-Pentane	00109-66-0	1.21	308.21	374.457	
3-Methylpentane	00096-14-0	1.69	261.64	442.392	
2-Methyl-2-butene	00513-35-9	14.20	259.29	3680.648	
Toluene	00108-88-3	3.93	237.27	931.277	
t-2-Pentene	00646-04-8	10.47	218.58	2289.338	
2,3-Dimethylbutane	00079-29-8	0.90	181.55	163.160	
2-Methyl-1-butene	00563-46-2	6.38	148.52	947.358	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	126.02	151.118	
Methylcyclopentane	00096-37-7	2.05	125.11	256.440	
c-2-Pentene	00627-20-3	10.28	117.11	1204.011	
Cyclohexane	00110-82-7	1.14	102.72	116.827	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	91.29	1068.496	
c-2-Butene	00590-18-1	14.26	84.97	1211.611	
Benzene	00071-43-2	0.69	84.47	58.652	
2-Methylpropane	00075-28-5	1.18	75.17	88.450	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	54.92	436.096	
2,4-Dimethylpentane	00108-08-7	1.46	52.83	77.100	
2-Methylhexane	00591-76-4	1.09	44.49	48.279	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	40.15	212.747	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	39.22	125.158	
t-2-Hexene	04050-45-7	8.55	38.61	330.080	
Methylcyclohexane	00108-87-2	1.56	38.03	59.150	
Cyclopentene	00142-29-0	6.69	34.03	227.545	
n-Heptane	00142-82-5	0.97	32.63	31.514	
3-Methyl-t-2-pentene	00616-12-6	11.66	30.87	359.933	
2,3,4-Trimethylpentane	00565-75-3	0.95	29.09	27.606	
2-Methyl-2-pentene	00625-27-4	11.03	28.33	312.515	
2,3-Dimethylpentane	00565-59-3	1.25	26.21	32.725	
3-Methyl-c-2-pentene	00922-62-3	12.52	25.51	319.336	
1-Methylcyclopentene	00693-89-0	12.45	23.86	297.115	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	23.06	152.327	
2,2-Dimethylbutane	00075-83-2	1.11	23.02	25.580	
3 & 4-Methyl-1-Pentenes	00691-37-2+00760-20-3	5.78	17.37	100.334	
2,4-Dimethylhexane	00589-43-5	1.61	15.03	24.139	
Propane	00074-98-6	0.46	14.56	6.658	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	13.99	108.507	
2,2-Dimethylpentane	00590-35-2	1.04	13.81	14.409	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	11.13	17.860	

Vehicle 207c - Fuel 7 psi E10 - 1 Day Diurnal - Test 7741 continued

0.020 Leak at Tank Top

Non Zero Mass Species Sorted By VOC

Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
1-Butyne	00107-00-6	6.05	10.88	65.828	
n-Octane	00111-65-9	0.80	8.27	6.585	
t-1,2-Dimethylcyclopentane	00822-50-4	2.95	8.19	24.124	
2,2,5-Trimethylhexane	03522-94-9	1.05	7.65	8.057	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	7.63	40.976	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	7.17	52.989	
c-1,3-Dimethylcyclopentane	02532-58-3	2.95	6.95	20.469	
2,2,3-Trimethylbutane	00464-06-2	1.05	6.39	6.735	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	6.22	6.795	
3,3-Dimethylpentane	00562-49-2	1.12	4.99	5.586	
2-Methylheptane	00592-27-8	0.97	4.86	4.701	
3-Methylheptane	00589-81-1	1.12	4.42	4.965	
ortho-Xylene	00095-47-6	7.58	3.67	27.827	
c-1,3-Dimethylcyclohexane	00638-04-0	2.95	3.53	10.397	
2,3,5-Trimethylhexane	01069-53-0	1.12	3.50	3.922	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	3.38	14.856	
2-Methyl-2-Hexene & c-3-Heptene	02738-19-4+07642-10-6	7.84	3.11	24.341	
2-Methyl-1,3-butadiene	00078-79-5	10.48	2.80	29.328	
Ethylcyclohexane	01678-91-7	1.35	2.62	3.525	
Ethylbenzene	00100-41-4	2.96	2.41	7.138	
1,3,5-Trimethylbenzene	00108-67-8	11.75	2.30	27.026	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	2.25	12.456	
n-Propylbenzene	00103-65-1	1.96	2.04	4.004	
Unknown #5		2.95	1.72	5.063	
3,3-Dimethylhexane	00563-16-6	1.15	1.64	1.888	
t-1,4-Dimethylcyclohexane	02207-04-7	2.95	1.59	4.690	
c-2-Heptene	06443-92-1	7.08	1.33	9.383	
n-Nonane	00111-84-2	0.68	1.25	0.851	
1-Octene	00111-66-0	3.14	1.24	3.881	
Indan	00496-11-7	3.23	1.19	3.852	
t-3-Heptene	14686-14-7	6.17	1.14	7.031	
Ethylene	00074-85-1	8.88	1.13	10.031	
4-Methyloctane	02216-34-4	0.85	1.11	0.942	
1,2,3-Trimethylbenzene	00526-73-8	11.94	1.04	12.456	
Unknown #16		2.95	1.01	2.970	
Unknown #3		2.95	0.97	2.854	
Unknown #6	.	2.95	0.97	2.845	
2,4,4-TMe-1- & 2,3-DMe-2-Pentene	00107-39-1+10574-37-5	6.54	0.90	5.881	
t-1,3 & c-1,4-DiMeCyHexane	02207-03-6+00624-29-3	2.95	0.87	2.557	
Isopropylbenzene (Cumene)	00098-82-8	2.95	0.81	2.392	
Unknown #8		2.95	0.81	2.388	
n-Decane	00124-18-5	0.59	0.80	0.470	

Vehicle 207c - Fuel 7 psi E10 - 1 Day Diurnal - Test 7741 continued					
0.020 Leak at Tank Top					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2-MeOctane & 2,3-DiMeHeptane	03074-71-3+03221-61-2	0.85	0.79	0.678	
Unknown #13		2.95	0.79	2.322	
3-Methyloctane	02216-33-3	0.88	0.77	0.681	
3-Me-t-3-Hexene & t-2-Heptene	03899-36-3+14686-13-6	8.38	0.76	6.379	
1,3-Butadiene	00106-99-0	12.45	0.76	9.484	
2,4-Dimethylheptane	02213-23-2	1.26	0.64	0.805	
1-Heptene	00592-76-7	4.29	0.60	2.584	
1,2-Dimethyl-4-Ethylbenzene	00934-80-5	7.54	0.55	4.183	
2,4-DiMeOctane+AlBenz+PrCyHexane	04032-94-4+00300-57-2+	1.18	0.55	0.656	
Unknown #9		2.95	0.47	1.372	
1-Methyl-3-Propylbenzene	01074-43-7	7.08	0.41	2.934	
1-Nonene	00124-11-8	2.49	0.39	0.967	
n-Undecane	01120-21-4	0.52	0.39	0.202	
3-Ethyl-c-2-Pentene	00816-79-5	9.76	0.38	3.690	
4-Isopropyltoluene (p-Cymene)	00099-87-6	4.41	0.34	1.484	
3-Methylnonane		2.95	0.23	0.667	
1,4-Dimethyl-2-Ethylbenzene	01758-88-9	7.54	0.21	1.596	
1-Methyl-4-Isobutylbenzene	05161-04-6	3.82	0.20	0.770	
t-2-Octene & t-1,2-DiMeCyHexane	13389-42-9+06876-23-9	5.92	0.18	1.055	
1,4-Diethylbenzene	00105-05-5	4.39	0.16	0.705	
3,5-Dimethylheptane	00926-82-9	1.42	0.12	0.166	
Unknown #22		2.95	0.05	0.140	
		Total	7698.7	22774.1	2.958
No MIR available, use weighted average of 2.9471					

Vehicle 207c - Fuel 10 psi E10 - 86°F Static - Test 7781					
0.020 Leak at Canister Inlet					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
n-Butane	00106-97-8	1.08	248.72	267.848	
2-Methylbutane (Isopentane)	00078-78-4	1.35	104.69	141.848	
Ethanol	00064-17-5	1.45	75.22	108.992	
n-Hexane	00110-54-3	1.13	22.84	25.919	
Toluene	00108-88-3	3.93	18.33	71.943	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	17.90	25.017	
3-Methylpentane	00096-14-0	1.69	17.42	29.458	
2-Methyl-2-butene	00513-35-9	14.20	16.98	240.966	
n-Pentane	00109-66-0	1.21	15.76	19.144	
t-2-Pentene	00646-04-8	10.47	15.11	158.229	
2,3-Dimethylbutane	00079-29-8	0.90	12.02	10.800	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	10.91	13.077	
2-Methyl-1-butene	00563-46-2	6.38	10.39	66.260	
Methylcyclopentane	00096-37-7	2.05	9.08	18.621	
Benzene	00071-43-2	0.69	8.92	6.192	
c-2-Pentene	00627-20-3	10.28	8.05	82.752	
c-2-Butene	00590-18-1	14.26	8.02	114.334	
Cyclohexane	00110-82-7	1.14	7.99	9.092	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	7.71	90.247	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	6.54	48.312	
2-Methylpropane	00075-28-5	1.18	6.46	7.600	
1-Butyne	00107-00-6	6.05	6.46	39.077	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	5.68	30.522	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	5.15	39.910	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	5.08	40.355	
2-Methylhexane	00591-76-4	1.09	4.05	4.399	
2,4-Dimethylpentane	00108-08-7	1.46	4.01	5.847	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	3.51	11.196	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	3.47	18.365	
Methylcyclohexane	00108-87-2	1.56	3.45	5.369	
Propane	00074-98-6	0.46	3.26	1.490	
t-2-Hexene	04050-45-7	8.55	3.06	26.148	
n-Heptane	00142-82-5	0.97	3.05	2.946	
2,3,4-Trimethylpentane	00565-75-3	0.95	2.79	2.643	
2,3-Dimethylpentane	00565-59-3	1.25	2.50	3.122	
Cyclopentene	00142-29-0	6.69	2.42	16.150	
3-Methyl-t-2-pentene	00616-12-6	11.66	2.37	27.634	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	2.23	9.804	
3-Methyl-c-2-pentene	00922-62-3	12.52	2.19	27.369	
ortho-Xylene	00095-47-6	7.58	2.15	16.278	
2-Methyl-2-pentene	00625-27-4	11.03	2.10	23.172	
1,3,5-Trimethylbenzene	00108-67-8	11.75	1.83	21.545	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	1.82	12.056	

Vehicle 207c - Fuel 10 psi E10 - 86°F Static - Test 7781 continued					
0.020 Leak at Canister Inlet					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2,2-Dimethylbutane	00075-83-2	1.11	1.78	1.977	
1-Methylcyclopentene	00693-89-0	12.45	1.78	22.123	
2,4-Dimethylhexane	00589-43-5	1.61	1.39	2.225	
n-Octane	00111-65-9	0.80	1.30	1.032	
3 & 4-Methyl-1-Pentenes	00691-37-2+00760-20-3	5.78	1.27	7.319	
Ethylbenzene	00100-41-4	2.96	1.19	3.519	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	1.15	6.367	
2,2,5-Trimethylhexane	03522-94-9	1.05	1.11	1.172	
2,2-Dimethylpentane	00590-35-2	1.04	1.11	1.155	
n-Propylbenzene	00103-65-1	1.96	1.04	2.036	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	0.99	1.597	
c-1,3-Dimethylcyclopentane	02532-58-3	2.71	0.91	2.470	
t-1,2-Dimethylcyclopentane	00822-50-4	2.71	0.77	2.095	
3-Methylheptane	00589-81-1	1.12	0.74	0.827	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	0.71	0.771	
2-Methyl-1,3-butadiene	00078-79-5	10.48	0.69	7.201	
1,2,3-Trimethylbenzene	00526-73-8	11.94	0.60	7.215	
2,2,3-Trimethylbutane	00464-06-2	1.05	0.60	0.636	
3,3-Dimethylpentane	00562-49-2	1.12	0.49	0.550	
2-Methylheptane	00592-27-8	0.97	0.47	0.455	
c-1,3-Dimethylcyclohexane	00638-04-0	2.71	0.46	1.251	
n-Nonane	00111-84-2	0.68	0.46	0.315	
		Total	742.7	2016.4	2.715
No MIR available, use weighted average of 2.7072					

Vehicle 207c - Fuel 10 psi E10 - Dynamic - Test 25817					
0.020 Leak at Canister Inlet					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
n-Butane	00106-97-8	1.08	428.44	461.388	
2-Methylbutane (Isopentane)	00078-78-4	1.35	260.93	353.529	
Ethanol	00064-17-5	1.45	171.78	248.906	
Toluene	00108-88-3	3.93	100.47	394.340	
n-Hexane	00110-54-3	1.13	80.65	91.515	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	64.53	90.196	
3-Methylpentane	00096-14-0	1.69	44.91	75.939	
n-Pentane	00109-66-0	1.21	43.70	53.093	
2-Methyl-2-butene	00513-35-9	14.20	36.37	516.297	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	32.26	38.683	
2,3-Dimethylbutane	00079-29-8	0.90	29.56	26.564	
t-2-Pentene	00646-04-8	10.47	28.64	299.954	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	28.03	328.116	
Benzene	00071-43-2	0.69	25.91	17.991	
Cyclohexane	00110-82-7	1.14	25.42	28.906	
Methylcyclopentane	00096-37-7	2.05	24.37	49.961	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	20.32	161.395	
2-Methyl-1-butene	00563-46-2	6.38	18.81	119.952	
c-2-Butene	00590-18-1	14.26	18.57	264.799	
c-2-Pentene	00627-20-3	10.28	17.75	182.543	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	17.38	134.786	
Ethylene	00074-85-1	8.88	16.36	145.343	
n-Heptane	00142-82-5	0.97	15.36	14.831	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	13.70	101.191	
Methylcyclohexane	00108-87-2	1.56	13.10	20.372	
Ethane	00074-84-0	0.26	12.61	3.314	
2,4-Dimethylpentane	00108-08-7	1.46	11.56	16.872	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	11.30	60.681	
Methane	00074-82-8	0.01	10.67	0.148	
2,3,4-Trimethylpentane	00565-75-3	0.95	10.28	9.750	
2-Methylhexane	00591-76-4	1.09	10.26	11.134	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	8.29	26.461	
Propane	00074-98-6	0.46	8.09	3.698	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	7.84	41.529	
t-2-Hexene	04050-45-7	8.55	7.60	65.002	
n-Octane	00111-65-9	0.80	6.36	5.062	
2,3-Dimethylpentane	00565-59-3	1.25	6.17	7.698	
3-Methyl-t-2-pentene	00616-12-6	11.66	6.04	70.439	
3 & 4-Methyl-1-Pentenes	00691-37-2+00760-20-3	5.78	5.74	33.157	
Cyclopentene	00142-29-0	6.69	5.55	37.098	
1,3-Butadiene	00106-99-0	12.45	5.30	66.022	
2,2,5-Trimethylhexane	03522-94-9	1.05	5.25	5.529	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	5.14	22.607	

Vehicle 207c - Fuel 10 psi E10 - Dynamic - Test 25817 continued

0.020 Leak at Canister Inlet

Non Zero Mass Species Sorted By VOC

Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2-Methyl-2-pentene	00625-27-4	11.03	5.03	55.446	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	4.95	32.687	
2-Methyl-1,3-butadiene	00078-79-5	10.48	4.95	51.856	
1,3,5-Trimethylbenzene	00108-67-8	11.75	4.57	53.683	
ortho-Xylene	00095-47-6	7.58	4.27	32.375	
n-Propylbenzene	00103-65-1	1.96	4.25	8.330	
3-Methyl-c-2-pentene	00922-62-3	12.52	4.19	52.480	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	4.11	4.489	
1-Methylcyclopentene	00693-89-0	12.45	3.99	49.719	
2,2,3-Trimethylbutane	00464-06-2	1.05	3.91	4.118	
Ethylbenzene	00100-41-4	2.96	3.12	9.253	
2,2-Dimethylbutane	00075-83-2	1.11	3.06	3.401	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	3.03	16.819	
3-Methylheptane	00589-81-1	1.12	2.96	3.328	
t-1,2-Dimethylcyclopentane	00822-50-4	2.84	2.90	8.213	
2-Methylpropane	00075-28-5	1.18	2.81	3.306	
Cyclopentadiene	00542-92-7	6.89	2.51	17.329	
2,4-Dimethylhexane	00589-43-5	1.61	2.50	4.021	
2-Methylheptane	00592-27-8	0.97	2.38	2.306	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	2.35	3.769	
c-1,3-Dimethylcyclohexane	00638-04-0	2.84	2.34	6.642	
c-1,3-Dimethylcyclopentane	02532-58-3	2.84	2.29	6.498	
2,2-Dimethylpentane	00590-35-2	1.04	2.21	2.301	
3,3-Dimethylpentane	00562-49-2	1.12	2.02	2.260	
Unknown #1		2.84	1.72	4.890	
2,3,5-Trimethylhexane	01069-53-0	1.12	1.56	1.746	
t-1,4-Dimethylcyclohexane	02207-04-7	2.84	0.94	2.672	
4-Isopropyltoluene (p-Cymene)	00099-87-6	4.41	0.32	1.409	
		Total	1806.6	5152.1	2.852
No MIR available, use weighted average of 2.8358					

Vehicle 207c - Fuel 10 psi E10 - 1 Day Diurnal - Test 7794					
0.020 Leak at Canister Inlet					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
n-Butane	00106-97-8	1.08	3166.58	3410.131	
2-Methylbutane (Isopentane)	00078-78-4	1.35	1651.07	2237.018	
Ethanol	00064-17-5	1.45	678.31	982.860	
n-Hexane	00110-54-3	1.13	320.71	363.900	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	289.26	404.320	
n-Pentane	00109-66-0	1.21	250.77	304.666	
2-Methyl-2-butene	00513-35-9	14.20	208.49	2959.520	
3-Methylpentane	00096-14-0	1.69	196.82	332.790	
t-2-Pentene	00646-04-8	10.47	176.41	1847.614	
Toluene	00108-88-3	3.93	150.91	592.313	
2,3-Dimethylbutane	00079-29-8	0.90	139.82	125.657	
2-Methyl-1-butene	00563-46-2	6.38	121.82	777.050	
c-2-Pentene	00627-20-3	10.28	95.42	981.058	
Methylcyclopentane	00096-37-7	2.05	94.86	194.438	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	92.04	110.372	
2-Methylpropane	00075-28-5	1.18	78.82	92.741	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	76.52	895.654	
Cyclohexane	00110-82-7	1.14	74.83	85.109	
c-2-Butene	00590-18-1	14.26	71.17	1014.871	
Benzene	00071-43-2	0.69	61.55	42.735	
2,4-Dimethylpentane	00108-08-7	1.46	39.65	57.864	
2-Methylhexane	00591-76-4	1.09	33.04	35.857	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	32.87	174.149	
t-2-Hexene	04050-45-7	8.55	30.07	257.097	
Methylcyclohexane	00108-87-2	1.56	29.31	45.582	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	29.20	93.167	
Cyclopentene	00142-29-0	6.69	27.36	182.929	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	25.52	202.689	
3-Methyl-t-2-pentene	00616-12-6	11.66	24.25	282.759	
n-Heptane	00142-82-5	0.97	24.20	23.372	
2-Methyl-2-pentene	00625-27-4	11.03	22.38	246.882	
2,3,4-Trimethylpentane	00565-75-3	0.95	21.16	20.076	
3-Methyl-c-2-pentene	00922-62-3	12.52	20.08	251.353	
2,3-Dimethylpentane	00565-59-3	1.25	19.84	24.770	
2,2-Dimethylbutane	00075-83-2	1.11	19.32	21.463	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	18.24	120.499	
1-Methylcyclopentene	00693-89-0	12.45	17.31	215.538	
3 & 4-Methyl-1-Pentenes	00691-37-2+00760-20-3	5.78	13.91	80.388	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	12.24	90.391	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	12.19	94.507	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	12.03	64.583	
2,4-Dimethylhexane	00589-43-5	1.61	11.35	18.218	
2,2-Dimethylpentane	00590-35-2	1.04	10.32	10.765	

Vehicle 207c - Fuel 10 psi E10 - 1 Day Diurnal - Test 7794 continued					
0.020 Leak at Canister Inlet					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	8.17	13.113	
1-Butyne	00107-00-6	6.05	7.72	46.679	
n-Octane	00111-65-9	0.80	6.71	5.344	
t-1,2-Dimethylcyclopentane	00822-50-4	2.40	6.50	15.606	
2,2,5-Trimethylhexane	03522-94-9	1.05	6.01	6.331	
Propane	00074-98-6	0.46	5.68	2.596	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	5.54	6.047	
c-1,3-Dimethylcyclopentane	02532-58-3	2.40	5.53	13.283	
2,2,3-Trimethylbutane	00464-06-2	1.05	5.20	5.478	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	4.78	21.014	
2-Methylheptane	00592-27-8	0.97	4.69	4.538	
1,3,5-Trimethylbenzene	00108-67-8	11.75	4.53	53.235	
3-Methylheptane	00589-81-1	1.12	4.33	4.866	
3,3-Dimethylpentane	00562-49-2	1.12	3.94	4.406	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	3.64	20.198	
ortho-Xylene	00095-47-6	7.58	3.25	24.656	
c-1,3-Dimethylcyclohexane	00638-04-0	2.40	3.12	7.507	
2-Methyl-1,3-butadiene	00078-79-5	10.48	3.02	31.639	
2-Methyl-2-Hexene & c-3-Heptene	02738-19-4+07642-10-6	7.84	2.65	20.793	
Ethylbenzene	00100-41-4	2.96	2.55	7.563	
n-Propylbenzene	00103-65-1	1.96	2.48	4.851	
1-MeCyHexene & 4-MeHeptane	00591-49-1+00589-53-7	3.86	1.81	7.006	
n-Nonane	00111-84-2	0.68	1.75	1.194	
Unknown #5		2.40	1.66	3.989	
3,3-Dimethylhexane	00563-16-6	1.15	1.65	1.905	
n-Decane	00124-18-5	0.59	1.64	0.967	
1,2,3-Trimethylbenzene	00526-73-8	11.94	1.57	18.685	
t-1,4-Dimethylcyclohexane	02207-04-7	2.40	1.46	3.518	
c-2-Heptene	06443-92-1	7.08	1.44	10.185	
Ethylcyclohexane	01678-91-7	1.35	1.36	1.825	
2,4,4-TMe-1- & 2,3-DMe-2-Pentene	00107-39-1+10574-37-5	6.54	1.32	8.621	
Unknown #16		2.40	1.32	3.163	
2,3,5-Trimethylhexane	01069-53-0	1.12	1.30	1.459	
Isopropylbenzene (Cumene)	00098-82-8	2.40	1.10	2.640	
4-Methyloctane	02216-34-4	0.85	1.08	0.916	
n-Undecane	01120-21-4	0.52	1.06	0.553	
t-3-Heptene	14686-14-7	6.17	1.01	6.224	
1,1-Dimethylcyclohexane	00590-66-9	1.12	0.88	0.986	
Unknown #3		2.40	0.67	1.615	
1-Heptene	00592-76-7	4.29	0.66	2.838	
1,3-Butadiene	00106-99-0	12.45	0.60	7.523	
3-Me-t-3-Hexene & t-2-Heptene	03899-36-3+14686-13-6	8.38	0.60	5.059	
3-Methyloctane	02216-33-3	0.88	0.59	0.525	

Vehicle 207c - Fuel 10 psi E10 - 1 Day Diurnal - Test 7794 continued					
0.020 Leak at Canister Inlet					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
3-Methyloctane	02216-33-3	0.88	0.59	0.525	
1,3-Dimethyl-4-Ethylbenzene	00874-41-9	7.54	0.56	4.193	
t-1,3 & c-1,4-DiMeCyHexane	02207-03-6+00624-29-3	2.40	0.55	1.330	
Unknown #22	.	2.40	0.53	1.268	
1-Nonene	00124-11-8	2.49	0.47	1.178	
Unknown #8		2.40	0.47	1.119	
2,4-Dimethylheptane	02213-23-2	1.26	0.38	0.486	
Indan	00496-11-7	3.23	0.33	1.060	
1,4-Diethylbenzene	00105-05-5	4.39	0.27	1.190	
		Total	8632.1	20792.7	2.409
No MIR available, use weighted average of 2.4024					

Vehicle 207c - Fuel 7 psi E10 - 86°F Static - Test 7819					
0.020 Leak at Canister Inlet					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	57.16	82.823	
Benzene	00071-43-2	0.69	8.18	5.680	
Propane	00074-98-6	0.46	1.41	0.644	
2-Methylpropane	00075-28-5	1.18	3.44	4.046	
2-Methylbutane (Isopentane)	00078-78-4	1.35	76.13	103.147	
2,3-Dimethylbutane	00079-29-8	0.90	8.19	7.363	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	8.03	43.132	
3-Methylpentane	00096-14-0	1.69	11.89	20.098	
Methylcyclopentane	00096-37-7	2.05	6.89	14.124	
n-Butane	00106-97-8	1.08	36.76	39.588	
Toluene	00108-88-3	3.93	21.59	84.759	
n-Pentane	00109-66-0	1.21	15.45	18.766	
n-Hexane	00110-54-3	1.13	26.16	29.678	
2-Methyl-2-butene	00513-35-9	14.20	12.37	175.649	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	8.75	10.498	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	9.43	69.613	
t-2-Pentene	00646-04-8	10.47	11.96	125.262	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	17.75	24.812	
		Total	341.5	859.7	2.517

Vehicle 207c - Fuel 7 psi E10 - Dynamic - Test 25820					
0.020 Leak at Canister Inlet					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	133.63	193.622	
Benzene	00071-43-2	0.69	24.98	17.342	
Methane	00074-82-8	0.01	16.01	0.222	
Ethane	00074-84-0	0.26	11.46	3.013	
Ethylene	00074-85-1	8.88	19.76	175.570	
2-Methylpropane	00075-28-5	1.18	3.12	3.675	
2,2-Dimethylbutane	00075-83-2	1.11	4.19	4.659	
2-Methylbutane (Isopentane)	00078-78-4	1.35	215.31	291.718	
2-Methyl-1,3-butadiene	00078-79-5	10.48	4.58	48.031	
2,3-Dimethylbutane	00079-29-8	0.90	26.58	23.890	
ortho-Xylene	00095-47-6	7.58	4.71	35.666	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	22.21	119.231	
3-Methylpentane	00096-14-0	1.69	41.67	70.465	
Methylcyclopentane	00096-37-7	2.05	23.37	47.896	
Isopropylbenzene (Cumene)	00098-82-8	3.42	1.82	6.237	
4-Isopropyltoluene (p-Cymene)	00099-87-6	4.41	4.30	18.968	
Ethylbenzene	00100-41-4	2.96	4.83	14.312	
n-Propylbenzene	00103-65-1	1.96	5.49	10.766	
1,4-Diethylbenzene	00105-05-5	4.39	3.66	16.071	
n-Butane	00106-97-8	1.08	62.49	67.299	
1,3-Butadiene	00106-99-0	12.45	6.78	84.410	
1-Butyne	00107-00-6	6.05	8.43	50.998	
2,4-Dimethylpentane	00108-08-7	1.46	11.62	16.956	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	15.45	119.819	
1,3,5-Trimethylbenzene	00108-67-8	11.75	9.98	117.261	
Methylcyclohexane	00108-87-2	1.56	11.85	18.425	
Toluene	00108-88-3	3.93	98.72	387.494	
n-Pentane	00109-66-0	1.21	39.31	47.757	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	22.66	265.262	
n-Hexane	00110-54-3	1.13	73.72	83.651	
Cyclohexane	00110-82-7	1.14	22.06	25.094	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	7.07	22.568	
n-Octane	00111-65-9	0.80	5.95	4.737	
n-Nonane	00111-84-2	0.68	1.80	1.229	
1-Dodecene	00112-41-4	1.56	1.42	2.220	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	21.54	171.014	
n-Decane	00124-18-5	0.59	6.31	3.731	
Cyclopentene	00142-29-0	6.69	5.68	37.986	
n-Heptane	00142-82-5	0.97	9.40	9.074	
2,2,3-Trimethylbutane	00464-06-2	1.05	1.70	1.794	
Indan	00496-11-7	3.23	2.22	7.175	
2-Methyl-2-butene	00513-35-9	14.20	32.88	466.742	
1,2,3,5-Tetramethylbenzene	00527-53-7	9.26	1.36	12.591	

Vehicle 207c - Fuel 7 psi E10 - Dynamic - Test 25820 continued					
0.020 Leak at Canister Inlet					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	34.27	41.093	
Cyclopentadiene	00542-92-7	6.89	3.51	24.164	
3,3-Dimethyl-1-butene	00558-37-2	5.68	0.92	5.207	
3,3-Dimethylpentane	00562-49-2	1.12	2.45	2.737	
3,3-Dimethylhexane	00563-16-6	1.15	1.64	1.893	
2-Methyl-1-butene	00563-46-2	6.38	18.33	116.899	
2,3-Dimethylpentane	00565-59-3	1.25	6.12	7.634	
2,3,4-Trimethylpentane	00565-75-3	0.95	11.62	11.028	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	3.65	3.982	
2,4-Dimethylhexane	00589-43-5	1.61	6.89	11.062	
3-Methylheptane	00589-81-1	1.12	1.95	2.189	
c-2-Butene	00590-18-1	14.26	10.53	150.118	
2,2-Dimethylpentane	00590-35-2	1.04	3.80	3.966	
2-Methylhexane	00591-76-4	1.09	10.16	11.022	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	4.70	7.541	
2-Methylheptane	00592-27-8	0.97	4.52	4.375	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	9.43	49.963	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	7.92	43.905	
3-Methyl-t-2-pentene	00616-12-6	11.66	6.64	77.449	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	18.39	135.823	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	7.20	31.635	
2-Methyl-2-pentene	00625-27-4	11.03	6.41	70.697	
c-2-Pentene	00627-20-3	10.28	14.01	144.091	
c-1,3-Dimethylcyclohexane	00638-04-0	3.42	1.80	6.175	
t-2-Pentene	00646-04-8	10.47	26.98	282.558	
3 & 4-Methyl-1-Pentenes	00691-37-2+00760-20-3	5.78	4.31	24.915	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	57.32	80.128	
1-Methylcyclopentene	00693-89-0	12.45	4.45	55.438	
t-1,2-Dimethylcyclopentane	00822-50-4	3.42	3.41	11.670	

Vehicle 207c - Fuel 7 psi E10 - Dynamic - Test 25820 continued					
0.020 Leak at Canister Inlet					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
1,3-Dimethyl-4-Ethylbenzene	00874-41-9	7.54	1.94	14.640	
3-Methyl-c-2-pentene	00922-62-3	12.52	6.49	81.193	
3,5-Dimethylheptane	00926-82-9	1.42	3.64	5.179	
1,2-Dimethyl-4-Ethylbenzene	00934-80-5	7.54	1.25	9.411	
2,3,5-Trimethylhexane	01069-53-0	1.12	1.48	1.655	
1-Methyl-3-Propylbenzene	01074-43-7	7.08	1.89	13.380	
t-1,4-Dimethylcyclohexane	02207-04-7	3.42	0.92	3.134	
4-Methyloctane	02216-34-4	0.85	1.75	1.482	
c-1,3-Dimethylcyclopentane	02532-58-3	3.42	2.14	7.310	
2-Methyl-2-Hexene & c-3-Heptene	02738-19-4+07642-10-6	7.84	1.41	11.049	
2,2,5-Trimethylhexane	03522-94-9	1.05	5.09	5.358	
t-2-Hexene	04050-45-7	8.55	8.75	74.823	
1-Methyl-4-Isobutylbenzene	05161-04-6	3.82	0.79	3.010	
c-2-Heptene	06443-92-1	0.66	1.21	0.790	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	5.16	34.075	
Unknown #16		3.42	4.07	13.925	
Unknown #13		3.42	1.72	5.885	
Unknown #1		3.42	1.11	3.781	
		Total	1396.2	4836.1	3.464
No MIR available, use weighted average of 3.4221					

Vehicle 207c - Fuel 7 psi E10 - 1 Day Diurnal - Test 7844					
0.020 Leak at Canister Inlet					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Ethanol	00064-17-5	1.45	937.13	1357.878	
Benzene	00071-43-2	0.69	83.95	58.292	
Ethylene	00074-85-1	8.88	3.85	34.170	
Propane	00074-98-6	0.46	22.04	10.077	
2-Methylpropane	00075-28-5	1.18	95.71	112.611	
2,2-Dimethylbutane	00075-83-2	1.11	17.71	19.683	
2-Methylbutane (Isopentane)	00078-78-4	1.35	1544.62	2092.786	
2-Methyl-1,3-butadiene	00078-79-5	10.48	2.84	29.796	
2,3-Dimethylbutane	00079-29-8	0.90	174.45	156.779	
ortho-Xylene	00095-47-6	7.58	6.70	50.741	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	14.79	79.395	
3-Methylpentane	00096-14-0	1.69	252.80	427.457	
Methylcyclopentane	00096-37-7	2.05	122.42	250.934	
Isopropylbenzene (Cumene)	00098-82-8	2.90	0.96	2.776	
Ethylbenzene	00100-41-4	2.96	3.81	11.287	
n-Propylbenzene	00103-65-1	1.96	3.40	6.654	
n-Butane	00106-97-8	1.08	453.49	488.366	
1,3-Butadiene	00106-99-0	12.45	0.98	12.253	
1-Butyne	00107-00-6	6.05	7.85	47.505	
2,4,4-TMe-1- & 2,3-DMe-2-Pentene	00107-39-1+10574-37-5	6.54	2.77	18.142	
2,4-Dimethylpentane	00108-08-7	1.46	51.82	75.616	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	22.88	177.408	
1,3,5-Trimethylbenzene	00108-67-8	11.75	7.93	93.244	
Methylcyclohexane	00108-87-2	1.56	45.98	71.513	
Toluene	00108-88-3	3.93	270.04	1059.911	
n-Pentane	00109-66-0	1.21	242.20	294.263	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	72.71	851.054	
n-Hexane	00110-54-3	1.13	420.08	476.657	
Cyclohexane	00110-82-7	1.14	103.00	117.149	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	40.25	128.427	
n-Octane	00111-65-9	0.80	12.07	9.611	
1-Octene	00111-66-0	3.14	1.35	4.256	
n-Nonane	00111-84-2	0.68	2.38	1.626	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	50.45	400.610	
1-Nonene	00124-11-8	2.49	1.09	2.715	
n-Decane	00124-18-5	0.59	3.72	2.201	
Cyclopentene	00142-29-0	6.69	26.97	180.349	
n-Heptane	00142-82-5	0.97	33.72	32.566	
2,2-Dimethylpropane	00463-82-1	0.65	1.97	1.273	
2,2,3-Trimethylbutane	00464-06-2	1.05	6.61	6.964	
Indan	00496-11-7	3.23	2.53	8.173	
2-Methyl-2-butene	00513-35-9	14.20	202.69	2877.200	
1,2,3-Trimethylbenzene	00526-73-8	11.94	1.23	14.661	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	132.97	159.450	

Vehicle 207c - Fuel 7 psi E10 - 1 Day Diurnal - Test 7844 continued

0.020 Leak at Canister Inlet

Non Zero Mass Species Sorted By VOC

Species	CAS No.	MIR	Composite VOC mg	Ozone mg
3,3-Dimethylpentane	00562-49-2	1.12	5.28	5.904
3,3-Dimethylhexane	00563-16-6	1.15	1.81	2.080
2-Methyl-1-butene	00563-46-2	6.38	117.48	749.377
2,3-Dimethylpentane	00565-59-3	1.25	28.56	35.651
2,3,4-Trimethylpentane	00565-75-3	0.95	40.84	38.752
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	12.23	13.361
2,4-Dimethylhexane	00589-43-5	1.61	20.49	32.895
3-Methylheptane	00589-81-1	1.12	8.80	9.892
c-2-Butene	00590-18-1	14.26	75.64	1078.587
2,2-Dimethylpentane	00590-35-2	1.04	13.55	14.130
1-MeCyHexene & 4-MeHeptane	00591-49-1+00589-53-7	3.86	3.92	15.155
2-Methylhexane	00591-76-4	1.09	45.71	49.606
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	14.84	23.818
2-Methylheptane	00592-27-8	0.97	9.23	8.932
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	39.78	210.781
1-Heptene	00592-76-7	4.29	1.08	4.612
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	5.63	31.181
3-Methyl-t-2-pentene	00616-12-6	11.66	30.93	360.613
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	11.87	87.650
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	7.12	31.276
2-Methyl-2-pentene	00625-27-4	11.03	28.10	309.980
c-2-Pentene	00627-20-3	10.28	92.07	946.625
c-1,3-Dimethylcyclohexane	00638-04-0	2.90	5.91	17.181
t-2-Pentene	00646-04-8	10.47	170.71	1787.966
3 & 4-Methyl-1-Pentenes	00691-37-2+00760-20-3	5.78	14.96	86.463
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	360.99	504.588
1-Methylcyclopentene	00693-89-0	12.45	21.60	269.071
t-1,2-Dimethylcyclopentane	00822-50-4	2.90	9.88	28.702
3-Methyl-c-2-pentene	00922-62-3	12.52	24.68	308.948
2,3,5-Trimethylhexane	01069-53-0	1.12	4.67	5.232
1-Methyl-3-Propylbenzene	01074-43-7	7.08	1.94	13.738
Ethylcyclohexane	01678-91-7	1.35	4.29	5.775
t-1,3 & c-1,4-DiMeCyHexane	02207-03-6+00624-29-3	2.90	1.21	3.519
t-1,4-Dimethylcyclohexane	02207-04-7	2.90	2.42	7.039
2,4-Dimethylheptane	02213-23-2	1.26	0.53	0.674
3-Methyloctane	02216-33-3	0.88	1.67	1.477
4-Methyloctane	02216-34-4	0.85	2.47	2.098
c-1,3-Dimethylcyclopentane	02532-58-3	2.90	7.81	22.684
2-Methyl-2-Hexene & c-3-Heptene	02738-19-4+07642-10-6	7.84	4.65	36.450
2,2,5-Trimethylhexane	03522-94-9	1.05	12.65	13.316
3-Me-t-3-Hexene & t-2-Heptene	03899-36-3+14686-13-6	8.38	1.53	12.818

Vehicle 207c - Fuel 7 psi E10 - 1 Day Diurnal - Test 7844 continued					
0.020 Leak at Canister Inlet					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2,4-DiMeOctane+AlBenz+PrCyHexane	04032-94-4+00300-57-2+	1.18	1.30	1.538	
t-2-Hexene	04050-45-7	8.55	37.16	317.667	
t-2-Nonene	06434-78-2	2.90	0.75	2.171	
c-2-Heptene	06443-92-1	7.08	2.11	14.913	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	23.29	153.898	
t-3-Heptene	14686-14-7	6.17	1.98	12.193	
Unknown #5		2.90	4.13	11.999	
Unknown #16		2.90	4.04	11.736	
Unknown #13		2.90	1.90	5.520	
Unknown #8		2.90	1.36	3.963	
Unknown #3		2.90	0.85	2.475	
Unknown #9		2.90	0.84	2.439	
		Total	6858.2	20043.6	2.923
No MIR available, use weighted average of 2.9048					

Vehicle 211c

Test	Fuel	Leak	Test No.	Bag THC mg	GC as % of THC	GC VOC mg	Ozone mg	Reactivity	Species Present
86° F	E10 - 10 psi	Tank Top	7636	783.2	80.2	627.8	1669.4	2.659	61
Static	E10 - 7 psi	Tank Top	7669	1071.0	110.6	1184.6	3821.4	3.226	70
	E10 - 10 psi	Can. Inlet	7732	1127.1	101.9	1148.4	2656.3	2.313	65
	E10 - 7 psi	Can. Inlet	7793	819.2	83.4	682.9	2074.8	3.038	63
Dynamic	E10 - 10 psi	Tank Top	25788	2520.6	78.0	1965.7	6069.4	3.088	66
	E10 - 7 psi	Tank Top	25793	1311.9	100.1	1312.8	4431.1	3.375	70
	E10 - 10 psi	Can. Inlet	25809	14518.3	116.9	16978.3	40296.1	2.373	89
	E10 - 7 psi	Can. Inlet	25818	4384.5	87.5	3838.4	11846.9	3.086	69
DHB	E10 - 10 psi	Tank Top	7648	8910.7	95.9	8544.3	20902.2	2.446	45
Total	E10 - 7 psi	Tank Top	7681	2884.2	107.8	3109.3	9771.6	3.143	80
	E10 - 10 psi	Can. Inlet	7769	11548.1	93.4	10783.2	25220.2	2.339	44
	E10 - 7 psi	Can. Inlet	7836	4028.0	95.2	3835.6	11646.0	3.036	83

Vehicle 211c - Fuel 10 psi E10 - 86°F Static - Test 7636					
0.020 Leak at Tank Top					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
n-Butane	00106-97-8	1.08	229.71	247.380	
2-Methylbutane (Isopentane)	00078-78-4	1.35	142.45	193.009	
n-Hexane	00110-54-3	1.13	24.83	28.180	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	22.40	31.314	
n-Pentane	00109-66-0	1.21	18.17	22.079	
3-Methylpentane	00096-14-0	1.69	15.84	26.779	
2-Methyl-2-butene	00513-35-9	14.20	15.09	214.170	
t-2-Pentene	00646-04-8	10.47	12.69	132.895	
Toluene	00108-88-3	3.93	12.02	47.172	
2,3-Dimethylbutane	00079-29-8	0.90	11.03	9.914	
c-2-Butene	00590-18-1	14.26	9.04	128.849	
2-Methyl-1-butene	00563-46-2	6.38	8.90	56.745	
Methylcyclopentane	00096-37-7	2.05	7.69	15.753	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	7.34	8.807	
c-2-Pentene	00627-20-3	10.28	6.80	69.944	
2-Methylpropane	00075-28-5	1.18	6.45	7.585	
t-2-Butene	00624-64-6	15.20	5.36	81.392	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	5.28	23.207	
Cyclohexane	00110-82-7	1.14	5.19	5.901	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	4.81	56.278	
Benzene	00071-43-2	0.69	4.79	3.328	
2,4-Dimethylpentane	00108-08-7	1.46	3.27	4.777	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	3.15	25.054	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	2.94	15.565	
Methylcyclohexane	00108-87-2	1.56	2.48	3.858	
2-Methylhexane	00591-76-4	1.09	2.27	2.467	
t-2-Hexene	04050-45-7	8.55	2.11	18.015	
Cyclopentene	00142-29-0	6.69	1.99	13.290	
n-Heptane	00142-82-5	0.97	1.94	1.873	
2,3,4-Trimethylpentane	00565-75-3	0.95	1.92	1.821	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	1.81	9.714	
3-Methyl-t-2-pentene	00616-12-6	11.66	1.76	20.565	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	1.63	12.606	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	1.55	4.943	
3-Methyl-1-butene	00563-45-1	6.85	1.53	10.520	
2-Methyl-2-pentene	00625-27-4	11.03	1.52	16.805	
3 & 4-Methyl-1-Pentenes	00691-37-2+00760-20-3	5.78	1.52	8.765	
2,3-Dimethylpentane	00565-59-3	1.25	1.46	1.824	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	1.41	9.307	
2,2-Dimethylpentane	00590-35-2	1.04	1.40	1.463	
2,4,4-Trimethyl-2-Pentene	00107-40-4	6.30	1.20	7.568	
1-Methylcyclopentene	00693-89-0	12.45	1.19	14.834	
2,2-Dimethylbutane	00075-83-2	1.11	1.19	1.317	

Vehicle 211c - Fuel 10 psi E10 - 86°F Static - Test 7636 continued

0.020 Leak at Tank Top

Non Zero Mass Species Sorted By VOC

Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
3-Methyl-c-2-pentene	00922-62-3	12.52	1.15	14.408	
n-Octane	00111-65-9	0.80	1.07	0.853	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	1.05	7.733	
ortho-Xylene	00095-47-6	7.58	1.02	7.756	
t-1,2-Dimethylcyclopentane	00822-50-4	2.65	0.91	2.408	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	0.72	4.003	
c-1,3-Dimethylcyclopentane	02532-58-3	2.65	0.62	1.656	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	0.56	0.903	
2,2,3-Trimethylbutane	00464-06-2	1.05	0.55	0.579	
2,2,5-Trimethylhexane	03522-94-9	1.05	0.53	0.556	
1,3,5-Trimethylbenzene	00108-67-8	11.75	0.52	6.076	
n-Propylbenzene	00103-65-1	1.96	0.46	0.903	
2,3,5-Trimethylhexane	01069-53-0	1.12	0.42	0.471	
2-Methylheptane	00592-27-8	0.97	0.41	0.396	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	0.34	0.375	
1,2,3-Trimethylbenzene	00526-73-8	11.94	0.20	2.373	
Ethylbenzene	00100-41-4	2.96	0.07	0.221	
2,4-Dimethylhexane	00589-43-5	1.61	0.06	0.101	
		Total	627.8	1669.4	2.659
No MIR available, use weighted average of 2.653					

Vehicle 211c - Fuel 10 psi E10 - Dynamic - Test 25788					
0.020 Leak at Tank Top					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Unknown #22	.	3.07	3.91	12.012	
Ethanol	00064-17-5	1.45	13.21	19.145	
Benzene	00071-43-2	0.69	21.39	14.852	
Propane	00074-98-6	0.46	3.97	1.816	
2-Methylpropane	00075-28-5	1.18	36.36	42.785	
2,2-Dimethylbutane	00075-83-2	1.11	8.42	9.359	
2-Methylbutane (Isopentane)	00078-78-4	1.35	396.97	537.844	
2-Methyl-1,3-butadiene	00078-79-5	10.48	1.33	13.930	
2,3-Dimethylbutane	00079-29-8	0.90	29.73	26.719	
ortho-Xylene	00095-47-6	7.58	3.37	25.550	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	17.07	91.659	
3-Methylpentane	00096-14-0	1.69	37.56	63.505	
Methylcyclopentane	00096-37-7	2.05	36.80	75.429	
Ethylbenzene	00100-41-4	2.96	2.20	6.505	
n-Propylbenzene	00103-65-1	1.96	2.02	3.961	
n-Butane	00106-97-8	1.08	565.98	609.509	
2,4,4-Trimethyl-2-Pentene	00107-40-4	6.30	2.80	17.658	
2,4-Dimethylpentane	00108-08-7	1.46	18.81	27.453	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	9.06	70.235	
1,3,5-Trimethylbenzene	00108-67-8	11.75	7.58	89.093	
Methylcyclohexane	00108-87-2	1.56	10.94	17.016	
Toluene	00108-88-3	3.93	29.03	113.947	
n-Pentane	00109-66-0	1.21	50.36	61.181	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	23.97	280.592	
n-Hexane	00110-54-3	1.13	72.33	82.075	
Cyclohexane	00110-82-7	1.14	32.48	36.942	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	10.19	32.519	
n-Octane	00111-65-9	0.80	2.52	2.004	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	14.37	114.113	
Cyclopentene	00142-29-0	6.69	9.13	61.061	
n-Heptane	00142-82-5	0.97	9.78	9.444	
2,2,3-Trimethylbutane	00464-06-2	1.05	2.64	2.787	
2-Methyl-2-butene	00513-35-9	14.20	41.43	588.042	
1,2,3-Trimethylbenzene	00526-73-8	11.94	2.46	29.401	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	19.66	23.570	
3,3-Dimethylpentane	00562-49-2	1.12	2.04	2.285	
2-Methyl-1-butene	00563-46-2	6.38	42.34	270.054	
2,3-Dimethylpentane	00565-59-3	1.25	10.73	13.392	
2,3,4-Trimethylpentane	00565-75-3	0.95	18.05	17.127	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	4.64	5.066	
2,4-Dimethylhexane	00589-43-5	1.61	8.32	13.366	
3-Methylheptane	00589-81-1	1.12	1.79	2.017	
c-2-Butene	00590-18-1	14.26	70.09	999.462	

Vehicle 211c - Fuel 10 psi E10 - Dynamic - Test 25788 continued

0.020 Leak at Tank Top

Non Zero Mass Species Sorted By VOC

Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2,2-Dimethylpentane	00590-35-2	1.04	4.32	4.507	
2-Methylhexane	00591-76-4	1.09	14.00	15.189	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	6.00	9.628	
2-Methylheptane	00592-27-8	0.97	1.75	1.693	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	9.48	50.222	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	3.47	19.212	
3-Methyl-t-2-pentene	00616-12-6	11.66	8.15	95.045	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	9.42	69.577	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	11.76	51.688	
2-Methyl-2-pentene	00625-27-4	11.03	7.77	85.750	
c-2-Pentene	00627-20-3	10.28	30.96	318.320	
t-2-Pentene	00646-04-8	10.47	35.54	372.250	
3 & 4-Methyl-1-Pentenes	00691-37-2+00760-20-3	5.78	4.84	27.975	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	61.83	86.431	
1-Methylcyclopentene	00693-89-0	12.45	5.53	68.908	
t-1,2-Dimethylcyclopentane	00822-50-4	3.07	2.62	8.040	
3-Methyl-c-2-pentene	00922-62-3	12.52	7.12	89.120	
2,3,5-Trimethylhexane	01069-53-0	1.12	4.96	5.552	
c-1,3-Dimethylcyclopentane	02532-58-3	3.07	2.32	7.120	
2,2,5-Trimethylhexane	03522-94-9	1.05	7.64	8.047	
t-2-Hexene	04050-45-7	8.55	9.94	84.993	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	7.84	51.768	
Unknown #1		3.07	0.61	1.868	
		Total	1965.7	6069.4	3.088
No MIR available, use weighted average of 3.0729					

Vehicle 211c - Fuel 10 psi E10 - 1 Day Diurnal - Test 7648					
0.020 Leak at Tank Top					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
n-Butane	00106-97-8	1.08	3077.27	3313.949	
2-Methylbutane (Isopentane)	00078-78-4	1.35	1856.18	2514.916	
Ethanol	00064-17-5	1.45	396.72	574.830	
n-Hexane	00110-54-3	1.13	340.20	386.019	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	321.23	449.005	
n-Pentane	00109-66-0	1.21	280.21	340.433	
3-Methylpentane	00096-14-0	1.69	220.23	372.381	
2-Methyl-2-butene	00513-35-9	14.20	206.48	2930.948	
t-2-Pentene	00646-04-8	10.47	174.05	1822.913	
2,3-Dimethylbutane	00079-29-8	0.90	160.47	144.212	
Toluene	00108-88-3	3.93	143.87	564.695	
2-Methyl-1-butene	00563-46-2	6.38	129.69	827.211	
c-2-Butene	00590-18-1	14.26	117.93	1681.690	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	110.40	132.385	
Methylcyclopentane	00096-37-7	2.05	104.04	213.254	
c-2-Pentene	00627-20-3	10.28	95.15	978.316	
Cyclohexane	00110-82-7	1.14	90.43	102.849	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	83.27	974.664	
Benzene	00071-43-2	0.69	67.56	46.910	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	47.74	379.105	
2,4-Dimethylpentane	00108-08-7	1.46	46.24	67.476	
2-Methylhexane	00591-76-4	1.09	34.73	37.687	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	33.46	177.272	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	32.55	103.856	
3-Methyl-t-2-pentene	00616-12-6	11.66	29.51	344.072	
Methylcyclohexane	00108-87-2	1.56	28.02	43.585	
2-Methylpropane	00075-28-5	1.18	27.69	32.579	
Cyclopentene	00142-29-0	6.69	26.82	179.344	
2,3,4-Trimethylpentane	00565-75-3	0.95	26.72	25.357	
2,3-Dimethylpentane	00565-59-3	1.25	25.40	31.709	
n-Heptane	00142-82-5	0.97	24.13	23.305	
2-Methyl-2-pentene	00625-27-4	11.03	22.92	252.898	
2,4-Dimethylhexane	00589-43-5	1.61	20.70	33.231	
t-2-Hexene	04050-45-7	8.55	20.64	176.446	
3-Methyl-c-2-pentene	00922-62-3	12.52	20.63	258.275	
2,2-Dimethylbutane	00075-83-2	1.11	18.86	20.962	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	18.52	122.337	
3 & 4-Methyl-1-Pentenes	00691-37-2+00760-20-3	5.78	15.63	90.315	

Vehicle 211c - Fuel 10 psi E10 - 1 Day Diurnal - Test 7648 continued					
0.020 Leak at Tank Top					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
t-1,2-Dimethylcyclopentane	00822-50-4	2.44	12.99	31.732	
2,2-Dimethylpentane	00590-35-2	1.04	12.11	12.632	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	7.30	11.719	
1-Methylcyclopentene	00693-89-0	12.45	4.73	58.885	
Propane	00074-98-6	0.46	4.00	1.829	
3,3-Dimethylpentane	00562-49-2	1.12	3.50	3.910	
Ethylbenzene	00100-41-4	2.96	3.42	10.143	
		Total	8544.3	20902.2	2.446
No MIR available, use weighted average of 2.4426					

Vehicle 211c - Fuel 7 psi E10 - 86°F Static - Test 7669					
0.020 Leak at Tank Top					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2-Methylbutane (Isopentane)	00078-78-4	1.35	320.59	434.358	
Ethanol	00064-17-5	1.45	114.88	166.456	
n-Butane	00106-97-8	1.08	79.75	85.883	
n-Hexane	00110-54-3	1.13	69.13	78.445	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	61.03	85.309	
n-Pentane	00109-66-0	1.21	48.85	59.344	
3-Methylpentane	00096-14-0	1.69	42.60	72.030	
2-Methyl-2-butene	00513-35-9	14.20	40.13	569.617	
t-2-Pentene	00646-04-8	10.47	33.13	346.941	
Toluene	00108-88-3	3.93	30.59	120.057	
2,3-Dimethylbutane	00079-29-8	0.90	29.76	26.746	
2-Methyl-1-butene	00563-46-2	6.38	24.53	156.477	
Methylcyclopentane	00096-37-7	2.05	20.48	41.973	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	20.28	24.314	
c-2-Butene	00590-18-1	14.26	18.91	269.674	
c-2-Pentene	00627-20-3	10.28	18.24	187.499	
Cyclohexane	00110-82-7	1.14	16.84	19.156	
t-2-Butene	00624-64-6	15.20	15.97	242.714	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	15.53	181.821	
2-Methylpropane	00075-28-5	1.18	15.43	18.157	
Benzene	00071-43-2	0.69	11.43	7.936	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	9.24	73.354	
2,4-Dimethylpentane	00108-08-7	1.46	9.01	13.151	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	8.47	37.217	
2-Methylhexane	00591-76-4	1.09	7.14	7.751	
Methylcyclohexane	00108-87-2	1.56	6.24	9.705	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	5.99	31.754	
t-2-Hexene	04050-45-7	8.55	5.96	50.989	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	5.92	18.884	
Cyclopentene	00142-29-0	6.69	5.07	33.919	
3-Methyl-t-2-pentene	00616-12-6	11.66	4.99	58.164	
2,3,4-Trimethylpentane	00565-75-3	0.95	4.81	4.562	
2-Methyl-2-pentene	00625-27-4	11.03	4.59	50.603	
Propane	00074-98-6	0.46	4.39	2.008	
2,3-Dimethylpentane	00565-59-3	1.25	4.32	5.391	
n-Heptane	00142-82-5	0.97	4.30	4.150	
3-Methyl-c-2-pentene	00922-62-3	12.52	4.14	51.810	
2,2-Dimethylbutane	00075-83-2	1.11	3.82	4.244	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	3.69	24.386	
1-Methylcyclopentene	00693-89-0	12.45	3.26	40.561	
2,4-Dimethylhexane	00589-43-5	1.61	2.88	4.618	
3 & 4-Methyl-1-Pentenes	00691-37-2+00760-20-3	5.78	2.86	16.517	
2,2-Dimethylpentane	00590-35-2	1.04	2.34	2.439	

Vehicle 211c - Fuel 7 psi E10 - 86°F Static - Test 7669 continued

0.020 Leak at Tank Top

Non Zero Mass Species Sorted By VOC

Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	2.04	15.831	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	1.83	2.937	
t-1,2-Dimethylcyclopentane	00822-50-4	3.21	1.54	4.941	
c-1,3-Dimethylcyclopentane	02532-58-3	3.21	1.47	4.723	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	1.32	7.062	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	1.32	1.436	
n-Octane	00111-65-9	0.80	1.30	1.038	
3,3-Dimethylpentane	00562-49-2	1.12	1.17	1.305	
2,2,5-Trimethylhexane	03522-94-9	1.05	1.01	1.059	
2-Methylheptane	00592-27-8	0.97	0.99	0.957	
2,2,3-Trimethylbutane	00464-06-2	1.05	0.92	0.970	
2,4,4-Trimethyl-2-Pentene	00107-40-4	6.30	0.85	5.378	
3-Methylheptane	00589-81-1	1.12	0.83	0.929	
2-Methyl-1,3-butadiene	00078-79-5	10.48	0.76	7.923	
2,3,5-Trimethylhexane	01069-53-0	1.12	0.75	0.843	
2-Methyl-2-Hexene & c-3-Heptene	02738-19-4+07642-10-6	7.84	0.66	5.137	
c-1,3-Dimethylcyclohexane	00638-04-0	3.21	0.54	1.733	
t-3-Heptene	14686-14-7	6.17	0.51	3.173	
1-MeCyHexene & 4-MeHeptane	00591-49-1+00589-53-7	3.86	0.44	1.701	
t-1,4-Dimethylcyclohexane	02207-04-7	3.21	0.44	1.410	
Unknown #5		3.21	0.43	1.371	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	0.43	2.356	
Ethylbenzene	00100-41-4	2.96	0.40	1.173	
3,3-Dimethylhexane	00563-16-6	1.15	0.36	0.411	
ortho-Xylene	00095-47-6	7.58	0.35	2.689	
n-Propylbenzene	00103-65-1	1.96	0.35	0.690	
1,2,3-Trimethylbenzene	00526-73-8	11.94	0.09	1.110	
		Total	1184.6	3821.4	3.226
No MIR available, use weightedaverage	of 3.2140				

Vehicle 211c - Fuel 7 psi E10 - Dynamic - Test 25793					
0.020 Leak at Tank Top					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2-Methylbutane (Isopentane)	00078-78-4	1.35	397.66	538.788	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	84.68	118.367	
n-Butane	00106-97-8	1.08	74.70	80.442	
n-Hexane	00110-54-3	1.13	74.13	84.118	
n-Pentane	00109-66-0	1.21	51.51	62.576	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	45.45	199.691	
3-Methylpentane	00096-14-0	1.69	45.43	76.808	
2-Methyl-2-butene	00513-35-9	14.20	42.32	600.795	
t-2-Pentene	00646-04-8	10.47	35.42	371.010	
Toluene	00108-88-3	3.93	35.11	137.807	
2,3-Dimethylbutane	00079-29-8	0.90	32.68	29.366	
c-2-Butene	00590-18-1	14.26	31.76	452.906	
1-Butyne	00107-00-6	6.05	29.43	178.046	
2-Methyl-1-butene	00563-46-2	6.38	27.79	177.240	
Methylcyclopentane	00096-37-7	2.05	22.58	46.288	
c-2-Pentene	00627-20-3	10.28	20.47	210.481	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	19.81	23.756	
Cyclohexane	00110-82-7	1.14	19.38	22.040	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	18.77	219.644	
2-Methylpropane	00075-28-5	1.18	13.17	15.500	
Benzene	00071-43-2	0.69	12.29	8.533	
2,4-Dimethylpentane	00108-08-7	1.46	10.13	14.783	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	8.93	70.903	
Ethanol	00064-17-5	1.45	8.10	11.731	
Methylcyclohexane	00108-87-2	1.56	7.92	12.315	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	7.87	25.100	
2-Methylhexane	00591-76-4	1.09	6.91	7.494	
t-2-Hexene	04050-45-7	8.55	6.21	53.050	
n-Heptane	00142-82-5	0.97	5.79	5.588	
2,3,4-Trimethylpentane	00565-75-3	0.95	5.74	5.450	
Cyclopentene	00142-29-0	6.69	5.74	38.396	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	5.33	28.250	
2-Methyl-2-pentene	00625-27-4	11.03	4.86	53.633	
2,3-Dimethylpentane	00565-59-3	1.25	4.82	6.023	
2,2,3-Trimethylbutane	00464-06-2	1.05	4.76	5.013	
3-Methyl-c-2-pentene	00922-62-3	12.52	4.68	58.610	
3-Methyl-t-2-pentene	00616-12-6	11.66	4.57	53.286	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	4.47	34.684	
Methane	00074-82-8	0.01	4.44	0.061	
2,2-Dimethylbutane	00075-83-2	1.11	4.31	4.788	
1,3,5-Trimethylbenzene	00108-67-8	11.75	4.30	50.588	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	4.05	26.789	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	3.76	20.184	

Vehicle 211c - Fuel 7 psi E10 - Dynamic - Test 25793 continued					
0.020 Leak at Tank Top					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
3 & 4-Methyl-1-Pentenes	00691-37-2+00760-20-3	5.78	3.70	21.397	
1-Methylcyclopentene	00693-89-0	12.45	3.70	46.043	
2,4,4-Trimethyl-2-Pentene	00107-40-4	6.30	3.42	21.544	
2,4-Dimethylhexane	00589-43-5	1.61	3.28	5.262	
2,2-Dimethylpentane	00590-35-2	1.04	3.04	3.172	
n-Octane	00111-65-9	0.80	2.82	2.250	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	2.78	4.469	
n-Decane	00124-18-5	0.59	2.76	1.632	
Unknown #22	.	3.35	2.34	7.864	
3,3-Dimethylpentane	00562-49-2	1.12	2.13	2.379	
t-1,2-Dimethylcyclopentane	00822-50-4	3.35	2.05	6.881	
c-1,3-Dimethylcyclopentane	02532-58-3	3.35	1.93	6.463	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	1.79	9.913	
2-Methyl-1,3-butadiene	00078-79-5	10.48	1.77	18.506	
2-Methylheptane	00592-27-8	0.97	1.60	1.548	
3-Methylheptane	00589-81-1	1.12	1.44	1.615	
2,2,5-Trimethylhexane	03522-94-9	1.05	1.43	1.509	
2,3,5-Trimethylhexane	01069-53-0	1.12	1.41	1.579	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	1.13	1.234	
n-Propylbenzene	00103-65-1	1.96	1.13	2.208	
Unknown #1		3.35	0.94	3.164	
c-1,3-Dimethylcyclohexane	00638-04-0	3.35	0.88	2.948	
Indan	00496-11-7	3.23	0.84	2.722	
1,2,3-Trimethylbenzene	00526-73-8	11.94	0.70	8.357	
Ethylbenzene	00100-41-4	2.96	0.67	1.991	
n-Undecane	01120-21-4	0.52	0.47	0.244	
ortho-Xylene	00095-47-6	7.58	0.43	3.244	
		Total	1312.8	4431.1	3.375
No MIR available, use weighted average of 3.3545					

Vehicle 211c - Fuel 7 psi E10 - 1 Day Diurnal - Test 7681					
0.020 Leak at Tank Top					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2-Methylbutane (Isopentane)	00078-78-4	1.35	911.65	1235.182	
n-Butane	00106-97-8	1.08	231.23	249.015	
Ethanol	00064-17-5	1.45	217.03	314.477	
n-Hexane	00110-54-3	1.13	180.50	204.804	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	166.11	232.193	
n-Pentane	00109-66-0	1.21	138.34	168.070	
3-Methylpentane	00096-14-0	1.69	115.05	194.534	
2-Methyl-2-butene	00513-35-9	14.20	112.09	1591.055	
t-2-Pentene	00646-04-8	10.47	94.69	991.727	
2,3-Dimethylbutane	00079-29-8	0.90	82.78	74.396	
2-Methyl-1-butene	00563-46-2	6.38	68.14	434.644	
Toluene	00108-88-3	3.93	66.47	260.916	
Methylcyclopentane	00096-37-7	2.05	53.32	109.301	
c-2-Pentene	00627-20-3	10.28	51.52	529.739	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	50.82	60.938	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	45.42	531.610	
c-2-Butene	00590-18-1	14.26	45.25	645.316	
Cyclohexane	00110-82-7	1.14	43.41	49.370	
1-Butyne	00107-00-6	6.05	32.88	198.937	
2-Methylpropane	00075-28-5	1.18	31.75	37.353	
Benzene	00071-43-2	0.69	27.11	18.826	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	26.34	209.192	
2,4-Dimethylpentane	00108-08-7	1.46	22.65	33.058	
2-Methylhexane	00591-76-4	1.09	17.73	19.242	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	15.71	83.242	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	15.45	49.310	
Methylcyclohexane	00108-87-2	1.56	15.18	23.615	
t-2-Hexene	04050-45-7	8.55	15.16	129.592	
Cyclopentene	00142-29-0	6.69	14.53	97.160	
3-Methyl-t-2-pentene	00616-12-6	11.66	12.42	144.819	
2,3,4-Trimethylpentane	00565-75-3	0.95	11.58	10.983	
2-Methyl-2-pentene	00625-27-4	11.03	11.49	126.792	
3-Methyl-c-2-pentene	00922-62-3	12.52	10.75	134.519	
2,3-Dimethylpentane	00565-59-3	1.25	10.71	13.370	
2,2-Dimethylbutane	00075-83-2	1.11	10.58	11.760	
n-Heptane	00142-82-5	0.97	10.36	10.005	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	9.47	62.551	
1-Methylcyclopentene	00693-89-0	12.45	8.38	104.410	
3 & 4-Methyl-1-Pentenes	00691-37-2+00760-20-3	5.78	8.27	47.793	
2,2-Dimethylpentane	00590-35-2	1.04	6.64	6.929	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	6.17	27.125	
2,4-Dimethylhexane	00589-43-5	1.61	6.06	9.728	
2,4,4-Trimethyl-2-Pentene	00107-40-4	6.30	6.04	38.080	

Vehicle 211c - Fuel 7 psi E10 - 1 Day Diurnal - Test 7681 continued

0.020 Leak at Tank Top

Non Zero Mass Species Sorted By VOC

Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	5.51	42.757	
Propane	00074-98-6	0.46	4.76	2.175	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	4.73	25.371	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	4.65	7.462	
2,3,5-Trimethylhexane	01069-53-0	1.12	3.88	4.344	
t-1,2-Dimethylcyclopentane	00822-50-4	3.13	3.77	11.793	
2,2,5-Trimethylhexane	03522-94-9	1.05	3.16	3.323	
c-1,3-Dimethylcyclopentane	02532-58-3	3.13	3.10	9.687	
2,2,3-Trimethylbutane	00464-06-2	1.05	2.91	3.072	
n-Octane	00111-65-9	0.80	2.60	2.066	
c-1,3-Dimethylcyclohexane	00638-04-0	3.13	2.40	7.496	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	2.25	2.454	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	2.17	12.015	
3,3-Dimethylpentane	00562-49-2	1.12	2.15	2.401	
1,3,5-Trimethylbenzene	00108-67-8	11.75	2.07	24.386	
2-Methylheptane	00592-27-8	0.97	1.98	1.916	
Ethylbenzene	00100-41-4	2.96	1.98	5.852	
3-Methylheptane	00589-81-1	1.12	1.77	1.989	
2,2-Dimethylpropane	00463-82-1	0.65	1.67	1.082	
ortho-Xylene	00095-47-6	7.58	1.63	12.357	
2-Methyl-2-Hexene & c-3-Heptene	02738-19-4+07642-10-6	7.84	1.55	12.162	
2-Methyl-1,3-butadiene	00078-79-5	10.48	1.43	15.042	
Unknown #1		3.13	1.23	3.845	
Unknown #16		3.13	1.16	3.646	
n-Decane	00124-18-5	0.59	1.10	0.648	
n-Propylbenzene	00103-65-1	1.96	0.88	1.715	
t-1,4-Dimethylcyclohexane	02207-04-7	3.13	0.77	2.415	
1-MeCyHexene & 4-MeHeptane	00591-49-1+00589-53-7	3.86	0.76	2.955	
Unknown #5		3.13	0.70	2.205	
c-2-Heptene	06443-92-1	7.08	0.65	4.610	
3,3-Dimethylhexane	00563-16-6	1.15	0.65	0.749	
n-Nonane	00111-84-2	0.68	0.49	0.335	
t-3-Heptene	14686-14-7	6.17	0.43	2.680	
4-Isopropyltoluene (p-Cymene)	00099-87-6	4.41	0.43	1.884	
1,3-Butadiene	00106-99-0	12.45	0.42	5.279	
4-Methyl-t-2-pentene	00674-76-0	8.04	0.21	1.722	
Methane	00074-82-8	0.01	0.08	0.001	
		Total	3109.3	9771.6	3.143
No MIR available, use weighted average of 3.1294					

Vehicle 211c - Fuel 10 psi E10 - 86°F Static - Test 7721					
0.020 Leak at Canister Inlet					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
n-Butane	00106-97-8	1.08	394.58	424.924	
2-Methylbutane (Isopentane)	00078-78-4	1.35	200.10	271.113	
Ethanol	00064-17-5	1.45	101.29	146.760	
2-Methylpropane	00075-28-5	1.18	57.16	67.259	
n-Hexane	00110-54-3	1.13	40.68	46.161	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	36.68	51.277	
n-Pentane	00109-66-0	1.21	31.54	38.314	
3-Methylpentane	00096-14-0	1.69	25.55	43.201	
2-Methyl-2-butene	00513-35-9	14.20	24.51	347.976	
t-2-Pentene	00646-04-8	10.47	20.85	218.342	
Toluene	00108-88-3	3.93	20.39	80.037	
2,3-Dimethylbutane	00079-29-8	0.90	18.31	16.453	
2-Methyl-1-butene	00563-46-2	6.38	15.10	96.290	
Methylcyclopentane	00096-37-7	2.05	12.46	25.547	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	11.61	13.918	
c-2-Pentene	00627-20-3	10.28	11.23	115.451	
Cyclohexane	00110-82-7	1.14	10.42	11.856	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	9.27	108.557	
c-2-Butene	00590-18-1	14.26	8.33	118.751	
Benzene	00071-43-2	0.69	7.81	5.423	
Propane	00074-98-6	0.46	6.19	2.830	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	5.60	44.506	
2,4-Dimethylpentane	00108-08-7	1.46	5.33	7.775	
2,2-DiMeHexane	00590-73-8	0.94	5.13	4.827	
2-Methylhexane	00591-76-4	1.09	4.60	4.988	
1-Butyne	00107-00-6	6.05	3.79	22.956	
t-2-Hexene	04050-45-7	8.55	3.74	31.963	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	3.69	19.536	
t-3-Heptene	14686-14-7	6.17	3.51	21.645	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	3.38	10.790	
Cyclopentene	00142-29-0	6.69	3.28	21.962	
3-Methyl-t-2-pentene	00616-12-6	11.66	3.04	35.469	
2,3-Dimethylpentane	00565-59-3	1.25	2.95	3.678	
2-Methyl-2-pentene	00625-27-4	11.03	2.84	31.321	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	2.70	4.341	
2,3,4-Trimethylpentane	00565-75-3	0.95	2.65	2.517	
3-Methyl-c-2-pentene	00922-62-3	12.52	2.56	32.099	
1-Methylcyclopentene	00693-89-0	12.45	2.24	27.940	
2,2-Dimethylbutane	00075-83-2	1.11	2.22	2.468	
2-MeOctane & 2,3-DiMeHeptane	03074-71-3+03221-61-2	0.85	2.22	1.896	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	2.20	16.239	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	2.17	14.311	
3 & 4-Methyl-1-Pentenes	00691-37-2+00760-20-3	5.78	1.97	11.406	

Vehicle 211c - Fuel 10 psi E10 - 86°F Static - Test 7721 continued

0.020 Leak at Canister Inlet

Non Zero Mass Species Sorted By VOC

Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2,2-Dimethylpentane	00590-35-2	1.04	1.51	1.577	
Unknown #5		2.30	1.05	2.411	
t-1,4-Dimethylcyclohexane	02207-04-7	2.30	0.88	2.023	
Unknown #7		2.30	0.82	1.885	
t-1,2-Dimethylcyclopentane	00822-50-4	2.30	0.74	1.713	
c-1,3-Dimethylcyclopentane	02532-58-3	2.30	0.72	1.658	
3,3-Dimethylpentane	00562-49-2	1.12	0.71	0.796	
Unknown #17		2.30	0.69	1.596	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	0.67	0.737	
2-Methylheptane	00592-27-8	0.97	0.66	0.636	
2,2,3-Trimethylbutane	00464-06-2	1.05	0.61	0.647	
c-1,3-Dimethylcyclohexane	00638-04-0	2.30	0.49	1.136	
n-Propylbenzene	00103-65-1	1.96	0.46	0.909	
1,3,5-Trimethylbenzene	00108-67-8	11.75	0.40	4.690	
2-Methyl-1,3-butadiene	00078-79-5	10.48	0.38	3.988	
n-Nonane	00111-84-2	0.68	0.37	0.255	
3-Methylnonane		2.30	0.30	0.695	
ortho-Xylene	00095-47-6	7.58	0.27	2.080	
Unknown #1		2.30	0.27	0.619	
c-1,2-Dimethylcyclohexane	02207-01-4	2.30	0.20	0.453	
Ethylbenzene	00100-41-4	2.96	0.19	0.574	
c-2-Octene	07642-04-8	2.30	0.07	0.157	
		Total	1148.4	2656.3	2.313
No MIR available, use weighted average of 2.3006					

Vehicle 211c - Fuel 10 psi E10 - Dynamic - Test 25809					
0.020 Leak at Canister Inlet					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
n-Butane	00106-97-8	1.08	6226.50	6705.400	
2-Methylbutane (Isopentane)	00078-78-4	1.35	3053.10	4136.602	
Ethanol	00064-17-5	1.45	1240.94	1798.086	
n-Hexane	00110-54-3	1.13	675.18	766.114	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	597.50	835.184	
n-Pentane	00109-66-0	1.21	466.72	567.029	
3-Methylpentane	00096-14-0	1.69	415.73	702.943	
2-Methyl-2-butene	00513-35-9	14.20	392.33	5569.075	
Toluene	00108-88-3	3.93	331.67	1301.796	
t-2-Pentene	00646-04-8	10.47	322.39	3376.598	
2,3-Dimethylbutane	00079-29-8	0.90	291.64	262.093	
2-Methylpropane	00075-28-5	1.18	233.23	274.414	
2-Methyl-1-butene	00563-46-2	6.38	226.88	1447.167	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	204.39	245.085	
Methylcyclopentane	00096-37-7	2.05	203.43	416.985	
c-2-Pentene	00627-20-3	10.28	176.45	1814.172	
Cyclohexane	00110-82-7	1.14	168.82	192.015	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	138.42	1620.212	
c-2-Butene	00590-18-1	14.26	127.75	1821.732	
Benzene	00071-43-2	0.69	116.64	80.988	
2,4-Dimethylpentane	00108-08-7	1.46	87.81	128.139	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	82.62	656.064	
2-Methylhexane	00591-76-4	1.09	72.54	78.719	
Methylcyclohexane	00108-87-2	1.56	66.54	103.503	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	63.41	202.326	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	60.48	320.467	
t-2-Hexene	04050-45-7	8.55	58.35	498.847	
2,3,4-Trimethylpentane	00565-75-3	0.95	52.95	50.244	
Cyclopentene	00142-29-0	6.69	51.40	343.686	
3-Methyl-t-2-pentene	00616-12-6	11.66	47.95	559.045	
n-Heptane	00142-82-5	0.97	47.10	45.487	
2-Methyl-2-pentene	00625-27-4	11.03	45.48	501.761	
2,3-Dimethylpentane	00565-59-3	1.25	44.59	55.663	
3-Methyl-c-2-pentene	00922-62-3	12.52	40.46	506.426	
2,2-Dimethylbutane	00075-83-2	1.11	38.25	42.506	
1-Butyne	00107-00-6	6.05	36.92	223.362	
1-Methylcyclopentene	00693-89-0	12.45	36.35	452.735	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	36.04	238.096	
Propane	00074-98-6	0.46	29.35	13.414	
3 & 4-Methyl-1-Pentenes	00691-37-2+00760-20-3	5.78	28.83	166.570	
2,4-Dimethylhexane	00589-43-5	1.61	27.03	43.405	
2,2-Dimethylpentane	00590-35-2	1.04	23.35	24.353	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	21.77	160.819	

Vehicle 211c - Fuel 10 psi E10 - Dynamic - Test 25809 continued

0.020 Leak at Canister Inlet

Non Zero Mass Species Sorted By VOC

Species	CAS No.	MIR	Composite VOC mg	Ozone mg
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	21.13	113.426
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	21.09	163.564
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	19.10	30.664
t-1,2-Dimethylcyclopentane	00822-50-4	2.37	15.50	36.684
2,2,5-Trimethylhexane	03522-94-9	1.05	13.03	13.719
c-1,3-Dimethylcyclopentane	02532-58-3	2.37	13.01	30.786
n-Octane	00111-65-9	0.80	12.49	9.946
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	12.21	13.331
2,2,3-Trimethylbutane	00464-06-2	1.05	11.35	11.967
2-Methylheptane	00592-27-8	0.97	9.24	8.935
3,3-Dimethylpentane	00562-49-2	1.12	8.10	9.066
3-Methylheptane	00589-81-1	1.12	7.47	8.400
c-1,3-Dimethylcyclohexane	00638-04-0	2.37	7.36	17.426
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	7.32	32.157
1,3,5-Trimethylbenzene	00108-67-8	11.75	6.57	77.181
ortho-Xylene	00095-47-6	7.58	6.23	47.185
2-Methyl-1,3-butadiene	00078-79-5	10.48	5.46	57.217
2-Methyl-2-Hexene & c-3-Heptene	02738-19-4+07642-10-6	7.84	5.45	42.730
Indan	00496-11-7	3.23	4.77	15.440
2,3,5-Trimethylhexane	01069-53-0	1.12	4.75	5.321
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	4.72	26.175
n-Nonane	00111-84-2	0.68	4.08	2.788
Ethylbenzene	00100-41-4	2.96	4.06	12.023
Ethylcyclohexane	01678-91-7	1.35	4.03	5.419
n-Propylbenzene	00103-65-1	1.96	3.29	6.454
1,2,3-Trimethylbenzene	00526-73-8	11.94	2.98	35.631
t-1,4-Dimethylcyclohexane	02207-04-7	2.37	2.92	6.905
1-MeCyHexene & 4-MeHeptane	00591-49-1+00589-53-7	3.86	2.76	10.652
Unknown #5		2.37	2.73	6.466
1-Octene	00111-66-0	3.14	2.50	7.855
3,3-Dimethylhexane	00563-16-6	1.15	2.31	2.665
c-2-Heptene	06443-92-1	7.08	2.30	16.249
n-Decane	00124-18-5	0.59	2.27	1.339
t-3-Heptene	14686-14-7	6.17	2.14	13.214
4-Methyloctane	02216-34-4	0.85	1.85	1.572
3-Methyloctane	02216-33-3	0.88	1.59	1.405
1,4-Diethylbenzene	00105-05-5	4.39	1.44	6.326
Unknown #3		2.37	1.39	3.291
t-1,3 & c-1,4-DiMeCyHexane	02207-03-6+00624-29-3	2.37	1.30	3.069
1-Heptene	00592-76-7	4.29	1.28	5.491
Unknown #8		2.37	1.20	2.850
3-Me-t-3-Hexene & t-2-Heptene	03899-36-3+14686-13-6	8.38	0.99	8.322

Vehicle 211c - Fuel 10 psi E10 - Dynamic - Test 25809 continued					
0.020 Leak at Canister Inlet					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
Unknown #22	.	2.37	0.96	2.267	
1,3-Butadiene	00106-99-0	12.45	0.92	11.436	
n-Undecane	01120-21-4	0.52	0.84	0.439	
Unknown #16		2.37	0.55	1.290	
		Total	16978.3	40296.1	2.373
No MIR available, use weighted average of 2.3668					

Vehicle 211c - Fuel 10 psi E10 - 1 Day Diurnal - Test 7769

0.020 Leak at Canister Inlet

Non Zero Mass Species Sorted By VOC

Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
n-Butane	00106-97-8	1.08	4218.85	4543.329	
2-Methylbutane (Isopentane)	00078-78-4	1.35	2156.01	2921.153	
Ethanol	00064-17-5	1.45	639.56	926.704	
n-Hexane	00110-54-3	1.13	421.03	477.731	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	383.30	535.775	
n-Pentane	00109-66-0	1.21	326.95	397.223	
3-Methylpentane	00096-14-0	1.69	264.61	447.417	
2-Methyl-2-butene	00513-35-9	14.20	262.31	3723.433	
t-2-Pentene	00646-04-8	10.47	217.83	2281.458	
2,3-Dimethylbutane	00079-29-8	0.90	189.65	170.438	
2-Methyl-1-butene	00563-46-2	6.38	153.51	979.200	
Toluene	00108-88-3	3.93	126.82	497.783	
Methylcyclopentane	00096-37-7	2.05	122.40	250.903	
c-2-Pentene	00627-20-3	10.28	118.53	1218.653	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	118.25	141.790	
2-Methylpropane	00075-28-5	1.18	97.86	115.144	
Cyclohexane	00110-82-7	1.14	95.61	108.746	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	91.32	1068.814	
c-2-Butene	00590-18-1	14.26	90.27	1287.178	
Benzene	00071-43-2	0.69	61.24	42.524	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	59.25	470.484	
2,4-Dimethylpentane	00108-08-7	1.46	51.93	75.786	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	42.51	225.233	
2-Methylhexane	00591-76-4	1.09	39.92	43.324	
Methylcyclohexane	00108-87-2	1.56	38.93	60.559	
1-Butyne	00107-00-6	6.05	33.05	199.919	
Cyclopentene	00142-29-0	6.69	32.96	220.392	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	32.34	103.208	
n-Heptane	00142-82-5	0.97	28.10	27.134	
2-Methyl-2-pentene	00625-27-4	11.03	26.48	292.135	
2,3-Dimethylpentane	00565-59-3	1.25	25.60	31.953	
3-Methyl-t-2-pentene	00616-12-6	11.66	25.37	295.819	
2,3,4-Trimethylpentane	00565-75-3	0.95	25.00	23.725	
2,2-Dimethylbutane	00075-83-2	1.11	24.30	27.002	
3-Methyl-c-2-pentene	00922-62-3	12.52	23.12	289.438	
t-2-Hexene	04050-45-7	8.55	22.69	193.990	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	20.01	132.218	
1-Methylcyclopentene	00693-89-0	12.45	18.12	225.703	
2,4-Dimethylhexane	00589-43-5	1.61	13.92	22.345	
2,2-Dimethylpentane	00590-35-2	1.04	13.03	13.596	
3 & 4-Methyl-1-Pentenes	00691-37-2+00760-20-3	5.78	11.99	69.248	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	9.79	15.716	
t-1,2-Dimethylcyclopentane	00822-50-4	2.34	7.88	18.415	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	1.01	7.482	
		Total	10783.2	25220.2	2.339
	244				
No MIR available, use weighted average of 2.3371					

Vehicle 211c - Fuel 7 psi E10 - 86°F Static - Test 7793					
0.020 Leak at Canister Inlet					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2-Methylbutane (Isopentane)	00078-78-4	1.35	208.68	282.736	
n-Butane	00106-97-8	1.08	68.16	73.402	
n-Hexane	00110-54-3	1.13	37.42	42.455	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	36.16	50.539	
Ethanol	00064-17-5	1.45	33.87	49.080	
n-Pentane	00109-66-0	1.21	30.97	37.631	
3-Methylpentane	00096-14-0	1.69	23.95	40.491	
2-Methyl-2-butene	00513-35-9	14.20	23.81	337.913	
t-2-Pentene	00646-04-8	10.47	19.85	207.950	
2,3-Dimethylbutane	00079-29-8	0.90	17.35	15.592	
Toluene	00108-88-3	3.93	17.02	66.802	
2-Methyl-1-butene	00563-46-2	6.38	14.55	92.799	
Methylcyclopentane	00096-37-7	2.05	11.47	23.519	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	11.37	13.632	
c-2-Pentene	00627-20-3	10.28	10.91	112.168	
Cyclohexane	00110-82-7	1.14	9.18	10.442	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	9.09	106.428	
c-2-Butene	00590-18-1	14.26	8.22	117.258	
Benzene	00071-43-2	0.69	6.14	4.266	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	5.10	40.529	
2,4-Dimethylpentane	00108-08-7	1.46	4.95	7.221	
1-Butyne	00107-00-6	6.05	4.20	25.383	
2-Methylpropane	00075-28-5	1.18	4.09	4.811	
Methylcyclohexane	00108-87-2	1.56	3.98	6.193	
2-Methylhexane	00591-76-4	1.09	3.97	4.310	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	3.92	12.500	
t-2-Hexene	04050-45-7	8.55	3.32	28.352	
Cyclopentene	00142-29-0	6.69	3.20	21.388	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	3.06	16.190	
2,3,4-Trimethylpentane	00565-75-3	0.95	2.81	2.664	
3-Methyl-t-2-pentene	00616-12-6	11.66	2.78	32.432	
2,3-Dimethylpentane	00565-59-3	1.25	2.71	3.382	
2-Methyl-2-pentene	00625-27-4	11.03	2.63	28.991	
n-Heptane	00142-82-5	0.97	2.61	2.517	
3-Methyl-c-2-pentene	00922-62-3	12.52	2.11	26.449	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	2.02	13.341	
2,2-Dimethylbutane	00075-83-2	1.11	1.92	2.132	
3 & 4-Methyl-1-Pentenes	00691-37-2+00760-20-3	5.78	1.90	10.952	
1-Methylcyclopentene	00693-89-0	12.45	1.82	22.606	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	1.81	2.904	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	1.66	12.846	
2,2-Dimethylpentane	00590-35-2	1.04	1.57	1.637	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	1.41	7.572	

Vehicle 211c - Fuel 7 psi E10 - 86°F Static - Test 7793 continued

0.020 Leak at Canister Inlet

Non Zero Mass Species Sorted By VOC

Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	1.39	10.251	
2,4-Dimethylhexane	00589-43-5	1.61	1.28	2.054	
Propane	00074-98-6	0.46	1.25	0.570	
2,2,3-Trimethylbutane	00464-06-2	1.05	1.16	1.223	
c-1,3-Dimethylcyclopentane	02532-58-3	3.03	1.11	3.360	
t-1,2-Dimethylcyclopentane	00822-50-4	3.03	1.03	3.108	
n-Octane	00111-65-9	0.80	0.98	0.779	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	0.89	0.976	
2-Methyl-1,3-butadiene	00078-79-5	10.48	0.85	8.877	
2,2,5-Trimethylhexane	03522-94-9	1.05	0.80	0.843	
1,3,5-Trimethylbenzene	00108-67-8	11.75	0.79	9.335	
3,3-Dimethylpentane	00562-49-2	1.12	0.63	0.710	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	0.62	2.739	
3-Methylheptane	00589-81-1	1.12	0.44	0.498	
2-Methylheptane	00592-27-8	0.97	0.44	0.429	
c-1,3-Dimethylcyclohexane	00638-04-0	3.03	0.37	1.109	
ortho-Xylene	00095-47-6	7.58	0.35	2.631	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	0.33	1.851	
n-Propylbenzene	00103-65-1	1.96	0.31	0.598	
Ethylbenzene	00100-41-4	2.96	0.15	0.439	
		Total	682.9	2074.8	3.038
No MIR available, use weighted average of 3.0273					

Vehicle 211c - Fuel 7 psi E10 - Dynamic - Test 25818					
0.020 Leak at Canister Inlet					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2-Methylbutane (Isopentane)	00078-78-4	1.35	1052.27	1425.702	
Ethanol	00064-17-5	1.45	368.10	533.364	
n-Butane	00106-97-8	1.08	264.80	285.167	
n-Hexane	00110-54-3	1.13	215.99	245.076	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	194.74	272.203	
n-Pentane	00109-66-0	1.21	157.98	191.932	
3-Methylpentane	00096-14-0	1.69	134.17	226.870	
2-Methyl-2-butene	00513-35-9	14.20	125.66	1783.699	
t-2-Pentene	00646-04-8	10.47	107.74	1128.460	
Toluene	00108-88-3	3.93	103.19	405.014	
2,3-Dimethylbutane	00079-29-8	0.90	93.97	84.455	
2-Methyl-1-butene	00563-46-2	6.38	77.05	491.485	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	69.90	83.815	
Methylcyclopentane	00096-37-7	2.05	62.64	128.408	
c-2-Pentene	00627-20-3	10.28	57.41	590.268	
Cyclohexane	00110-82-7	1.14	56.56	64.330	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	53.70	628.483	
c-2-Butene	00590-18-1	14.26	43.60	621.746	
Benzene	00071-43-2	0.69	37.22	25.841	
1-Butyne	00107-00-6	6.05	33.08	200.127	
2,4-Dimethylpentane	00108-08-7	1.46	28.65	41.813	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	26.87	213.341	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	26.03	139.753	
2-Methylhexane	00591-76-4	1.09	24.60	26.697	
2-Methylpropane	00075-28-5	1.18	24.42	28.735	
Methylcyclohexane	00108-87-2	1.56	22.16	34.460	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	21.41	113.452	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	20.28	64.722	
t-2-Hexene	04050-45-7	8.55	18.75	160.280	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	18.35	135.512	
2,3,4-Trimethylpentane	00565-75-3	0.95	18.14	17.208	
Cyclopentene	00142-29-0	6.69	16.30	108.972	
2,3-Dimethylpentane	00565-59-3	1.25	14.95	18.665	
3-Methyl-t-2-pentene	00616-12-6	11.66	14.39	167.759	
2-Methyl-2-pentene	00625-27-4	11.03	13.92	153.551	
n-Heptane	00142-82-5	0.97	11.91	11.503	
1-Methylcyclopentene	00693-89-0	12.45	11.75	146.397	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	11.57	89.715	
3-Methyl-c-2-pentene	00922-62-3	12.52	11.18	139.900	
2,4-Dimethylhexane	00589-43-5	1.61	11.01	17.683	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	10.99	72.630	
3 & 4-Methyl-1-Pentenes	00691-37-2+00760-20-3	5.78	10.59	61.191	
2,2-Dimethylbutane	00075-83-2	1.11	9.96	11.062	

Vehicle 211c - Fuel 7 psi E10 - Dynamic - Test 25818 continued

0.020 Leak at Canister Inlet

Non Zero Mass Species Sorted By VOC

Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
1,3,5-Trimethylbenzene	00108-67-8	11.75	9.36	110.051	
2,2,5-Trimethylhexane	03522-94-9	1.05	8.75	9.212	
2,2-Dimethylpentane	00590-35-2	1.04	8.56	8.924	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	7.67	12.305	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	7.54	33.114	
n-Octane	00111-65-9	0.80	6.76	5.383	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	6.58	36.462	
4-Isopropyltoluene (p-Cymene)	00099-87-6	4.41	6.15	27.109	
Propane	00074-98-6	0.46	5.84	2.670	
t-1,2-Dimethylcyclopentane	00822-50-4	3.07	5.78	17.778	
ortho-Xylene	00095-47-6	7.58	5.32	40.274	
c-1,3-Dimethylcyclopentane	02532-58-3	3.07	5.07	15.573	
n-Propylbenzene	00103-65-1	1.96	4.90	9.599	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	4.75	5.192	
c-1,3-Dimethylcyclohexane	00638-04-0	3.07	4.48	13.777	
2-Methyl-1,3-butadiene	00078-79-5	10.48	4.38	45.947	
3-Methylheptane	00589-81-1	1.12	4.29	4.820	
1,4-Diethylbenzene	00105-05-5	4.39	4.17	18.308	
3,3-Dimethylpentane	00562-49-2	1.12	3.89	4.354	
2,2,3-Trimethylbutane	00464-06-2	1.05	3.60	3.792	
2-Methylheptane	00592-27-8	0.97	2.75	2.658	
Indan	00496-11-7	3.23	2.71	8.760	
n-Nonane	00111-84-2	0.68	2.54	1.733	
1-Methyl-3-Propylbenzene	01074-43-7	7.08	1.81	12.793	
n-Decane	00124-18-5	0.59	1.45	0.857	
Ethylbenzene	00100-41-4	2.96	1.34	3.977	
		Total	3838.4	11846.9	3.086
No MIR available, use weighted average of 3.0742					

Vehicle 211c - Fuel 7 psi E10 - 1 Day Diurnal - Test 7836					
0.020 Leak at Canister Inlet					
Non Zero Mass Species Sorted By VOC					
Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
2-Methylbutane (Isopentane)	00078-78-4	1.35	1002.44	1358.189	
Ethanol	00064-17-5	1.45	292.18	423.362	
n-Butane	00106-97-8	1.08	290.07	312.377	
n-Hexane	00110-54-3	1.13	243.80	276.633	
2-MePentane & 4-Me-c-2-Pentene	00691-38-3+00107-83-5	1.40	226.54	316.651	
3-Methylpentane	00096-14-0	1.69	155.96	263.709	
n-Pentane	00109-66-0	1.21	155.20	188.558	
2-Methyl-2-butene	00513-35-9	14.20	126.58	1796.850	
2,3-Dimethylbutane	00079-29-8	0.90	111.29	100.014	
t-2-Pentene	00646-04-8	10.47	105.00	1099.738	
Toluene	00108-88-3	3.93	100.02	392.585	
2-Methyl-1-butene	00563-46-2	6.38	74.89	477.698	
Methylcyclopentane	00096-37-7	2.05	71.48	146.527	
2,2,4-TriMePentane (IsoOctane)	00540-84-1	1.20	70.09	84.049	
c-2-Pentene	00627-20-3	10.28	57.59	592.056	
Cyclohexane	00110-82-7	1.14	57.44	65.330	
2-Methylpropane	00075-28-5	1.18	57.22	67.323	
c-2-Butene	00590-18-1	14.26	49.71	708.857	
1-Pentene & 2-Butyne	00109-67-1+00503-17-3	11.70	44.90	525.537	
Benzene	00071-43-2	0.69	39.56	27.472	
1-Butyne	00107-00-6	6.05	35.34	213.821	
2-Methylpropene & 1-Butene	00115-11-7+00106-98-9	7.94	32.05	254.545	
2,4-Dimethylpentane	00108-08-7	1.46	30.70	44.806	
Methylcyclohexane	00108-87-2	1.56	25.75	40.054	
2-Methylhexane	00591-76-4	1.09	24.13	26.182	
2-Methyl-1-pentene & 1-Hexene	00592-41-6+00763-29-1	5.30	23.03	122.000	
t-2-Hexene	04050-45-7	8.55	20.57	175.842	
Cyclohexene & 3-Methylhexane	00110-83-8+00589-34-4	3.19	20.46	65.297	
2,3,4-Trimethylpentane	00565-75-3	0.95	17.08	16.203	
3-Methyl-t-2-pentene	00616-12-6	11.66	17.06	198.941	
Cyclopentene	00142-29-0	6.69	15.99	106.896	
2-Methyl-2-pentene	00625-27-4	11.03	15.93	175.741	
2,3-Dimethylpentane	00565-59-3	1.25	15.20	18.969	
n-Heptane	00142-82-5	0.97	14.92	14.408	
3-Methyl-c-2-pentene	00922-62-3	12.52	13.38	167.511	
c-2-Hexene & 3-MeCyclopentene	07688-21-3+01120-62-3	6.61	12.19	80.542	
2,2-Dimethylbutane	00075-83-2	1.11	12.17	13.527	
1,2,4-TriMeBenz & t-Butylbenzene	00095-63-6+00098-06-6	5.37	11.58	62.163	
1-Methylcyclopentene	00693-89-0	12.45	11.03	137.396	
Propane	00074-98-6	0.46	9.92	4.536	
3 & 4-Methyl-1-Pentenes	00691-37-2+00760-20-3	5.78	9.45	54.589	
2,4-Dimethylhexane	00589-43-5	1.61	8.40	13.485	
2,2-Dimethylpentane	00590-35-2	1.04	8.04	8.383	

Vehicle 211c - Fuel 7 psi E10 - 1 Day Diurnal - Test 7836 continued

0.020 Leak at Canister Inlet

Non Zero Mass Species Sorted By VOC

Species	CAS No.	MIR	Composite VOC mg	Ozone mg	
1-Methyl-3-Ethylbenzene	00620-14-4	7.39	7.76	57.282	
meta- & para-Xylenes	00108-38-3+00106-42-3	7.76	6.75	52.321	
2,5-DiMeHexane & EtCyPentane	00592-13-2+01640-89-7	1.61	6.06	9.734	
t-1,2-Dimethylcyclopentane	00822-50-4	3.02	5.34	16.156	
2,2,5-Trimethylhexane	03522-94-9	1.05	4.55	4.789	
c-1,3-Dimethylcyclopentane	02532-58-3	3.02	4.08	12.331	
2,3-DiMeHexane & 2,3-MeEtPentane	00584-94-1+	1.09	4.07	4.442	
1,3,5-Trimethylbenzene	00108-67-8	11.75	4.03	47.407	
n-Octane	00111-65-9	0.80	3.80	3.024	
2,2,3-Trimethylbutane	00464-06-2	1.05	3.58	3.773	
1-Methyl-4-Ethylbenzene	00622-96-8	4.39	3.50	15.376	
3,3-Dimethylpentane	00562-49-2	1.12	3.19	3.570	
2,3,5-Trimethylhexane	01069-53-0	1.12	2.97	3.332	
3-Methylheptane	00589-81-1	1.12	2.87	3.222	
1-Ethyl-2-Methylbenzene	00611-14-3	5.54	2.63	14.579	
2-Methylheptane	00592-27-8	0.97	2.59	2.502	
ortho-Xylene	00095-47-6	7.58	2.27	17.173	
1,2,3-Trimethylbenzene	00526-73-8	11.94	2.23	26.666	
2-Methyl-1,3-butadiene	00078-79-5	10.48	2.06	21.589	
c-1,3-Dimethylcyclohexane	00638-04-0	3.02	2.02	6.114	
2-Methyl-2-Hexene & c-3-Heptene	02738-19-4+07642-10-6	7.84	1.79	14.044	
Naphthalene	00091-20-3	3.28	1.72	5.634	
Unknown #16		3.02	1.69	5.123	
n-Nonane	00111-84-2	0.68	1.52	1.040	
n-Decane	00124-18-5	0.59	1.51	0.890	
Ethylbenzene	00100-41-4	2.96	1.50	4.447	
Indan	00496-11-7	3.23	1.32	4.264	
n-Propylbenzene	00103-65-1	1.96	1.20	2.348	
4-Methyloctane	02216-34-4	0.85	1.18	1.002	
Unknown #5		3.02	1.12	3.400	
Ethylcyclohexane	01678-91-7	1.35	1.08	1.449	
t-3-Heptene	14686-14-7	6.17	1.04	6.411	
1-MeCyHexene & 4-MeHeptane	00591-49-1+00589-53-7	3.86	0.98	3.789	
1-Methyl-3-Propylbenzene	01074-43-7	7.08	0.97	6.890	
t-1,4-Dimethylcyclohexane	02207-04-7	3.02	0.90	2.714	
1,4-Diethylbenzene	00105-05-5	4.39	0.90	3.928	
3,3-Dimethylhexane	00563-16-6	1.15	0.83	0.954	
c-2-Heptene	06443-92-1	7.08	0.77	5.453	
1,3-Butadiene	00106-99-0	12.45	0.52	6.436	
Unknown #3		3.02	0.36	1.101	
		Total	3835.6	11646.0	3.036
No MIR available, use weighted average of 3.0241					

Appendix V – Fuel Inspections – Previous Programs

CRC E-77-2 Fuel Inspection Results

Data from CRC E-74

Inspection	Units	E0 Fuel 6	E10 Fuel 7	E20 Fuel 4
API Gravity	°API	60.2	58.5	57.0
Relative Density	60/60°F	0.7382	0.7447	0.7508
DVPE	psi	7.01	7.30	8.49
Oxygenates--D4815				
MTBE	vol %	0.00	0.00	0.00
ETBE	vol %	0.00	0.00	0.00
EtOH	vol %	0.00	9.54	20.34
O2	wt %	0.00	3.53	7.47
Hydrocarbon Composition				
Aromatics	vol %	22.1	24.4	10.8
Olefins	vol %	8.0	8.8	5.5
Saturates	vol %	70.0	57.3	23.4
D86 Distillation				
IBP	°F	97.4	104.0	102.2
5% Evaporated	°F	131.6	128.0	125.2
10% Evaporated	°F	142.3	133.0	131.4
20% Evaporated	°F	156.4	141.0	141.3
30% Evaporated	°F	170.4	145.0	148.6
40% Evaporated	°F	184.0	153.0	154.7
50% Evaporated	°F	197.5	195.0	159.6
60% Evaporated	°F	212.0	219.0	163.6
70% Evaporated	°F	230.5	241.0	227.4
80% Evaporated	°F	258.8	271.0	269.5
90% Evaporated	°F	313.9	317.0	313.9
95% Evaporated	°F	332.2	330.0	325.5
EP	°F	360.3	360.0	340.6
Recovery	vol %	97.8	97.8	98.3
Residue	vol %	1.3	1.0	1.0
Loss	vol %	0.9	1.2	0.7
Driveability Index		1119.9	1101.5	989.8

Suppliers Additional Inspections

Fuel	Units	Fuel 6	Fuel 7	Fuel 4
Sulfur Content	ppm	29	27	27
Estimated C/H Ratio		6.2090	6.3323	6.3252
Est. Net Heat of Combustion	btu/lb	18573	18514	18513
Benzene	vol %	0.90	1.00	0.96
Research Octane Number		93.2	94.0	94.6
Motor Octane Number		83.8	83.8	83.4
(R+M)/2		88.5	88.9	89.0

Detailed Hydrocarbon Analysis

Fuel	Units	Fuel 6	Fuel 7	Fuel 4
Aromatics	vol %	23.86	24.81	21.78
Olefins	vol %	7.52	8.92	10.74
Saturates	vol %	67.43	56.21	46.23
Unclassified	vol %	1.15	0.86	0.15
Ethanol	vol %	0.00	9.20	21.11
Benzene	vol %	0.89	1.06	0.97
C/H Ratio		6.200	6.092	5.835
Oxygen	wt. %	0.008 [1]	3.40	7.73
Net Heat of Combustion	btu/lb	18,703	18,016	17,160

[1] Contains 0.04 vol % MTBE

Carbon, Hydrogen, and Oxygen

Fuel	Units	Fuel 6	Fuel 7	Fuel 4
Oxygen	wt. %	0.008	3.396	7.733
C+H	wt. %	99.99	96.60	92.27
H	wt. %	13.89	13.62	13.50
C	wt. %	86.10	82.98	78.77

Net Heat of Combusion -- Btu/lb

Fuel	Units	6	7	4
Haltermann D3338	Btu/lb	18,573	18,514	18,513
Average D3338	Btu/lb	18,579	18,514	18,491
Oxygen Corrected D3338	Btu/lb	18,579	17,860	17,103
DHA	Btu/lb	18,703	18,016	17,160