SYNTROLEUM

PETITION FOR RULEMAKING PURSUANT TO 10 C.F.R. PART 490

TO DESIGNATE SYNTROLEUM S-2 FUEL
AS AN ALTERNATIVE FUEL
UNDER SECTION 301(2) OF THE ENERGY POLICY ACT OF 1992

PRESENTED TO THE UNITED STATES DEPARTMENT OF ENERGY
OFFICE OF GENERAL COUNSEL

BY:
SYNTROLEUM

Mark Agee, President

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GLOSSARY

ANPR – Advanced Notice of Proposed Rulemaking
ATR - Autothermal Reformer Reactor
bpd – Barrels Per Day
Btu – British Thermal Unit
CAA – Clean Air Act of 1990
CH_4 - Methane
CIDI – Compression Ignition Direct-Injection
CNG – Compressed Natural Gas
CO – Carbon Monoxide
CO_2 – Carbon Dioxide
DOE – Department of Energy
EGR –Exhaust Gas Re-Circulation
EIA – Energy Information Administration
EPA – Environmental Protection Agency
EPAct – Energy Policy Act of 1992
FCC – Fluidized Catalytic Cracker
FPSO – Floating Production Storage and Offloading
FT – Fischer-Tropsch
FTP – Federal Test Procedure (EPA)
g/mi – Grams Per Mile
geg – Gasoline Equivalent Gallon
GHG – Greenhouse Gas
GREET – Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation
GREET Reformulated Diesel – Reformulated Diesel at a 50-ppm Sulfur Level
GRI – Gas Research Institute
GTL – Gas to Liquids
GVW – Gross Vehicle Weight
GWP – Global Warming Potential
HFET – EPA Highway Fuel Economy Test (EPA)
LCO – FCC Light Cycle Oil
LHV – Lower Heating Value
LNG – Liquefied Natural Gas
LPG – Liquefied Petroleum Gas
mpg – Miles Per Gallon
MTBE – Methyl-Tertiary-Butyl Ether
NMHC – Non-Methane Hydrocarbons
NO_x – Oxides of Nitrogen
N_2O – Nitrous Oxide
OPEC – Oil Producing Exporting Countries
PCF – Prototype Carbon Fund (the World Bank's)
PM – Particulate Matter
ppm – Parts Per Million
PNGV – The Partnership of New Generation of Vehicles
RFD – Reformulated Diesel at a 15 ppm Sulfur Level
RFG – Reformulated Gasoline at a 30 ppm Sulfur Level

SIDI – Spark Ignition Direct-Injection
S-2 – Syntroleum S-2 Fuel (used to denote synthetic paraffin diesel with the properties of S-2)
SO_x – Sulfur Oxides
SUV – Sport Utility Vehicles
SwRI – Southwest Research Institute
Syntroleum Process – Syntroleum's Proprietary GTL Process
tcf – Trillion Cubic Feet
THC – Total Hydrocarbons
US06 – Aggressive Driving Test Protocol (EPA)
VOC – Volatile Organic Compounds

I. SUMMARY

This petition requests that the Secretary initiate a rulemaking, pursuant to 10 C.F.R. Part 490, to add synthetic paraffin diesel with the properties and origin of Syntroleum S-2 fuel (referred to as "Syntroleum S-2 fuel" or "S-2") to the list of alternative fuels in the Energy Policy Act of 1992's ("EPAct"'s) implementing regulations at 10 C.F.R. Section 490.2. *See* 10 C.F.R. § 490.2 (1999).[1]

Section 301(2) of EPAct provides that the Secretary of the Department of Energy ("DOE") may deem a fuel an alternative fuel if the Secretary determines by rule, that the fuel (1) is substantially not petroleum, (2) would yield substantial energy security benefits, and (3) would yield substantial environmental benefits. 42 U.S.C. 13211 (2) (West 1999). S-2 meets all three requirements.

First, S-2 fuel is "substantially not petroleum" because it is a synthetic fuel that is manufactured from natural gas, using Syntroleum's proprietary gas to liquid ("GTL") process (the "Syntroleum Process").

Second, the use of S-2 would yield substantial energy security benefits because it would reduce the United States' reliance on imported oil as a transportation energy source. S-2 fuel would reduce the reliance on imported oil because it can be manufactured domestically from United States reserves of pipeline quality and sub-quality natural gas. In addition, the manufacture of S-2 abroad would create a competing fuel and force Oil Producing Exporting Countries ("OPEC") to maintain competitive prices.

Finally, S-2 would yield substantial environmental benefits. When S-2 is used in diesel engines, its emission levels of hydrocarbon ("HC"), carbon monoxide ("CO"), oxides of nitrogen ("NO_x"), and particulate matter ("PM") are lower than the emission levels from reformulated gasoline and diesel fuels. This environmental benefit can be realized immediately because S-2 can be used in existing conventional diesel engines. Moreover, the absence of sulfur in S-2 enables vehicles operating on S-2 to use advanced sulfur-sensitive exhaust treatment technologies, including catalytic converters and particulate traps, to achieve even lower emissions. Further, when S-2 is produced from flared or vented natural gas, S-2, on a full fuel-cycle basis, reduces total greenhouse gas ("GHG") emissions with significant energy savings.

[1] In addition, this petition requests that the Secretary deem synthetic paraffin diesel with the properties of Syntroleum S-2 fuel (referred to as "Syntroleum S-2 fuel" or "S-2") a replacement fuel, pursuant to Section 301(14) of the Energy Policy Act of 1992 ("EPAct"), 42 U.S.C.A. § 13211(14) (West 1999). *See infra*, note 9.

II. DESCRIPTION OF SYNTROLEUM S-2 FUEL AND ITS PRODUCTION

S-2 is a paraffinic, high-cetane distillate product suitable for conventional and advanced compression ignition engines. Additionally, it has been demonstrated to be a viable fuel for fuel cell vehicles. S-2 is physically similar to petroleum-based diesel, but it has superior combustion emission characteristics. Comparisons between key physical properties of S-2 and petroleum-based diesel are more thoroughly discussed in Section V, herein.

The Syntroleum Process (simplified process flow diagram attached as Figure 1) converts natural gas into ultra clean liquid fuels, such as S-2, using a patented GTL technology based on the Fischer-Tropsch (or "FT") process. The feedstock to this process can be anything from pipeline quality natural gas to methane rich gas containing up to 30% inert gases, including nitrogen and carbon dioxide.[2] Conventional chemical scrubbers remove sulfur and mercaptans in the natural gas feed prior to conversion into synthetic liquids.

The production of S-2 essentially involves two separate catalytic reactions and the separation and treatment of products produced from the second of these reactions. The first reaction takes place in an Autothermal Reformer Reactor ("ATR"), where the natural gas feed is combined with air and a small amount of steam to form synthesis gas (carbon monoxide and hydrogen). The second reaction takes place when the synthesis gas flows into a Syntroleum designed FT reactor, containing any of several proprietary catalysts. As the synthesis gas passes over the catalyst, it is converted into hydrocarbons of various molecular weights with water as a by-product. The hydrocarbons, essentially straight chain paraffins, along with water and non-reactive gases are removed from the reactor effluent in a two-step cooling and separation process. The water is treated for re-use or disposal. Energy in the form of low British thermal units ("Btu's") in the tail gas is recovered and used in the process.

From the hydrocarbon product stream of the FT reactor, heavy paraffins are separated from light paraffins and sent to a hydrocracker, where they are cracked under mild operating conditions (low temperature and pressure) into lighter paraffins. The hydrocracked heavy paraffin stream is then directed, along with the light paraffins, to a fractionation unit, where via conventional distillation, S-2 is separated from the other paraffinic products and sent to storage. The hydrocracked heavy and the light paraffins are hydrotreated before fractionation, which removes essentially all of the olefins and oxygenates produced by the process.

The use of ambient air, or enriched air, is a unique characteristic of the Syntroleum Process. It provides significant capital and operating cost reductions as well as safety advantages over competitive processes, which use pure oxygen to create a

[2] Total volume percent of inert gases should not exceed approximately 30 % and carbon dioxide should be below 12 % for efficient conversion via the Syntroleum Process. However, technologies under evaluation are capable of utilizing gas feedstock that has higher CO_2 concentrations.

synthesis gas that is largely free of nitrogen. Energy integration is also a key component of the capital efficiency of the Syntroleum Process. The Syntroleum Process uses the nitrogen to its advantage to assist in controlling the excess heat released from the catalytic reactions. In addition, the Syntroleum Process utilizes a portion of the excess energy to drive the plant processes. Any surplus plant heat energy may be converted to electricity, used to desalinize water, and/or used to increase process carbon efficiency. Fuel plant configurations, and thus GTL plant efficiencies will be site specific, commercially driven decisions.

S-2 can be produced economically in a variety of plant configurations and sizes depending on the gas source, site conditions, and the proximity of the plant to its intended fuel market. For example, the smaller plants are ideal in situations where oil cannot be produced without flaring or venting the associated (co-produced) natural gas. In these situations plants can be configured to produce as little as 1,000 barrels per day ("bpd"). Larger plants, producing 5,000 to 10,000 bpd, can be based on a variety of platforms designed for either land or marine use, constructed on site or erected from modular units. Fuel production trains of approximately 25,000 bpd have also been designed as components of 100,000 bpd and larger GTL complexes.

Mobile marine designs are particularly suited for smaller fields located offshore or in coastal delta areas that can operate over periods of 5 to 10 years until gas production diminishes, at which time the GTL plant would be moved to a new source of gas. Syntroleum GTL plants can be incorporated into the design of Floating Production Storage and Offloading ("FPSO") used in the development and commercialization of large offshore projects located in deep water and at distances too far from gas markets for gas pipelines to be economical. One such deep-water example is the United States Gulf of Mexico.

Depending upon plant size, configuration, and the suite of products co-produced, S-2 can be produced and sold for $0.80 - 1.50/gallon. As demand for S-2 increases and as larger dedicated plants are constructed over the next 3 to 5 years, this price is expected to decrease to $0.50 – 0.70/gallon. Within the next decade, S-2 is anticipated to be widely available at prices that are competitive with those prices of Tier 2 compliant gasoline and diesel fuels.

III. MARKET INCENTIVES

Use of alternative fuel grew at an annual rate of over 10% a year, whereas use of gasoline increased at a rate of only 1.6% a year.[3] However, even with this high growth, alternative fuel use only amounts to about 0.2% of the fuel used in the United States transportation sector each year. This gap can be narrowed. Syntroleum anticipates that approval of S-2 as an alternative fuel will help narrow the gap between the use of alternative fuel and gasoline.

The replacement of conventional fuels with alternative fuels under EPAct has proven to be a daunting challenge. The primary stumbling blocks are (1) ready markets for the fuel (existing vehicles that can use the fuel), and (2) undeveloped distribution systems that hinder the availability of the fuel. S-2 fuel does not face either obstacle.

A. There Are Ready Markets for Syntroleum S-2 Fuel.

S-2 is backward compatible, meaning that it can operate in standard diesel engines. Accordingly, standard diesel vehicles provide a ready market for the fuel. Two advantages of this ready market are that: (1) consumers can purchase cleaner fuel without having to buy a new vehicle, and (2) the environment instantaneously benefits because consumers can use cleaner fuel without having to wait for the development of engine technologies compatible with a new alternative fuel.

Moreover, as engine technology develops, the market for S-2 will expand because S-2 is technology neutral. In other words, S-2 can operate in innovative engines as well as current production model diesel engines and vehicles.[4] S-2's versatility is due to its high purity, compositional uniformity, compatibility with existing additive packages, and high hydrogen density.

The fuel cell, for example, is one of the most promising new power sources, and it presents a future potential market for S-2. S-2 is an ideal fuel cell fuel because it contains no measurable sulfur, aromatics, olefins or metals. Further, hydrogen yield per unit volume of fuel (as supplied to the fuel cell from a fuel cell fuel processor) using S-2 is roughly double that of other fuel cell fuels under consideration, and it can be transported as a liquid through the existing fuel distribution system. S-2 is likely to be more economical, structurally practical, and environmentally benign than conventional gasoline and diesel, which have also been tested in fuel cells. Recognizing S-2's potential, IdaTech Corp (formerly Northwest Power Systems), a leading manufacturer of fuel cell components and systems, certified S-2 as an effective on-board source of hydrogen to power its fuel cells in early February 2000.[5]

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[3] Use of alternative fuels has increased from 230 thousand gasoline equivalent gallons ("gegs") in 1992 to an estimated 351 thousand gegs in 1999. (Table D, Attachment 4).

[4] As discussed in Section VII, S-2 fuel has performed well as a diesel fuel in numerous tests in a variety of engines.

[5] *Northwest Power Certifies Syntroleum Fuels in Fuel Cell Reformers*, Syntroleum Corp., (Feb. 2, 2000), www.syntroleum.com.

The primary advantage of S-2's technology neutrality is that it encourages further innovation in engines. Consumers will not buy expensive new vehicles if there is a chance that the fuel required will be inconvenient or unavailable. Therefore, automobile manufacturers are reluctant to risk huge investments in new engines and vehicles without a reasonable expectation of adequate fuel supplies at an affordable cost. In short, concerns about potential market demand that accompany investment in new engine technologies are significantly reduced when there is a widely available compatible fuel.

B. S-2 Is Compatible with Existing Distribution Systems.

Syntroleum anticipates that the introduction and success of S-2 fuel as an alternative fuel to fleets covered under EPAct will lead to demand for S-2 fuel in the commercial sector. Demand for ultra-clean diesel fuel in the commercial sector is already escalating as engine and vehicle manufacturers begin to respond to the Environmental Protection Agency's ("EPA's") anticipated Tier 2 emission standards. For example, the traditional gasoline engines that power Sport Utility Vehicles ("SUVs") and full size pick-up trucks are expected to be replaced with cleaner and more efficient compression ignition direct injection ("CIDI") diesel engines. The current use of diesel engines in the light truck category, which includes SUVs and full size pick-up trucks, is about 5% and is growing at a rate of about 12% per year. This switch is significant because the light truck vehicle category is emerging as the dominant vehicle type in the United States, commanding 49% of the new-vehicle market in 1998.[6] Moreover, the use of diesel fuel overall is already growing 3 times faster than that of gasoline (Table D, Attachment 4). Further, the Partnership of New Generation of Vehicles ("PNGV") has identified the CIDI diesel engine as the innovation with the greatest potential to achieve their stated goal of 80 miles per gallon ("mpg").[7]

Syntroleum does not expect distribution to present an obstacle to meeting the demand in the commercial sector. Distribution will be straightforward because S-2 is compatible with existing transportation vehicles, and other means of conveyance (*e.g.* ships, barges etc.), as well as existing tanks and pumps in service stations and fueling facilities. This has three clear advantages: (1) it allows consumers to maintain current behavior patterns, while using a new, cleaner technology; (2) it allows fuel distributors to become partners instead of adversaries of new technology; and (3) it eliminates the need for large investments in new fuel delivery systems (service stations, etc.)[8]

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[6] Ward's Motor Vehicle Facts & Figures (1999). Notably, the biggest factor in those increased truck sales was a 15% rise in sport utility vehicles ("SUVs"), giving SUVs a total market share of all cars and trucks of 17.5%.

[7] Department of Energy ("DOE"), Office of Transportation Technologies, www.ott.doe.gov/oatt/enable_cidi.html.

[8] This assumes that the Environmental Protection Agency ("EPA") establishes a single specification diesel fuel for on road use.

IV. LEGAL STANDARD FOR THE DESIGNATION OF AN ALTERNATIVE FUEL

Section 301(2) of EPAct, defines the term "alternative fuel" as:

> *methanol, denatured ethanol and other alcohols; mixtures containing 85 percent or more (or such other percentage, but not less than 70 percent, as determined by the Secretary, by rule, to provide for requirements relating to cold start, safety, or vehicle function) by volume of methanol, denatured ethanol, and other alcohols with gasoline or other fuels; natural gas; liquefied petroleum gas; hydrogen; coal-derived liquid fuels; fuels (other than alcohol) derived from biological materials; electricity (including electricity from solar energy); and any other fuel the Secretary determines, by rule, is substantially not petroleum and would yield substantial energy security benefits and substantial environmental benefits.*

42 U.S.C.A. § 13211(2) (West 1999).[9]

Accordingly, to deem S-2 fuel an alternative fuel, the Secretary must examine whether S-2 fuel: (1) is substantially not petroleum, (2) would yield substantial energy security benefits, and (3) would yield substantial environmental benefits. *See id.* § 13211(2). For the reasons explained below, S-2 should be deemed an alternative fuel, as a matter of law, because it meets all three criteria.

[9] Syntroleum is also petitioning the DOE to deem S-2 (or all synthetic paraffin diesel with the properties of S-2) a "replacement fuel" when S-2 is blended with other motor fuels. Section 301(14) of EPAct defines the term "replacement fuel" as: "the portion of any motor fuel that is methanol, ethanol, or other alcohols, natural gas, liquefied petroleum gas, hydrogen, coal derived liquid fuels, fuels (other than alcohol) derived from biological materials, electricity (including electricity from solar energy), ethers, or any other fuel the Secretary determines, by rule, is substantially not petroleum and would yield substantial energy security benefits and substantial environmental benefits." 42 U.S.C.A. § 13211(14) (West 1999). The definitions of "alternative fuel" and "replacement fuel" suggest that when the DOE deems a fuel an "alternative fuel," any portion of that "alternative fuel" in a motor fuel would automatically qualify as a "replacement fuel." If such qualification as a "replacement fuel" is not automatic, Syntroleum wishes to make it clear that it is also petitioning the DOE to deem S-2 that is blended with another motor fuel a "replacement fuel."

V. CRITERION ONE: SUBSTANTIALLY NOT PETROLEUM

A. Syntroleum S-2 Fuel Is Produced Solely from Natural Gas or Flared Gas and Is 100% Non-Petroleum.

First, Section 301(2) of EPAct provides that the Secretary may deem a fuel an alternative fuel only if the fuel is substantially not petroleum. *See* 42 U.S.C.A. § 13211 (2) (West 1999). S-2 fuel is produced from natural gas, flared gas (also includes vented gas)[10], and/or other methane rich gas streams utilizing the Syntroleum Process, and is 100% non-petroleum.

The initial (raw) products of the Syntroleum Process are liquid hydrocarbons and water. Simple and conventional refining processes are then used to separate and upgrade the hydrocarbons into S-2 fuel, which meets the product specifications contained in Table 1.

At present, Syntroleum is requesting that S-2 fuel be designated as an alternative fuel, intended for direct use as a neat fuel for use in compression ignition engines and/or fuel cells. As such, 100% of its Btu content is non-petroleum. Nonetheless, Syntroleum recognizes that the use of S-2 fuel in blends with conventional diesel could offer marked improvements in regulated emissions and help the United States refining industry meet the anticipated phase-in of lower sulfur specifications for diesel fuel under Tier 2 standards. Therefore, Syntroleum anticipates seeking the designation of S-2 blends as alternative fuels in the near future.

B. Physical and Chemical Characteristics of S-2 Fuel

S-2 is a highly paraffinic, high-cetane distillate product suitable for conventional and advanced compression ignition engines, as well as fuel cells. S-2 is physically similar to petroleum-based diesel fuels, but with superior combustion emission characteristics. Comparisons of key physical properties are shown in Table 1. At ambient temperature and pressure, S-2 is a colorless, stable, environmentally safe liquid that can be shipped, stored, and dispensed using the same fuel distribution and handling procedures as petroleum diesel. Its volatility properties are the same as those for EPA #2 diesel. S-2 does not contain any measurable olefins, metals, aromatics or alcohols.

[10] Vented gas generally consists of methane and other minor gases, including ethane, propane, CO_2, and nitrogen.

Table 1. Comparison of Physical and Chemical Properties

Property	Test Method	Units	Syntroleum S-2	EPA # 2 Diesel
Specific gravity	ASTM D – 1298		0.771	0.846
API	ASTM D – 1298	^{o}(degrees)	52.0	35.9
Reid Vapor Pressure	ASTM D – 323	psi	0.5	N/A
Flash Point	ASTM D – 93	^{o}F	148	157
Cloud Point	ASTM D – 2500	^{o}F	<0	32
Color	ASTM D – 1500	Inspection	<0.5	25
Sulfur	ASTM D – 2622	Wt %	N/D	.05
Viscosity	ASTM D – 445	cSt@104° F	2.1	2.5
Carbon Residue	ASTM D – 524	Wt %	<0.05	.35
Copper Strip	ASTM D – 130	Inspection	1a	1
Aromatics	ASTM D – 1319	Vol %	N/D	30
Olefins	ASTM D – 1319	Vol %	N/D	1
Saturates	ASTM D – 1319	Vol %	>99%	69
Cetane Number	ASTM D – 613		>74	45
Oxidation Stability	ASTM D – 2274	mg/100 ml	0.0	
Distillation – IBP	ASTM D – 86			
Initial Boiling Point		^{o}F	320	363
@ 10 vol % recovered		^{o}F	390	420
@ 50 vol % recovered		^{o}F	493	497
@ 90 vol % recovered		^{o}F	601	590
Final Boiling Point		^{o}F	662	646
Lubricity	ASTM D – 6079	mm	<0.37	N/A
Ash	ASTM D – 482	Wt %	<0.001	0.01

\a\ N/D – Not Detectable
\b\ N/A – Not Applicable

VI. CRITERION TWO: SUBSTANTIAL ENERGY SECURITY BENEFITS

Second, Section 301(2) of EPAct provides that the Secretary may deem a fuel an alternative fuel only if the fuel has substantial energy security benefits. *See* 42 U.S.C.A. § 13211 (2) (West 1999). This criterion reflects the government's well-founded concern that the United States relies too heavily on imported oil, which is the feedstock for petroleum-based fuels. One way to reduce the United States' reliance on imported oil in the near future is to diversify the United States' transportation energy sources.

Based on Energy Information Agency ("EIA") data, overall demand for petroleum in the United States is expected to increase at a rate of 1.2% per year, while the United States' domestic production of petroleum is expected to decline at a rate of 1.1% per year. The EIA predicts that this imbalance will result in the increase of oil imports of 2.3% per year.

The transportation sector is in large part responsible for the increase in fuel demand. In 1997, for example, the transportation sector consumed 26% of the energy used in the United States, 97% of that was petroleum-based. Moreover, the EIA predicts that by 2010 the transportation sector will consume over 30% of energy used in the United States, with its consumption of petroleum-based fuels growing proportionally.[11] Because the transportation sector is such a major player, it could significantly reduce the United States' reliance on imported oil by simply diversifying its energy sources.

In furtherance of this goal, S-2 fuel, which is produced from natural gas, is a logical substitute for petroleum-based fuels in the transportation sector because: (1) the United States has plentiful natural gas resources, (2) numerous countries, in addition to members of OPEC, have plentiful natural gas resources, (3) S-2's full fuel- cycle is potentially more energy efficient than the full fuel-cycle for reformulated diesel ("RFD")[12] or reformulated gasoline ("RFG"), and (4) S-2's full fuel-cycle uses substantially less petroleum than either RFD or RFG.

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[11] *Annual Energy Outlook 1999 with Projections to 2020*, DOE/ Energy Information Agency ("EIA"), Office of Integrated Analysis and Forecasting; EIA-0383(99), (Dec. 1998), DOE, www.eia.doe.gov/ pub/pdf/multi.fuel/038399.pdf.

[12] Unless otherwise noted, reformulated diesel ("RFD") refers to a reformulated diesel fuel having 15 parts per million ("ppm") sulfur.

A. Syntroleum S-2 Fuel Can Reduce Reliance on Imported Oil Because It Can Utilize the United States' Natural Gas Resources.

As described above, S-2 fuel is 100% non-petroleum. The Syntroleum Process converts natural gas into S-2, using a patented GTL technology based on FT chemistry. The feedstock to this process can be anything from pipeline quality natural gas to methane rich gas streams containing up to 30% inert gases including nitrogen and carbon dioxide.[13]

The United States has plentiful natural gas resources. Currently, it is estimated that the United States has a reserve of 164 trillion cubic feet ("tcf"). The United States has a very sophisticated production, collection, and distribution system for delivering gas to a well-developed market. However, not all of this gas reaches the final market. In 1997, of the total United States natural gas production of 24.2 tcf, 3.50 tcf was re-injected and 0.26 tcf was vented or flared (Table B, Attachment 4). If this vented or flared gas were to be converted using the Syntroleum Process, over 800 million gasoline equivalent gallons ("gegs") of S-2 could be potentially produced. Just 1% of this amount (8 million gegs) is greater than either the total amount of alcohol based fuels used as alternative fuels in 1999 (5.5 million gegs), or the total amount of liquefied natural gas ("LNG") (6.9 million gegs) used during the same period (Table D, Attachment 4).[14] Viewed another way, 800 million gegs of S-2 is more than twice the total amount of alternative fuel consumed in 1999 (325 million gegs).[15]

In addition to the traditional sources of United States natural gas, there are other gas reserves that have not been tapped. The Gas Research Institute ("GRI") has reported that the deepwater Gulf of Mexico is poised for a major increase in production over the next 5 to 10 years, and gas from this area will soon represent a substantial percentage of all oil and gas production in the lower-48 states.[16] Current deepwater (water depths up to 1000 meters) discoveries in this region are placed at 40 tcf, with estimates of undiscovered potential reserves ranging from 68 tcf to 217 tcf. However, the depth and distance from shore will make commercialization of these vast amounts of gas difficult. With GTL plants placed on FPSOs, the natural gas could be converted to GTL fuels that could be easily transported to shore in conventional barges or tankers. These FPSOs could be either permanent facilities or used on a temporary basis while awaiting the development of a gas gathering and pipeline system to bring the gas production to shore. GTL-capable FPSOs could accelerate development of deepwater oil fields.

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[13] *See supra*, note 2.

[14] *Alternatives to Traditional Transportation Fuels*, DOE/EIA, (Jan. 2000), http://www.eia.doe.gov/cneaf/solar.renewables/alt_trans_fuel98/atf_99.html.

[15] *See id.*

[16] *Changing Perceptions of Remaining U.S. Conventional Gas Resources*, Gas Research Institute ("GRI"), Gas Issues and Trends, (Oct. 1998).

Stranded gas reserves have presented other difficulties. By definition, stranded gas reserves have little or no market prospect. However, GTL technology has suddenly brought stranded gas reserves within economic reach.[17] In Prudhoe Bay, Alaska, 25 to 30 tcf of natural gas that has been stranded under the Northern Slope suddenly has market prospects. If these reserves were tapped, and the natural gas was converted to liquid fuels, 2.5 to 3.0 billion barrels of ultra-clean fuels (an amount roughly equal to 10% of current United States reserves) could be produced and thus displace foreign fuel imports on a barrel for barrel basis.

Prior to consideration of GTL as an option, commercialization of these Alaskan reserves (as natural gas), required a significant investment in infrastructure. In addition to recovery and processing facilities, a new 800-mile gas pipeline and LNG complex was required to bring the natural gas to markets in the northwest. But now, with GTL technology, this gas can be produced and processed on site and pumped down the existing pipeline as either "synthetic crude" or segregated GTL product. The addition of GTL oil to the Trans Alaska Pipeline would have several additional benefits beyond the increased availability of GTL fuels to the United States. The additional pipeline throughput should reduce tariff increases that are anticipated as Alaskan North Slope production matures and declines. Moreover, GTL production would extend the economic life of the Trans Alaska Pipeline, and permit the production of oil that would have otherwise stayed in the ground. The DOE's recognition of S-2 as an alternative fuel will facilitate efforts to mobilize investment to economically capture stranded gas reserves on the North Slope of Alaska.

In addition to the conversion of gas now flared and vented, the Syntroleum Process enables sources of sub-quality natural gas to be tapped, as well. A 1996 GRI study found that 41% of proven reserves in the United States are "sub-quality" gas.[18] The GRI defines "sub-quality" as gas having nitrogen and/or carbon dioxide and/or hydrogen sulfide in excess of average pipeline limits of 4%, 2% and 4 parts per million ("ppm"), respectively. Not all sub-quality gas streams are suitable for conversion into liquid fuels because of their high sulfur content. Nevertheless, the Syntroleum Process can utilize 60% of the sub-quality gas streams identified in the GRI report that contain only nitrogen and/or carbon dioxide.[19]

Other sources of natural gas suitable for conversion into liquid transportation fuels are coal-bed methane, landfill methane, and ocean-bed methane hydrates. There is an estimated 275 to 649 tcf of recoverable coal bed methane in the United States, at least 4 times the current United States proven gas reserves. For safety reasons, much of this gas is vented into the atmosphere. Although some coal bed gas is recovered and sold

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[17] Jones, S., *Gas May Get to Market without New Pipeline*, Anchorage Daily News, (May 4, 1997), www.adnsearch.com.

[18] *Chemical Composition of Discovered and Undiscovered Natural Gas in the Continental United States*, GRI, (June 1999).

[19] *See supra*, note 2.

via pipelines, much of it is not. Some of these valuable resources could be recovered and converted into S-2 using the Syntroleum Process.

Moreover, landfills are the single largest anthropogenic source of methane emissions in the United States.[20] EPA estimates that 3,000 to 6,000 landfills in the United States currently produce gases containing methane, representing 600 bcf of methane per year, only 15% of which is recovered.[21] Of these landfills, more than 500 are capable of generating sufficient quantities of gas to support compact, mobile Syntroleum process plants to produce S-2. Once plant designs have been perfected for these smaller applications, S-2 will be able to be produced from other anthropogenic sources of methane and bio-mass.

Further, and on a much larger scale, there are vast deposits of methane hydrates (methane molecules trapped in ice) in the United States in permafrost regions and beneath the ocean floor. A 1995 United States geological survey assessment places a mean estimate of United States gas hydrates at 320,000 tcf, a number 20 times the optimistic estimate of remaining world reserves of conventional natural gas.[22] Although there is currently no proven means of economically recovering methane hydrates today, Syntroleum has recently been granted a United States patent for a system that recovers gas from ocean-bed methane hydrates and converts it into liquid fuels via floating GTL processing plants. Accordingly, Syntroleum is optimistic that methane hydrates will become an economically viable feedstock for S-2 production in the future.

B. Syntroleum S-2 Fuel Can Reduce Reliance on Imported Oil Because It Can Utilize Natural Gas In Foreign Countries, Other Than OPEC.

Although the United States natural gas resources are plentiful, the United States houses only 3 to 4% of the world's proven reserves of gas. By various estimates, there are 5,000 to 15,000 tcf of stranded gas resources in the world and even larger amounts of associated gas. West Africa, for example, provides almost 2% of the world's gas, but 60-70% of it is flared. Producing gas from foreign sources, such as West Africa, is economical. One study, which calculated the cost of producing gas from associated and dissolved gas fields located in major production areas in the world, reported that 6 of the fields it sampled have a combined annual production capacity of 290 bcf and are capable of producing 1.2 billion gallons of GTL fuel per year at a gas cost of less than $1.00/mcf.[23]

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[20] *See* http://www.epa.gov/oppeoee1/globalwarming/emissions/national/methane.html.

[21] *See id.*

[22] *Natural Gas 1998: Issues and Trends*, DOE/EIA, (1998), www.eia.doe.gov/oil_gas/natural_gas /info_glance/resourses.html.

[23] Greene, D.L., *An Assessment of Energy and Environmental Issues Related to the Use of Gas-to-Liquid Fuels in Transportation*, (Nov. 1999), www-cta.ornl.gov/publications/ornl-tm-1999-258.pdf.

Notably, even if GTL fuels, such as S-2, were produced outside of the United States, our reliance on oil imports would be reduced, and indeed, the market power of OPEC would be reduced. As part of a study for the DOE, D.L. Greene of the Oak Ridge National Laboratory examined in detail the impact on United States' energy security of GTL fuels being produced outside of the United States.[24] Based on his study, Greene concluded that because GTL fuels are a direct substitute for imported oil, the emergence of a GTL industry abroad could reduce the United States' oil imports, and in turn, reduce OPEC's market power. In essence, a GTL industry abroad could become a formidable OPEC competitor. Such a competitor may diminish OPEC's ability to raise oil prices from $18 a barrel to $30 a barrel on a whim, as OPEC did in the first quarter of the year 2000.

C. Syntroleum S-2 Fuel Is a Logical Substitute for Petroleum-Based Fuels Because Its Full Fuel-Cycle Is Potentially More Efficient than the Full Fuel-Cycle for RFD and RFG.

M. L. Wang and H. S. Huang of the Argonne National Laboratory developed a model to estimate the full fuel-cycle energy and emission impacts of conventional and alternative fuels, including FT diesels such as S-2, produced from natural gas and flared gas feedstocks. This model is known as the Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation ("GREET") model.[25] The GREET full fuel-cycle uses the following three stages of the fuel-cycle to evaluate energy use and emissions: (1) feedstock production, including transportation to fuel production facilities, (2) fuel production, including transportation and distribution to fueling locations, and (3) vehicle operation.

Using the GREET model, Syntroleum compared the full fuel-cycle energy efficiency (as well as GHG emissions) of S-2 produced from natural gas (gas delivered through a distribution infrastructure that serves a market) and flared gas to the full fuel-cycle energy efficiency of RFG and GREET reformulated diesel ("GREET Reformulated Diesel"). The GREET model takes into account the energy required to lower the sulfur levels of gasoline and diesel to 30 ppm and 50 ppm, respectively. However, EPA has announced that it will set Tier 2 diesel fuel sulfur specification at 15 ppm.[26] Therefore, S-2 should be compared to diesel fuel with a sulfur level of 15 ppm. In other words, the total energy required and GHG emissions produced during the sulfur removal and hydrotreating process must be taken into consideration. Accordingly, Syntroleum calculated the energy and hydrogen required to lower the sulfur level of

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[24] *See id.*

[25] Wang, M.Q., *GREET 1.5 – Transportation Fuel-Cycle Model*, Vol. 1 and Vol. 2, (Aug. 1999), http://www.ipd.anl.gov/anlpubs/1999/10/34035.pdf and http://www.ipd.anl.gov/anlpubs/1999/10/34034.pdf.; *see also* Wang, M.Q., *A Full Fuel-Cycle Analysis of Energy and Emissions Impacts of Transportation Fuel*, ANL, (Dec. 1999), http://www.ipd.anl.gov/anlpubs/2000/01/34988.pdf.

[26] *EPA Proposes Cutting Sulfur in Diesel Fuel; Lowering Truck Emissions*, Daily Report for Executives (BNA), May 18, 2000.

GREET Reformulated Diesel from 50 ppm to 15 ppm, referred to herein as RFD. Then, Syntroleum combined the result with the GREET model to compare total energy and emissions. The results of those calculations and the process parameters are shown in Attachment 3. The energy requirements for the production of S-2 during each phase of the full fuel-cycle are shown in Table 2 below.

Table 2 - Total Energy – Btu/mi

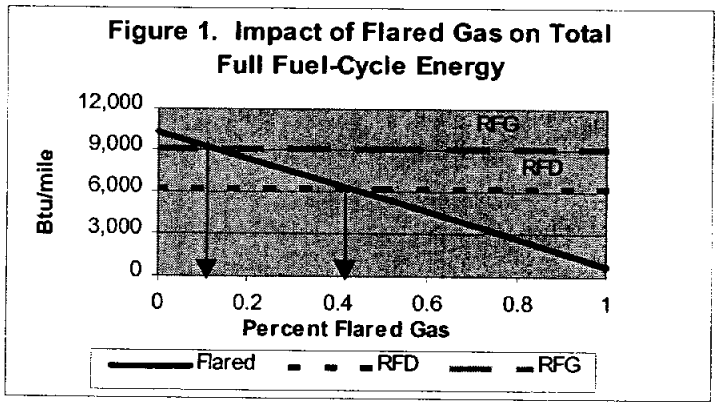
	Feed	Fuel	Vehicle	Total
S-2 from Natural gas	319	4,897	5,116	10,331
S-2 from Flared gas	319	-4,666	5,116	769
RFD \a\	185	1,036	5,060	6,281
RFG	266	1,606	7290	9,162

\a\ GREET model energy plus energy required to produce 15 ppm RFD

When S-2 fuel is produced from flared gas its full fuel-cycle is 88% and 92% more energy efficient than RFD and RFG, respectively. Energy that would otherwise be wasted as gas is flared and can be converted into clean S-2 with lower emissions than either of the two comparative fuels. The possibilities for S-2 to be made from flared gas are numerous. As mentioned above, in 1997, the United States alone produced 0.26 tcf of vented or flared gas, which could produce 800 million gegs of S-2. Moreover, over 10 times that amount of gas was flared worldwide. The gas flared worldwide could produce an amount of S-2 equal to 33% of all the diesel fuel consumed for transportation use in the United States each year.

However, not all of the S-2 can be made from flared gas.[27] Although many factors can influence the mix between the two sources of feedstock gas, project economics will be a critical factor. In many circumstances where gas is flared, its cost will be lower than the cost of natural gas produced for market. The critical economic role of feedstock gas prices will drive GTL project development towards flared gas.

Figure 1, below, illustrates that using just a small percentage of flared gas as an S-2 feedstock makes S-2 as energy efficient as, if not more energy efficient than, RFG or RFD.



[27] *See infra*, discussion at Section VII.B.2. (discussing the use of flared gas as a feedstock and its impact on GHG emissions).

Depending upon the fuel it displaces, the percent of flared gas used as a feedstock that is required to make S-2 energy "neutral" ranges from 10 to 40%. Any amount of flared gas over those percentages would result in net energy savings, as discussed above.

D. Syntroleum S-2 Fuel's Full Fuel-Cycle Uses Substantially Less Petroleum than RFD and RFG, Regardless of Whether It Is Produced From Natural Gas or Flared Gas.

As shown in Table 3, below, when S-2 fuel is produced from either natural gas or flared gas, the full fuel-cycle petroleum use is 96% and 97% less than the full fuel-cycle petroleum use of RFD and RFG, respectively.

Table 3 - GREET Full Fuel-Cycle Petroleum Use – Btu/mi

	Feed	Fuel	Vehicle	Total
S-2 from Natural gas	23	168	0	191
S-2 from Flared gas	23	165	0	188
RFD \a\	48	462	5,060	5,571
RFG	69	661	6,397	7,127

\a\ GREET Model petroleum use plus petroleum required to produce 15 ppm RFD

Moreover, S-2 has a carbon ratio of 85% (by weight) and a lower heating value ("LHV") of 121,600 Btu/gallon, making one gallon of S-2 used in a vehicle equivalent to 1.08 gallons of gasoline on an energy equivalent basis. Thus, S-2 use reduces petroleum use during vehicle operation. Efficiencies of diesel and gasoline full fuel-cycles are compared in more detail in Section VII.

VII. CRITERION THREE: SUBSTANTIAL ENVIRONMENTAL BENEFITS

Finally, Section 301(2) of EPAct provides that the Secretary may deem a fuel an alternative fuel only if use of the fuel has substantial environmental benefits. *See* 42 U.S.C.A. § 13211(2) (West 1999). S-2 meets this criterion for the reasons explained below.

A. Emission Reductions in Criteria Pollutants, Nitrous Oxide, and Air Toxics

S-2 fuel is an ultra clean liquid fuel with highly desirable properties for reducing emissions in diesel engines. Some of its attributes are:

- High cetane number
- No detectable sulfur
- No detectable aromatics
- Low density and high hydrogen content

Numerous studies have shown that FT diesel fuels with these attributes reduce emissions and perform well in diesel engines.[28] Explanations for the reduction of PM by synthetic paraffin diesel include the absence of sulfur and the high fuel hydrogen to carbon ratio (non-detectable aromatics). Its high cetane may assist in the reduction of CO, HCs, and aldehyde emissions, and its low aromatic content appears to reduce air toxins. Related properties of S-2 and similar FT fuels, which include lower fuel density, high hydrogen content, and high cetane may reduce flame temperature, and thereby reduce NO_x production.

Syntroleum tested S-2 fuel independently, at Southwest Research Institute ("SwRI"), against conventional EPA #2 diesel, California CARB specification diesel fuel, and Swedish City diesel fuel. Based upon the attributes discussed above, CARB diesel fuel and Swedish City diesel fuel are the cleanest diesel fuels commercially available today. Table 4, below, compares the specifications of these fuels as tested to S-2.

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[28] *See, e.g.*, T.W. Ryan, *Emission Performance of Fischer-Tropsch Diesel Fuels: Gas to Liquid Processing*, Intertech Conference, (1999); T.W. Ryan, III and D. Montalvo, *Emissions and Performance of Fischer-Tropsch Diesel Fuels in a Modern Heavy Duty Diesel Engine* (1997); P.W. Schaberg et al., *Diesel Exhaust Emissions Using Sasol Slurry Phase Distillate Process Fuels*, SAE Technical Paper 972898 (1997); P. Norton et al., *Emissions from Trucks using Fischer-Tropsch Diesel Fuel*, SAE Technical Paper 982526 (1998); B. Martin et al., *Influence of Future Fuel Formulations on Diesel Engine Emissions - A Joint European Study*, SAE Technical Paper 972966 (1997).

Table 4. Diesel Fuel Specifications

	S-2	EPA #2	CARB	Swedish
Specific Gravity	0.77	0.85	0.83	0.82
Sulfur, ppm	0	350	155	<1
Aromatics, vol %	0	31	8	4
Cetane Number	74	47	51	52

SwRI performed a series of tests in a 5.9-liter Cummins heavy-duty diesel engine on an engine dynamometer to compare S-2 fuel's emissions of criteria pollutants,[29] air toxics, and nitrous oxide ("N_2O"), to these other diesel fuels. SwRI also performed a series of tests using the same engine in a Dodge RAM 2500 HD Quad Cab SLT on a chassis dynamometer and a 1.9-liter light-duty diesel engine in a 1999 Volkswagen Golf GL TDI on a chassis dynamometer. Emissions data acquired during these tests are attached as Appendices A-L. Summaries of the SwRI test results are presented in Attachment 1.

SwRI's results, using the engine dynamometer tests and the chassis dynamometer tests, for the Cummings engine were so similar that, for purposes of comparing S-2 emissions to other diesels in this section, reference will only be made to the heavy-duty engine testing (on an engine dynamometer). However, later when Syntroleum compares S-2 to RFD using the GREET model, it cites emission results from the chassis tests for the Dodge RAM in order to be consistent with the model's LDT2 vehicle.[30] In addition, Syntroleum cites the test results for the Volkswagen equipped with exhaust emission control devices in its discussion of the enabling benefits of S-2 on after treatment devices.

1. Emission Reductions of Criteria Pollutants, Nitrous Oxide, and Air Toxics – the SwRI Engine Tests

a. Criteria Pollutants

(i) Tier 1 Emissions Standards

At the outset, it is notable that S-2 met or exceeded the applicable EPA Tier 1 emissions standards appropriate for each test platform according to the year of manufacture and vehicle category. For the engine tests, the applicable protocol was the EPA transient test. For the chassis tests, the applicable protocol for measuring criteria pollutants is EPA's Federal Test Procedure ("FTP"), or the city protocol, whereas EPA's Highway Fuel Economy Test ("HFET"), or the highway protocol, is used for fuel economy

[29] Criteria pollutants are listed pursuant to Section 108 of the Clean Air Act ("CAA"), and include particulate matter ("PM"), sulfur dioxide ("SO_2"), nitrogen oxides ("NO_X"), carbon monoxide ("CO"), volatile organic compounds ("VOCs")/ ozone, and lead ("Pb"). *See* 40 C.F.R. pt. 50 (1999). (Hydrocarbon ("HC") is frequently considered a criteria pollutant because it contributes to the formation of ozone). The term "criteria pollutants," as used herein, refers to any combination of these pollutants.

[30] The vehicle tested had a curb weight of 6,250 pounds consistent with the GREET category LDT2 vehicle (GVW between 6,001 and 8,500 pounds).

standards. The Aggressive Driving Test Protocol ("US06") is an addendum to the FTP protocol.

Table 5. EPA Emissions for Heavy-duty Engine \a

Test	Emissions Results, g/bhp-hr			
	HC	CO	NOx	PM
EPA Standards	1.3	15.5	4.0	0.10
S-2	0.1	0.8	3.1	0.06

\a\ EPA transient testing of a 5.9L Cummins B diesel engine (built Jan. 11, 1999) on an engine dynamometer with a CM 551 engine control module.

Table 6. FTP Emissions for Heavy Light-duty Vehicle \a\, \b

Test	FTP Emissions Results, g/mi				
	THC	NMHC	CO	NOX	PM
EPA Standards	NS	0.39	5.0	NS	NS
S-2	0.26	0.26	0.7	7.0	0.04

\a\ 2000 Dodge RAM 2500 HD Quad Cab SLT with a Cummins B 24-valve Turbo Diesel engine on a chassis dynamometer.
\b\ Shown for comparative purposes only because the applicable emission standards for this vehicle are based on the Cummings engine tested on the engine dynamometer.

Table 7. FTP Emissions for Light-duty Vehicle \a

Test	FTP Emissions Results, g/mi				
	THC	NMHC	CO	NOX	PM
EPA Standards	0.41	0.25	3.40	1.00	0.08
S-2	0.03	0.02	0.10	0.78	0.03

\a\ 1999 Volkswagen Golf GL TDI with a 1.9 L diesel engine on a chassis dynamometer.

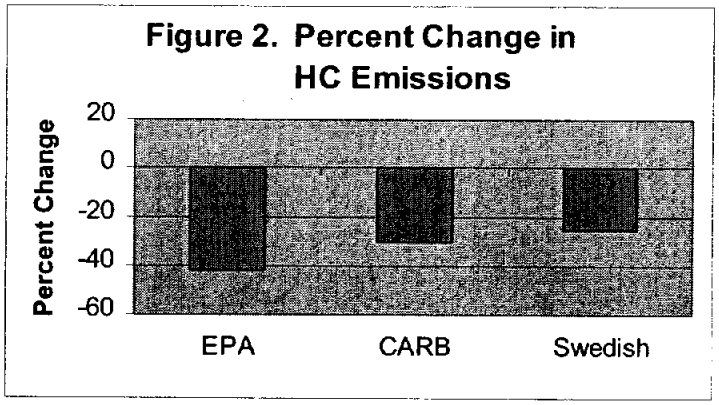
(ii) Relative Emissions Performance v. Test Fuel

The SwRI tests revealed that S-2's emissions of criteria pollutants are significantly lower than each of the other fuels tested. Table 8 shows the results of those tests and Figures 2 through 5 illustrate the percent change in S-2 emissions for each criteria pollutant.

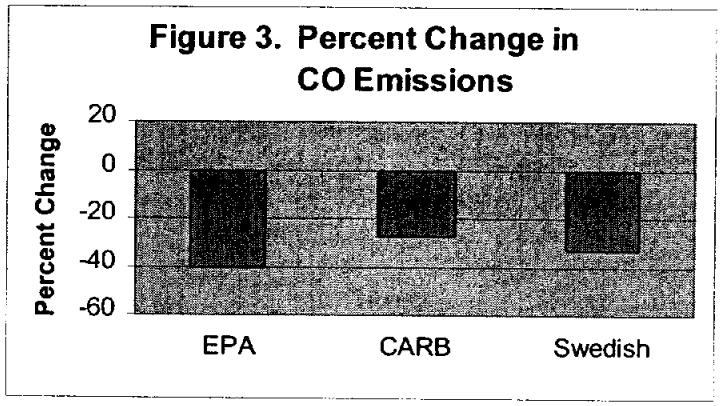
Table 8. Criteria Pollutants \a

	Measured Emission, g/bhp-hr \b\			
	HC	CO	NOx	PM
EPA #2 Diesel	0.12	1.2	4.0	0.10
CARB Diesel	0.09	1.1	3.7	0.08
Swedish City Diesel	0.09	1.2	3.6	0.08
S-2	0.07	0.8	3.2	0.06

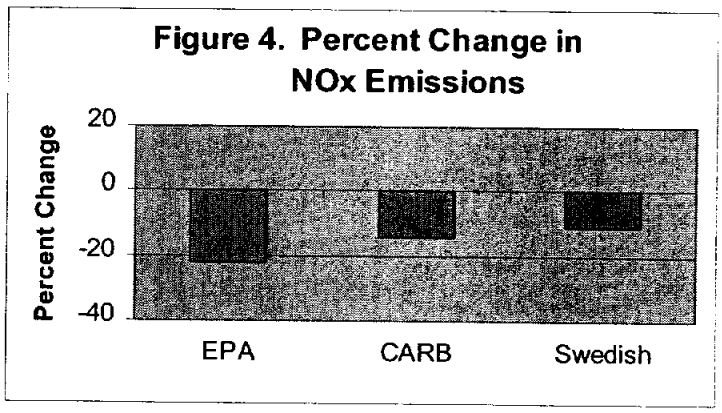
\a\ Heavy-duty engine tests
\b\ Some rounding in reported results



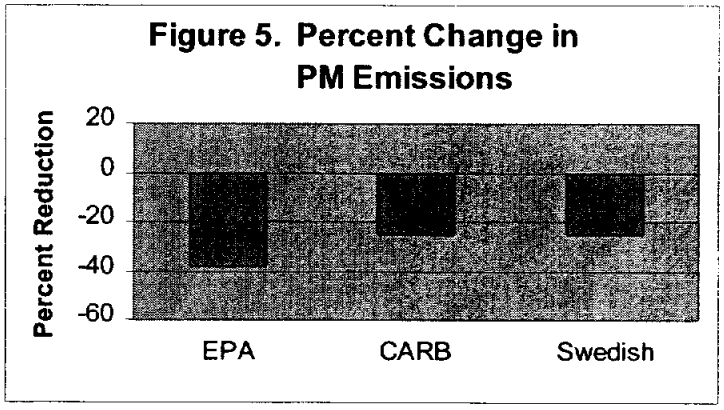
The results of the SwRI tests indicate that the HC emissions are reduced by 42% compared to EPA # 2 diesel, 30% compared to CARB diesel, and 25% compared to Swedish City diesel.



The results of the SwRI tests indicate that the CO emissions are reduced by 40% compared to EPA #2 diesel, 27% compared to CARB diesel, and 33% compared to Swedish City diesel.



The results of the SwRI tests indicate that the NO_x emissions are reduced by 22% compared to EPA #2 diesel, 14% compared to CARB diesel, and 11% compared to Swedish City diesel.



The results of the SwRI tests indicate that the PM emissions are reduced by 38% compared to EPA diesel, 25% compared to CARB diesel, and 25% compared to Swedish City diesel.

These tests indicate that S-2's emissions of criteria pollutants are significantly lower than the ultra low sulfur Swedish City diesel. This is particularly relevant because the sulfur level of Swedish City diesel (<1 ppm) is more than an order of magnitude lower than the 15 ppm, the proposed Tier 2 diesel fuel standard.

Additionally, the World-Wide Fuel Charter recommends that diesel fuel for "markets with further advanced requirements for emission control, to enable sophisticated NO_x and PM after treatment technologies" should be sulfur free, like S-2.[31]

b. Air Toxics and Nitrous Oxide

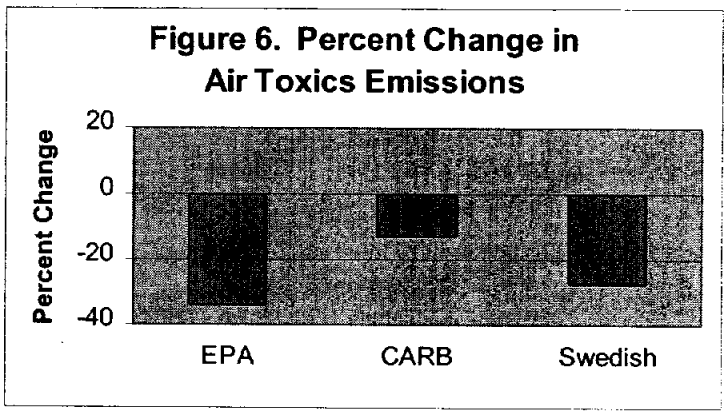
The SwRI tests reveal that S-2 fuel's emissions of air toxics and N_2O are considerably better than emissions of EPA #2 diesel, CARB diesel, and Swedish City diesel. In order for these tests to be compatible with criteria emissions discussed above, the heavy-duty engine tests are shown in Table 9. Tests for air toxics and N_2O were also conducted for heavy light-duty and light-duty vehicles. The results of these tests are appended in Attachment 1. Figures 6 and 7 illustrate the percent change in S-2 emissions for air toxics and N_2O, respectively.

[31] European Automobile Manufactures Association, Alliance of Automobile Manufactures, Engine Manufactures Association and the Japan Automobile Manufactures Association, World-Wide Fuel Charter, (Apr. 2000), http://www.acea.be/acea/WWFCharter042000.pdf.

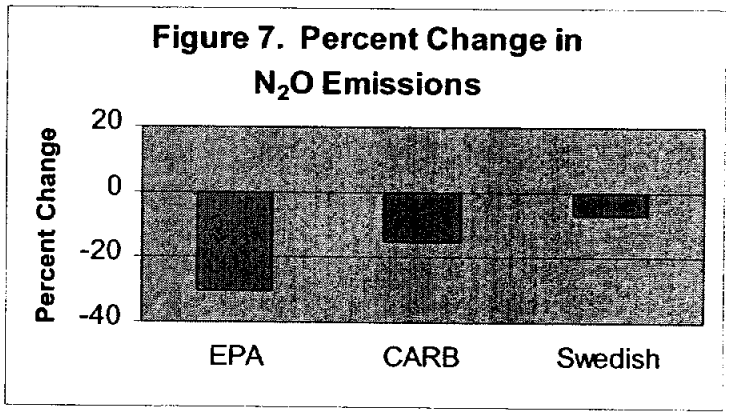
Table 9. Air Toxics and Nitrous Oxide \a

	Measured Emission, mg/bhp-hr	
	Air Toxics	N_2O
EPA #2 Diesel	23.8	7.1
CARB Diesel	17.9	5.9
Swedish City Diesel	21.5	5.4
S-2	15.6	5.0

\a\ Heavy Duty engine tests



The results of the SwRI tests indicate that the air toxic emissions are reduced by 34% compared to EPA #2 diesel, 13% compared to CARB diesel, and 27% compared to Swedish City diesel. Aldehyde and ketone emissions, also determined as part of the HC speciation, show very similar reductions.



The results of the SwRI tests indicate that the N_2O emissions are reduced by 30% compared to EPA diesel, 15% compared to CARB diesel, and 7% compared to Swedish City diesel.

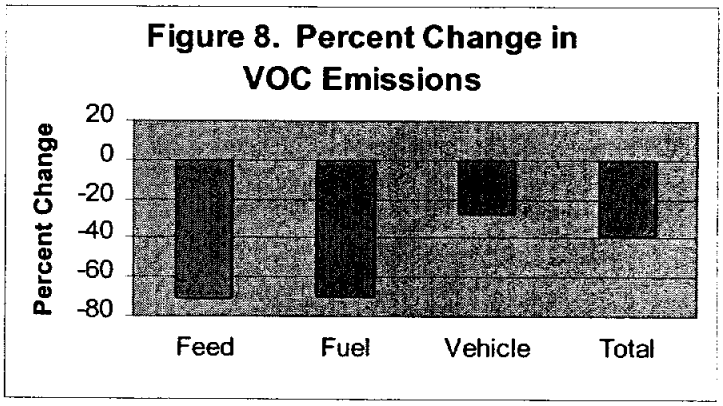
2. Reduction in Total Full Fuel-Cycle Emissions for Criteria Pollutants - GREET Model.

Full fuel-cycle emissions for S-2 (made from either non-flared or non-vented natural gas or from flared or vented gas) and RFD (15 ppm sulfur) were determined by adding the results from the GREET model to additional emissions determined by Syntroleum's analysis for RFD. Table 10, below, shows the emissions of the criteria pollutants for S-2 and RFD for the full fuel-cycle. Figures 8 through 12 illustrate the percent change in S-2 emissions for each pollutant during the feedstock production (including transportation), fuel production (including distribution), and vehicle operation phases of the full fuel-cycle.

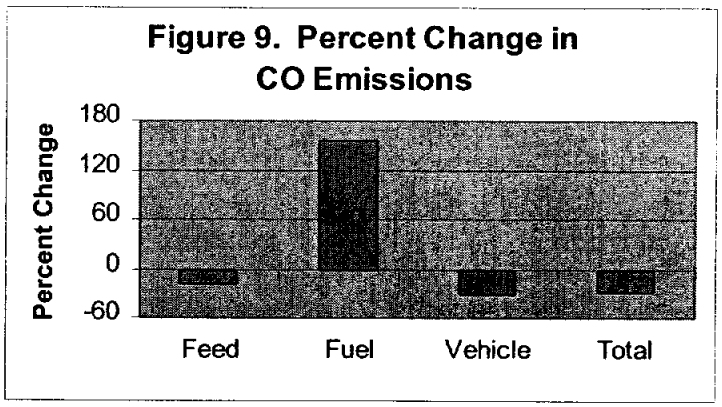
Table 10. Full Fuel-Cycle Emissions

	Estimated Emission, g/mi				
	VOC	CO	NO_x	PM	SO_x
RFD \a\	0.16	5.77	0.37	0.06	0.09
S-2 \b\	0.10	4.08	0.29	0.04	0.02

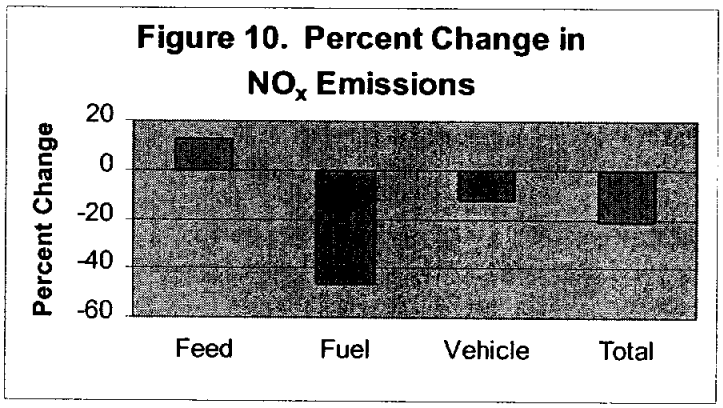
\a\ GREET model emissions plus emissions associated with production of 15 ppm RFD
\b\ Analysis for S-2 is based upon S-2 made from natural gas - either non-flared or non-vented gas or flared or vented gas. Full fuel cycle emissions for criteria pollutants from S-2 are consistent, regardless of whether the natural gas feedstock is vented or flared.



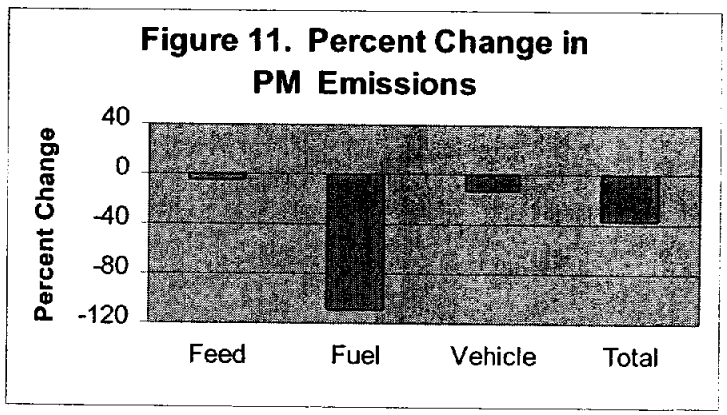
Reductions in VOCs are seen in all phases of the fuel-cycle, 71% during feedstock production, 70% during fuel production, and 27% during vehicle operation. S-2's total full fuel-cycle emissions of VOCs are 39% lower than those of RFD.



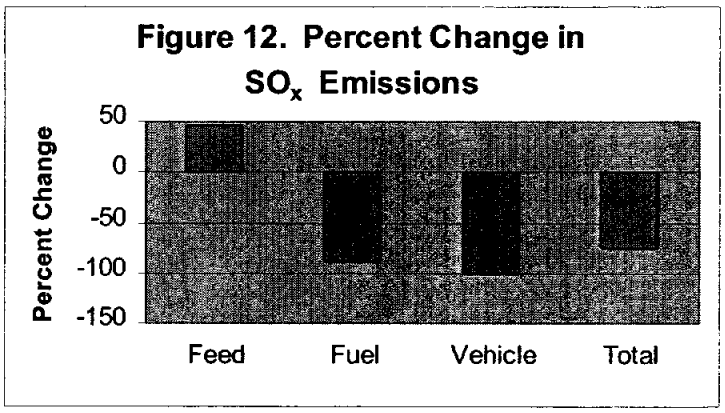
Reductions in CO emissions occur in two of the phases of the fuel-cycle, 18% during feedstock production and 31% during vehicle operation. Notwithstanding the increase in CO emissions during fuel production, the total full fuel-cycle reduction in S-2 emissions of CO compared to RFD is 29%.



Reductions in NO_x are seen in two of the phases of the fuel-cycle, 46% during fuel production and 12% during vehicle operation. Notwithstanding the slight increase in NO_x emissions during feedstock production (which was attributed the use of fuels other than S-2 during the production phase), the total full fuel-cycle reduction in S-2 emissions of NO_x compared to RFD is 21%.



Reductions in PM are observed in all phases of the fuel-cycle, 5% during feedstock production, 109% during fuel production, and 12% during vehicle operation. Total full fuel-cycle reduction in S-2 emissions of PM compared to RFD is 36%.



Reductions in sulfur oxides ("SO_x") occur in two of the phases of the fuel-cycle, 89% during fuel production and 100% during vehicle operation. Notwithstanding the increase in NO_x emissions during feedstock production (which was attributed to the use of fuels other than S-2 during the production phase), the total full fuel-cycle reduction in S-2 emissions of SO_x compared to RFD is 75%.

B. Emission Reductions in Greenhouse Gases

1. Emission Reductions in Greenhouse Gases – the SwRI Engine Tests

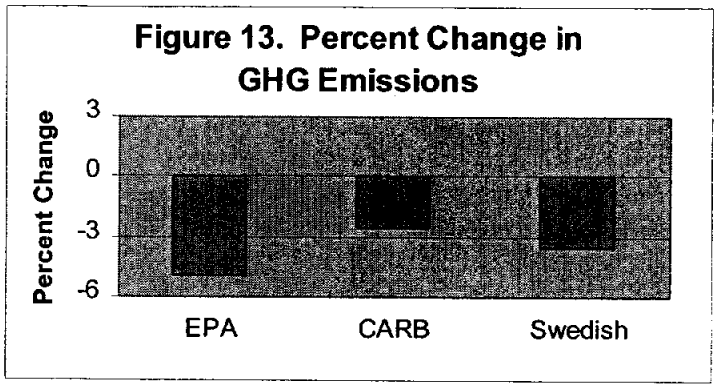
SwRI performed tests to compare the emissions of GHGs for S-2 to the test diesel fuels mentioned above. The GHGs measured included: carbon dioxide ("CO_2"), methane ("CH_4"), and N_2O. To evaluate total GHGs, the GREET model converted the emission rates for CH_4 and N_2O to the CO_2 equivalent based on the 100-year global warming potential ("GWP") factors as cited by the Intergovernmental Panel on Climate Change. For example, the GWP conversion factors for CH_4 and N_2O were 21 and 310, respectively.

GHG emission tests were run on the Cummings 5.9 L engine as tested on an engine dynamometer and in the Dodge Ram on a chassis dynamometer and on the 1.9L Volkswagen on a chassis dynamometer. Table 11 summarizes the total GHG emission for the various fuels as tested in the Heavy Light-duty vehicle in a combination cycle representative of that used in the GREET model (55% FTP test and 45% HFET test). Results of the engine and light-duty vehicle tests are in the appendices. Figure 13 illustrates the comparative results between the fuels tested.

Table 11. SwRI Total GHGs \a

	Measured Emission, g/mi
EPA #2	487
CARB	475
Swedish	480
S-2	463

\a\ Heavy Light-duty vehicle, 55% FTP/ 45% HFET



The results of the SwRI tests indicate that the GHG emissions are reduced by 4.9% compared to EPA #2 diesel, 2.5% compared to CARB diesel, and 3.5% compared to Swedish City diesel. It should be noted that in all cases, the majority of the improvement was due to lower CO_2 emissions with the S-2 fuel. The CH_4 and N_2O combined to contribute less than 1% of the total GHG emissions measured.

2. Estimated Reduction in Total Full Fuel-Cycle Greenhouse Gases - the GREET Model

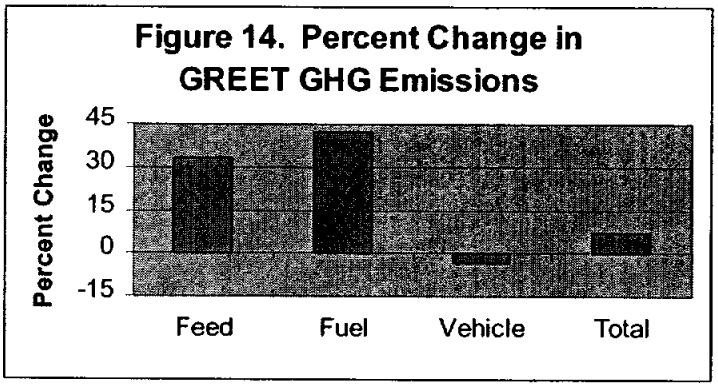
a. Preliminary Comparison Based on Syntroleum's Modified GREET Model

Full fuel-cycle emissions for S-2 (natural gas) and RFD (15 ppm sulfur) can be assessed by adding the results from the GREET model to additional emissions determined by Syntroleum's analysis for RFD. Table 12 shows the relative emissions of total GHGs during the feedstock production (including transportation), fuel production (including distribution), and vehicle operation phases of full fuel-cycle. Figure 14 illustrates the percent change in S-2 emissions for each of the three phases and the total GHGs.

Table 12. Full Fuel-Cycle GHG Emissions

	Estimated Emissions, g/mi			
	Feed	Fuel	Vehicle	Total
RFD \a\	27	93	405	525
S-2 \b\	37	132	393	561

\a\ GREET model emissions plus emissions associated with production of 15 ppm RFD
\b\ Analysis for S-2 is based upon an S-2 feedstock of natural gas from sources other than flared or vented gas.



A reduction of 3% in GHG emissions occurs during the vehicle operation phase of the fuel-cycle. Although there are increases during the feedstock production and the fuel production phases, these increases have a lesser impact because the bulk of the GHG emissions for all of the fuels are released during the vehicle operation phase. (See Table 12). Therefore, S-2's full fuel-cycle GHG emissions, in the preliminary comparison, are only 7% higher than those of RFD.

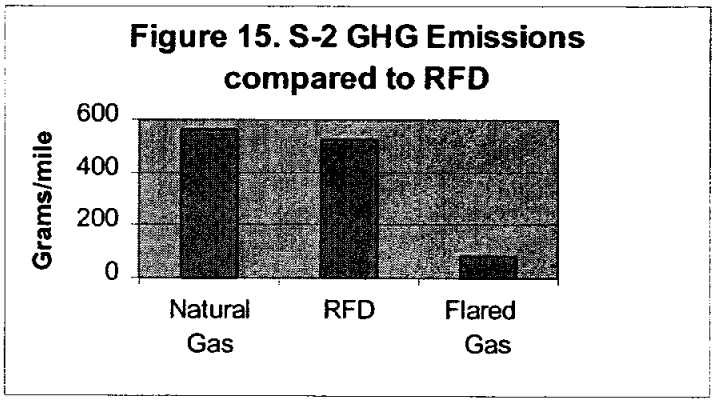
In summary, the preliminary GREET based comparison above suggests that S-2's total GHG emissions could be approximately 7% higher than those of RFD. However, this preliminary comparison does not take into account certain factors, which Syntroleum believes should be considered in a comprehensive comparison of GHG emissions. In particular, the preliminary GREET based comparison does not: (1) consider that S-2 will be produced from a combination of flared gas and pipeline quality natural gas on a worldwide basis; (2) consider the source of feedstock required to meet the increased demand for diesel fuel; and (3) consider that S-2 will displace RFG as well as RFD. Syntroleum believes that, if these three additional factors are taken into account in a comprehensive comparison of the GHG emissions, S-2's GHG emissions would be substantially equivalent to, if not lower than RFD's GHG emissions, and significantly lower than RFG's GHG emissions.

Syntroleum's reasons for believing that these three additional factors would lead to a more favorable comparison are set forth below.

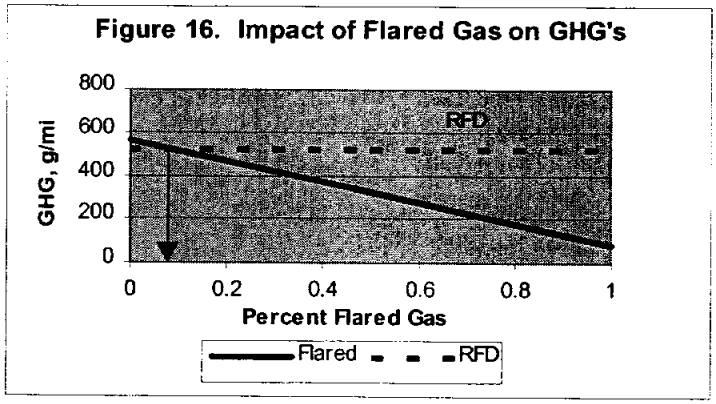
b. Comprehensive Comparison Taking into Account Three Additional Factors

(i) Flared Gas

Comparing the full fuel-cycles of S-2, produced from 100% flared gas, to RFD reveals that S-2 has significantly lower GHG emissions, as well as significantly lower criteria pollutant emissions, than RFD. The most dramatic shift is in the fuel production phase of the fuel-cycle. Generally, when gas is flared, the energy of oxidation is lost and the carbon is dumped as CO_2 directly to the atmosphere. Figure 15 compares the total GHG emissions for S-2 produced from either natural gas or flared gas, to the total GHG emissions for RFD.

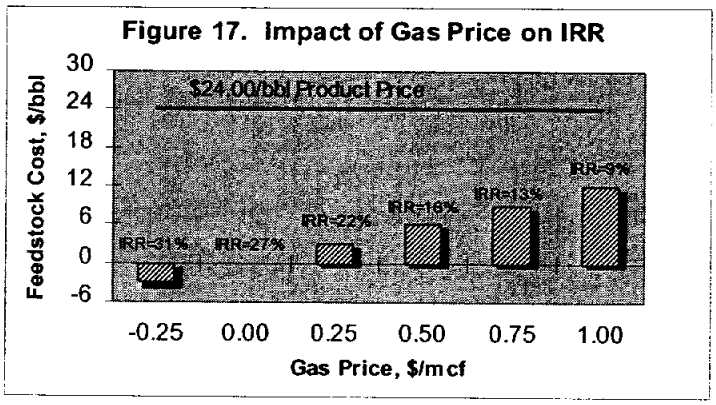


GHG emissions for S-2, produced from natural gas, are 558 grams per mile ("g/mi"), which is approximately 7% higher than the GHG emissions for RFD (525 g/mi). However, when S-2 is produced from flared gas, its GHG emissions are only 85 g/mi, which is 84% lower than GHG emissions for RFD. Moreover, when S-2 is produced from vented gas, the emissions reductions are even more significant because burned CH_4 has 21 times more impact on GHGs than combusted CH_4.
Figure 16, below, illustrates how increasing the percentage of flared gas used to produce S-2 can lower S-2'snet GHG emissions, such that S-2's GHG emissions are equal to or lower than those of RFD.



Accordingly, if approximately 10% of S-2 were to be produced from flared gas, its GHG emissions would be equal to those of RFD. Moreover, if more than 10% of S-2 were produced from flared gas, then S-2's GHG emissions would actually be more environmentally beneficial than RFD.

For the most accurate comparison of S-2's GHG emissions to RFD's GHG emissions, the crucial question is - what percent of S-2 will be produced from flared gas? Although there is no easy answer, it is clear that economic viability of S-2 production is a critical factor. Plants will be built in areas where manufacturers can access gas cheaply. As currently designed, the Syntroleum Process plants can economically produce S-2 at a price similar to that of RFD from oil, assuming that natural gas feedstock costs hold steady at approximately $1.00/mmbtu and a barrel of oil costs around $20.00 per barrel. The natural gas feedstock cost is essentially equal to the operating cost and capital cost combined. Figure 17, below, illustrates the potential impact of lowering feedstock costs on the project's internal rate of return.[32]



The difference between the product prices and feedstock costs (less capital charges and operating costs) directly affect the project margin. Any reduction in feedstock cost goes directly to the project's bottom line. As Figure 17 illustrates, small changes in the gas price lower the feedstock costs and dramatically improve the project economics.

All else being equal, flared gas is cheaper than pipeline natural gas and Syntroleum plants would use only flared gas. However, other factors that enter into the risk profile of the investment, such as the location of the gas, the size of the gas field, the political environment, and the infrastructure challenges, may counteract flared gas' price advantage. Certainly, lending institutions supporting any Syntroleum project would have key input into these decisions.

Nonetheless, there are other factors besides cost, such as carbon offset projects, that are likely to encourage the use of flared gas. For example, the conversion of flared gas to liquid fuel is an ideal candidate for the World Bank's Prototype Carbon Fund

[32] Figure 16 Basis: 25,000 bpd fuels plant, $23,000 per barrel (42 gallons) of installed capacity capital cost, $5.00 per bbl operating cost, 10 % discount rate and 15 year life.

("PCF").[33] The World Bank's PCF aims to promote a global market in GHG credits, operating strictly within the framework of the Kyoto Protocol. Memoranda of Understanding have been signed by 12 multinational companies and 5 governments to date, supporting the World Bank's PCF. The World Bank's PCF is projected to have about $100 million in funding to invest in 12-15 carbon offset projects over the next 3 years.

(ii) Increased Demand for Diesel

Not only is there a need for cleaner diesel fuel to meet Tier 2 standards, but the demand for diesel in the United States transportation sector is growing 3 times faster than gasoline. If this growth in diesel demand continues, 100,000 bpd of incremental diesel fuel will be required each year to keep pace. However, the options for more diesel production capacity are limited. This new supply of diesel fuel will likely come from new refining capacity to produce straight run diesel, from hydrocrackers or fluid catalytic cracking ("FCC") units to produce more diesel pool components and/or existing refinery streams whose current quality limits their use as viable components in the diesel pool. For example, current low-quality refinery streams include cracked gasoils produced from FCC units and delayed cokers. Table 12, below, compares their key properties to straight run diesel and hydrocracked diesel.

Table 13. Typical Refinery Diesel Pool Components

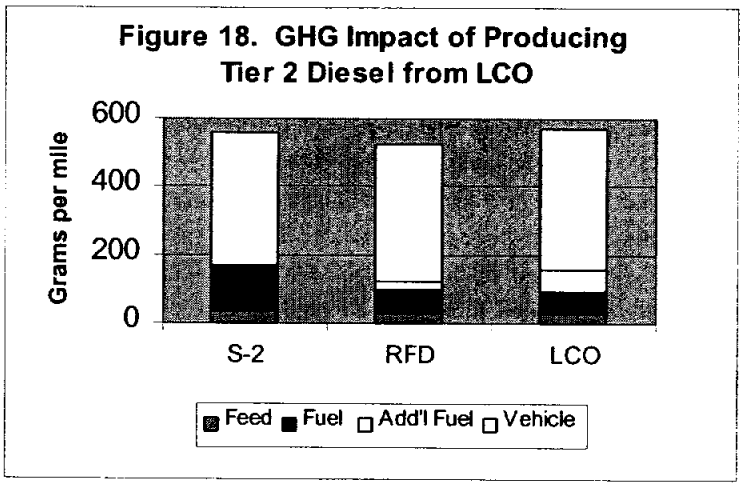
Property	Straight Run Diesel	Hydrocracked Diesel	Coker Diesel	FCC Cycle Oil
API	34	43	29	16
Sulfur, ppm	1K - 5K	10-50	10K – 20 K	1K – 20K
Aromatics, vol%	20	10	45	78
Cetane	51	58	30	20

Some quantities of these cracked gasoils are treated and blended with other straight run diesel streams and hydrocracked diesel streams to produce current EPA diesel fuels. However, the extremely high aromatic and sulfur content of these gasoils prohibit their complete use in the on-road diesel pool. Therefore, in many cases the gasoils end up in the bottom of the refinery product barrel as fuel oil, or in some cases, in off-road diesel. Selling these lower quality product streams is becoming more difficult because the preference for natural gas in many areas of the country, for power generation and industrial use, is eroding their traditional markets. In addition, the use of these lower quality streams may be further limited by the EPA's consideration of imposing lower sulfur levels for off-road diesel.

The net effect of the greater demand for diesel fuel is that refiners will be able to supply the necessary quantities of clean diesel that meets Tier 2 diesel specifications, only if they build new primary crude distillation capacity and/or utilize the resources they have in hand, cracked gasoils. In doing so, this supply of diesel will require more energy for process heat and more natural gas being converted to hydrogen to remove the sulfur (and aromatics). The end result will be higher emission levels of

[33] *See* http://www.prototypecarbonfund.org/

CO_2 and total GHG emissions for each barrel of ultra-low sulfur diesel produced. Figure 18 below shows the potential impact on GHG emissions when a cracked gasoil, such as FCC light cycle oil ("LCO"), is hydrotreated in order to produce clean diesel meeting Tier 2 Sulfur levels. The hydrotreating process parameters are shown in Attachment 3.



When Tier 2 diesel fuel is produced from LCO, the total GHG emissions are 569 g/mi, which is 8% higher than GHG emissions of RFD (525 g/mi). As mentioned above, the total GHG emissions of S-2, produced from natural gas (558 g/mi) only exceed the GHG emissions of RFD by 7%. Thus, total GHG emissions of LCO exceed total GHG emissions of S-2 by approximately 1%. Depending upon the quality of the cracked gasoil streams, the other diesel pool blend components, and various assumptions concerning the hydrotreating process, the GHG emissions could be even higher.

(iii) Displacement of RFG

Although Syntroleum is aware that S-2 is a direct replacement for RFD, not RFG, Syntroleum asserts that S-2 will also displace RFG, albeit somewhat indirectly. As mentioned above, diesel demand in the transportation sector is growing at a rate 3 times faster than gasoline. As shown in Table D, Attachment 4, the growth rate of diesel fuel consumption in the United States from 1992 to 1999 was 4.8%, whereas the growth rate of consumption of gasoline was much lower at 1.6%. This difference is indicative of a trend to replace gasoline engines with cleaner more efficient diesel engines. This trend is reflected in EPA's recent announcement of its Tier 2 standard, which states that automobile manufacturers plan "to increase sales of diesel-powered light-duty trucks and cars over the next few years."[34]

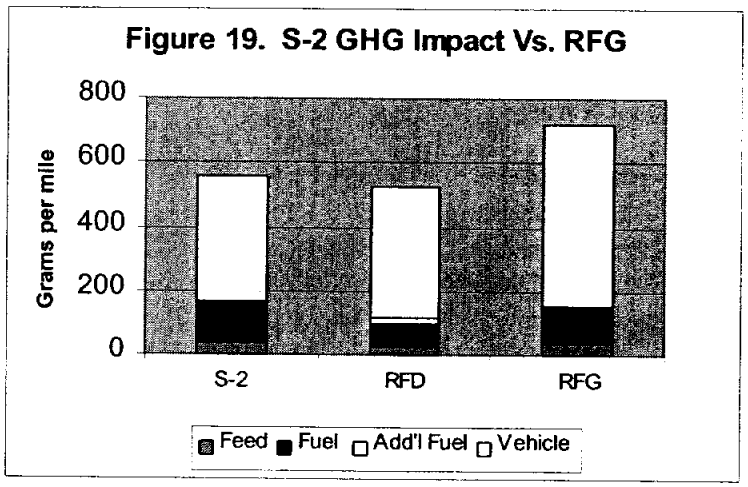
Moreover, according to Ward's Motor Vehicle Facts and Figures 1999, trucks continue to grow in popularity, supplanting cars as the dominant vehicle type in the United States by taking 49% of the new-vehicle market in 1998. In fact, Ward's

[34] *See* http://www.epa.gov/otaq/diesel.htm.

commented that: "The biggest factor in the increased truck sales was a 15% rise in deliveries of sport/utility vehicles of 1997, as the segment continued hitting new all-time highs for sales . . . accounting for 17.5% of the combined car and truck market in 1998." Currently, 5% of all these vehicles in the light truck category (0 to 14,000 gross vehicle weight ("GVW")) have diesel engines. The conversion from gasoline to diesel engines is growing each year, as evidenced by 12% growth for the two year period, 1996-1998 and 44% growth for the one year period, 1997-1998. In the heavier portion of this category, where some of the most popular full sized SUVs and larger pickup trucks are found (6,001 to 14,000), the conversion from gasoline engines to diesel engines was even greater, 18% for 1996-1998 and 50% for 1997-1998.

In addition, increased importation of SUVs from foreign automanufacturers that have a strong diesel market in their home countries is likely to increase the number of diesel vehicles in the United States. One year after its introduction to the United States, the sale of the Mercedes M Class SUV increased almost 300%. Heretofore, these manufacturers have largely supplied gasoline engines into the United States because that has been the engine demanded by the United States consumer. With availability of cleaner diesel fuels, manufacturers of diesel powered vehicles should be able to bring their diesel technology and experience into the United States' marketplace.

Figure 19, below, compares the total GHG emissions of S-2 compared to RFD and RFG.



As mentioned above, the GHG emissions of S-2 made from natural gas (558 g/mi) are slightly higher than the GHG emissions of RFD (525 g/mi). However, Figure 19 clearly shows that S-2's GHG emissions are 22% lower than RFG's GHG emissions (720 g/mi). Notably, if 15 to 20% of the S-2 produced displaces RFG, then the overall impact of S-2 on GHG emissions would be neutral.

In light of the first two factors discussed above – flared gas and the increased demand for diesel – S-2's actual GHG emissions during its full fuel-cycle are

substantially equivalent to, or better than, RFD's GHG emissions. Moreover, S-2, even when it is produced from 100% pipeline quality natural gas, has lower GHG emissions than RFG.

C. Other Environmentally Beneficial Attributes of S-2

1. Zero Sulfur in S-2 Enables Use of After Treatment Technologies.

As summarized above, certification of S-2 as an alternative fuel would help reduce direct exhaust emissions of criteria pollutants, N_2O and air toxics. Moreover, certification of S-2 would reduce emissions by enabling the development of new diesel engines and after treatment technologies that have been proven to be highly effective when used with low sulfur fuels,[35] and by enabling fuel cell commercialization.

The Tier 2 standards that EPA has announced call for reductions in the sulfur content of gasoline in order to enable advanced catalyst technologies needed to achieve the new emission standards for gasoline engines. In developing the Tier 2 standards, the EPA has adopted a "fuel-neutrality" approach by applying emission standards equally to diesel and gasoline powered vehicles. As a result, the proposed NO_x and PM standards are far more challenging for diesel engine designers. In their Advanced Notice of Proposed Rulemaking ("ANPR"), Control of Diesel Fuel Quality,[36] EPA recognized that diesel vehicles may not be able to meet Tier 2 standards without the development of advanced technologies for emissions control. Attachment 5 contains certain excerpts and quotes from the EPA, emphasizing the need for lower sulfur levels in future diesel fuels.

The EPA divides sulfur-sensitive technologies into two categories. One category is for those technologies that are moderately sensitive to sulfur reductions in diesel fuel, and the second is for those technologies that are highly sensitive to sulfur levels in diesel fuel. The potential benefits for several technologies under development today are listed below in Table 13.

Table 14. Sulfur-Sensitive Technologies

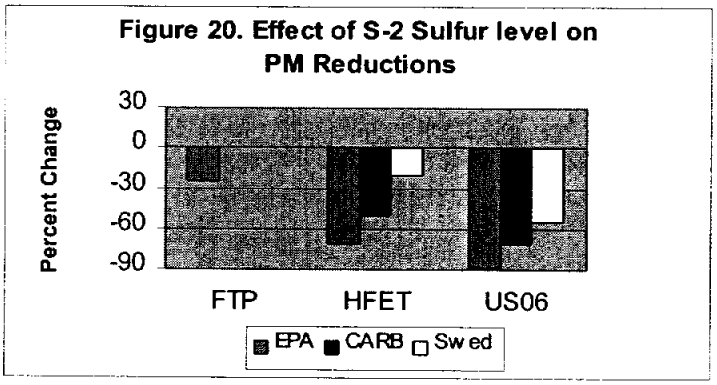
	Application	Emission	Potential Reduction %
Category 1– Moderately Sulfur Sensitive			
Exhaust Gas Re-circulation	HD & LD	NO_x	35 - 90
Oxidation Catalysts	HD & LD	PM	20-50
Continuously Regenerating Traps (CRT)	HD & LD	PM	>80
Category 2 – Highly Sulfur Sensitive			
NO_x Storage /Absorption	HD & LD	NO_x	50-90

[35] *Navistar's Green Diesel Technology Allows California Air Resources Board to Examine Clean-Diesel Option*, Navistar Int'l Corp., (Jan. 2000), biz.yahoo.com/prnews/00127/ca_navista_1.html.

[36] *See* 64 Fed. Reg. 26142 (May 13, 1999).

Engine manufacturers have suggested that sulfur levels should be capped at 5 to 10 ppm, although the need for even lower levels has also been widely debated. Even for those technologies that require low-sulfur fuel to function, there may be a range of operation in which the technologies may be able to tolerate higher sulfur levels. However, emissions performance of these "sulfur-tolerant" technologies may be further enhanced by additional reductions in the fuel sulfur.

SwRI tested S-2 fuel in a 1999 Volkswagen Golf GL TDI equipped with a turbo-charged 1.9 liter CIDI engine equipped with an exhaust gas re-circulation ("EGR") system and an oxidation catalyst exhaust after treatment device. As could be expected given this vehicle's sophisticated anti-pollution devices, the measured results for all emissions were very low, and the differences between the fuels tested much smaller. However, there was one notable exception - the reductions in PM. Figure 20 shows the reductions in PM for the fuels tested versus S-2 for the three EPA test protocols.



During the FTP protocol, which involves city driving, no significant differences were seen among S-2 (which has no sulfur), CARB diesel (which has a low sulfur content), and Swedish City diesel (which contains <1 ppm sulfur). However, for that protocol, the S-2 emissions were 25% lower than the higher sulfur EPA #2 diesel. The lack of difference amongst the fuels in this test was surprising because there was a fairly wide range in sulfur emissions among these fuels in the other tests performed. In the HFET (highway) and US06 (aggressive driving) tests, for example, the differences in sulfur level likely became more pronounced because the catalytic after treatment devices were allowed to warm up and enter into their effective operating ranges. During the HFET test cycle, reductions in PM were seen for all S-2 when compared to the other tested fuels, 71%, 50% and 20% for EPA #2 diesel, CARB diesel and Swedish City diesel, respectively. For the US06 test cycle, 88%, 77%, and 55% reductions in PM were seen compared to EPA #2 diesel, CARB diesel, and Swedish City diesel, respectively.

It is interesting to note that although the Swedish City diesel has a sulfur content of <1 ppm, it generated significantly more PM emissions than S-2. These tests may indicate that the Volkswagen catalytic converter after treatment device was exposed to higher sulfur diesel prior to testing with Swedish City Diesel, and/or sulfur is not the only contributor to PM emissions.

2. The Innovative Design of Syntroleum S-2 Fuel Plants Significantly Reduces the Discharge of Treated Wastewater.

Based on current designs, a commercial scale S-2 plant is expected to use less than half as much makeup water and discharge less than 33% as much treated wastewater as a typical petroleum refinery of similar size. A third party laboratory has recently conducted bench scale tests that show an excellent response from Syntroleum Process water to both steam stripping and aerobic treatment. Further, the biologic treatment tests have shown that Syntroleum Process water is easier to treat than water from a typical refinery or chemical plant. Biologic systems have a more difficult time digesting some of the more complex species in typical refinery water (aromatics, for instance) than those in an S-2 plant water that does not contain those species. This allows facilities to have smaller treatment lagoons or tanks and shorter treatment residence times.

3. S-2 Is More Environmentally Friendly than Conventional Gasoline and Diesel fuel.

The recent problems with methyl-tertiary-butyl ether ("MTBE"), a component of gasoline, contaminating drinking water supplies in California and elsewhere in the United States, highlight the need for environmentally friendly fuels. MTBE is a significant contaminant in water supplies in areas where it is used. Moreover, conventional gasoline and diesel fuel contain sulfur compounds, heavy metals, aromatic hydrocarbons, and other chemical species which may be toxic, carcinogenic, and otherwise harmful to the environment.

In contrast, S-2 fuel consists substantially of saturated paraffins, and is free of the dangerous components present in conventional fuels. In addition, as mentioned above, S-2 fuel produces much lower particulate levels than diesel fuel in current production engines, as demonstrated by recent tests performed by SwRI.

In tests recently performed by Product Safety Labs, in order to compile data for our Material Safety Data Sheets, S-2 was tested for oral toxicity, primary eye irritation and primary skin irritation. As a result of those tests, Syntroleum was found to have no serious health effects. There were no signs of gross toxicity, adverse pharmacologic effect, or abnormal behavior upon ingestion or exposure to the skin. Some slight eye irritation was experienced that cleared up within 48 hours. Based on these tests, S-2 was classified as minimally irritating to the eyes and non-irritating to the skin.

VIII. CONCLUSION

S-2 is an ideal alternative fuel. It is beyond dispute that S-2 meets all three criteria established in Section 301(2) of EPAct, 42 U.S.C.A. § 13211(2) (West 1999). First, S-2 is substantially not petroleum. S-2 is produced solely from natural gas (including flared and vented gas), and therefore, it is 100% non-petroleum.

Second, S-2 has substantial energy security benefits because it is a logical substitute for petroleum-based fuels. There are plentiful natural gas sources in the United States and in foreign countries other than those belonging to OPEC. Accordingly, if S-2 becomes a formidable competitor to petroleum-based diesel, then the United States' reliance on OPEC oil would be reduced.

Finally, S-2's full fuel-cycle emissions of criteria pollutants, N_2O, and air toxics are significantly lower than those of conventional EPA #2 diesel and the ultra low sulfur diesels – CARB diesel and Swedish City diesel. Moreover, the SwRI tests revealed that S-2 has lower GHG emissions during vehicle operation than EPA #2 diesel, CARB diesel, and Swedish City Diesel. Further, S-2 produced from flared gas has significantly lower full fuel-cycle GHG emissions than RFD. In addition, S-2's GHG emissions are dramatically lower (22%) than those of RFG.

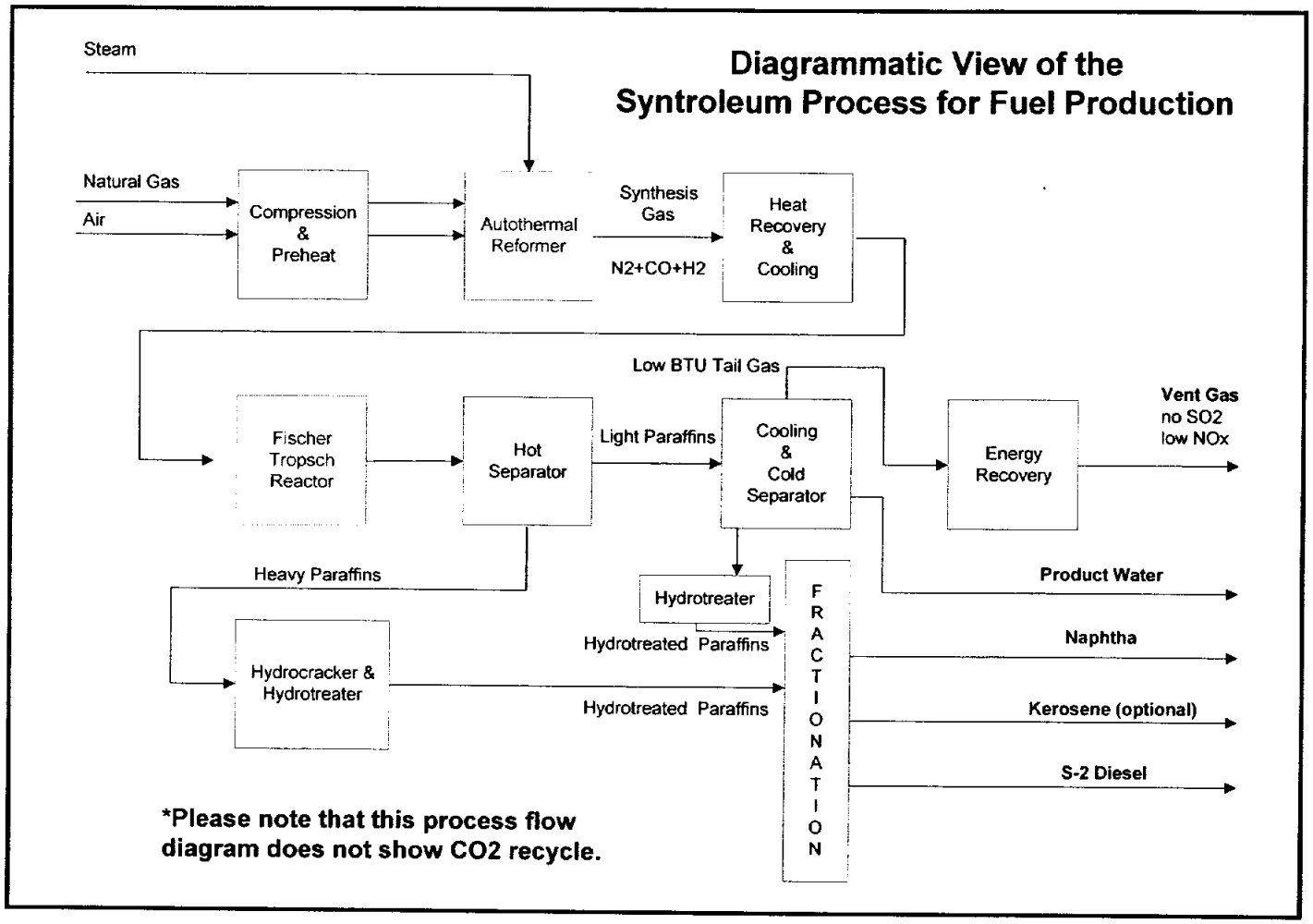
In fact, S-2's only potential drawback is its full fuel-cycle GHG emissions, which were estimated to be approximately 7% higher than those of RFD. However, on its face, this difference is negligible. Moreover, the 7% figure is based upon a preliminary comparison, which does not consider that the S-2 feedstock will be a combination of flared gas and pipeline quality natural gas, or that refining streams for RFD will get dirtier as demand for diesel increases. A more comprehensive comparison shows that S-2's GHG emissions are substantially equivalent to, or indeed lower than, those of RFD. For example, if merely 10% of S-2 is produced from flared gas, then S-2's and RFD's GHG emission levels are identical. And, if S-2's feedstock is more than 10% flared gas, then S-2's GHG emissions are more environmentally beneficial than RFD's. Further, a more comprehensive comparison shows that, given the growing demand for diesel, RFD's GHG emissions are actually 1% higher than those of S-2.

In addition, S-2 is a proven technology neutral fuel that has the potential to revolutionize transportation fuels because it enables dramatic emissions reduction in existing diesel engines, and it could accelerate commercialization of the fuel cell. Designation of S-2 as an alternative fuel would benefit consumers and the fuel industry.

For consumers, S-2 offers the convenience of using existing fuel distribution systems, and it meets vehicle power and range performance expectations. By eliminating the need for specially equipped vehicles or specialized refueling stations, S-2 can break the "chicken and egg" cycle that has challenged the widespread use of other alternative fuels to date. Ultimately, it could enable a seamless transition to future power technologies, such as fuel cells.

For the refining industry, S-2 offers a new path for providing clean transportation fuels. S-2 is a natural compliment to the current product slate of petroleum industry manufacturers. Although S-2 currently is intended to be used as a stand alone, neat fuel, it can also be an effective blending stock for meeting quality specifications for existing fuels during the transitional phases of the new EPA Tier 2 standards.

Figure 1 – Syntroleum Process Flow Chart



Attachment 1 – Summary of SwRI Emission Tests

SwRI tested S-2 fuel against conventional EPA #2 diesel, California CARB specification diesel fuel, and Swedish City diesel fuel to measure criteria pollutants, air toxics, N_2O and GHG emissions. All four fuels were tested in a 5.9-liter Cummins heavy-duty diesel engine on an engine dynamometer, in a Dodge RAM 2500 HD Quad Cab SLT on a chassis dynamometer (heavy light-duty vehicle) and in a 1.9-liter light-duty diesel engine in a 1999 Volkswagen Golf GL TDI on a chassis dynamometer (light-duty vehicle).

For the engine dynamometer test, a single EPA transient test was run. For the chassis dynamometer tests, three EPA test protocols were used: FTP (city), HFET (highway) and US06 (aggressive driving). Summaries of those tests by each test category are shown below. For more detailed information on SwRI tests, please refer to the full tests attached as Appendices A-L, or contact Syntroleum directly.

1. Heavy-duty Engine Test

Table 1.1.1 EPA Emissions for heavy-duty Cummins B Engine

Test	Measured Emissions, g/bhp-hr			
	HC	CO	NO_X	PM
EPA	0.12	1.29	4.04	0.10
CARB	0.09	1.10	3.70	0.08
Swedish	0.09	1.20	3.60	0.08
S-2	0.07	0.79	3.13	0.06

Table 1.1.2 Air Toxics and Nitrous Oxide for heavy-duty Cummins B Engine

Test	Measured Emission, mg/bph-hr					
	Benzene	1,3 Butadiene	Formaldehyde	Acetaldehyde	Total Air Toxins	N_2O
EPA	1.2	1.5	15.2	5.9	23.8	7.1
CARB	1.2	1.0	11.2	4.5	17.9	5.9
Swedish	1.3	1.1	13.6	5.5	21.5	5.4
S-2	0.8	1.2	9.7	3.9	15.6	5.0

2. Heavy Light-duty Vehicle Test Results

Table 1.2.1 FTP Emissions for Heavy Light-duty Dodge Ram

Test	Measured Emissions, g/mi				
	THC	NMHC	CO	NO_X	PM
EPA	0.38	0.38	1.4	9.13	0.058
CARB	0.34	0.34	1.2	8.10	0.051
Swedish	0.33	0.32	1.2	7.83	0.042
S-2	0.26	0.26	0.7	7.05	0.035

Table 1.2.2 HFET Emissions for Heavy Light-duty Dodge Ram

Test	Measured Emissions, g/mi				
	THC	NMHC	CO	NO_X	PM
EPA	0.19	0.19	0.5	5.10	0.034
CARB	0.16	0.16	0.5	4.48	0.030
Swedish	0.16	0.16	0.4	4.26	0.023
S-2	0.14	0.14	0.3	4.07	0.020

Table 1.2.3 US06 Emissions for Heavy Light-duty Dodge Ram

Test	Measured Emissions, g/mi				
	THC	NMHC	CO	NO_X	PM
EPA	0.19	0.19	0.7	5.24	0.105
CARB	0.17	0.17	0.6	4.86	0.060
Swedish	0.18	0.17	0.6	4.65	0.086
S-2	0.16	0.15	0.5	4.50	0.059

Table 1.2.4 Air Toxics and Nitrous Oxides for Heavy Light-duty Dodge Ram - FTP

Test	Measured Emission, mg/bph-hr					
	Benzene	1,3 Butadiene	Formaldehyde	Acetaldehyde	Total Air Toxins	N_2O
EPA	1.4	0.8	18.3	8.9	29.4	6.5
CARB	1.4	0.3	17.7	7.8	27.2	5.5
Swedish	1.3	0.8	16.1	9.6	27.9	5.5
S-2	0.9	0.6	12.9	5.5	19.9	5.0

Table 1.2.5 Air Toxics and Nitrous Oxides for Heavy Light-duty Dodge Ram – HFET

Test	Measured Emission, mg/bph-hr					
	Benzene	1,3 Butadiene	Formaldehyde	Acetaldehyde	Total Air Toxins	N_2O
EPA	0.4	0.1	6.3	2.7	9.5	4.0
CARB	0.6	0.1	5.7	2.4	8.8	3.3
Swedish	0.4	0.3	6.0	2.7	9.4	3.6
S-2	0.3	0.4	5.6	2.8	9.1	3.1

Table 1.2.6 Air Toxics and Nitrous Oxides for Heavy Light-duty Dodge Ram – US06

Test	Measured Emission, mg/bph-hr					
	Benzene	1,3 Butadiene	Formaldehyde	Acetaldehyde	Total Air Toxins	N_2O
EPA	0.6	0.3	7.3	3.6	11.8	5.5
CARB	0.7	0.4	7.1	3.6	11.8	4.6
Swedish	0.6	0.5	7.8	4.5	13.4	5.4
S-2	0.2	0.5	7.1	4.0	11.8	4.7

3. Light-duty Vehicle Test Results

Table 1.3.1 FTP Emissions for Light-duty Volkswagen Golf

Test	Measured Emissions, g/mi				
	THC	NMHC	CO	NO_X	PM
EPA	0.04	0.03	0.00	0.70	0.04
CARB	0.06	0.05	0.10	0.79	0.03
Swedish	0.02	0.02	0.00	0.46	0.03
S-2	0.03	0.02	0.10	0.78	0.03

Table 1.3.2 HFET Emissions for Light-duty Volkswagen Golf

Test	Measured Emissions, g/mi				
	THC	NMHC	CO	NO_X	PM
EPA	0.01	0.01	0.00	0.47	0.07
CARB	0.03	0.02	0.00	0.48	0.04
Swedish	0.01	0.01	0.00	0.46	0.03
S-2	0.01	0.01	0.00	0.49	0.02

Table 1.3.3 US06 Emissions for Light-duty Volkswagen Golf

Test	Measured Emissions, g/mi				
	THC	NMHC	CO	NO_X	PM
EPA	0.02	0.01	0.00	1.72	0.42
CARB	0.04	0.04	0.10	1.83	0.22
Swedish	0.01	0.01	0.00	1.71	0.11
S-2	0.01	0.01	0.00	1.75	0.05

Table 1.3.4 Air Toxics and Nitrous Oxides for Light-duty Volkswagen Golf - FTP

Test	Measured Emission, mg/bph-hr					
	Benzene	1,3 Butadiene	Formaldehyde	Acetaldehyde	Total Air Toxins	N_2O
EPA	0.2	Trace	3.0	2.7	5.9	8.7
CARB	0.2	0.0	3.1	2.7	6.0	8.7
Swedish	0.1	0.0	2.0	2.6	4.7	5.4
S-2	0.1	0.0	1.5	2.3	3.9	5.4

Table 1.3.5 Air Toxics and Nitrous Oxides for Light-duty Volkswagen Golf - HFET

Test	Measured Emission, mg/bph-hr					
	Benzene	1,3 Butadiene	Formaldehyde	Acetaldehyde	Total Air Toxins	N_2O
EPA	0.0	0.0	0.8	0.8	1.6	1.7
CARB	0.1	0.0	1.0	0.8	1.9	1.7
Swedish	0.0	0.0	0.7	0.8	1.5	1.8
S-2	0.0	0.0	0.5	0.7	1.2	1.8

Table 1.3.6 Air Toxics and Nitrous Oxides for Light-duty Volkswagen Golf – US06

Test	Measured Emission, mg/bph-hr					
	Benzene	1,3 Butadiene	Formaldehyde	Acetaldehyde	Total Air Toxins	N_2O
EPA	0.0	0.0	1.3	1.5	2.8	2.8
CARB	0.1	0.0	1.5	1.2	6.0	2.8
Swedish	0.2	0.0	1.1	1.4	2.7	2.7
S-2	0.0	0.0	0.8	1.3	2.1	2.7

Attachment 2 - GREET Model

M. Wang and H. S. Hwang of Argonne National Laboratory developed a model to estimate the full fuel-cycle energy and emission impacts of conventional and alternative fuels, including FT diesels, such as S-2, produced from natural gas and flared gas feedstocks. This model is known as the GREET model.[37] The full fuel-cycle incorporates the following three stages to evaluate energy use and emissions: (1) feedstock production, including transportation to fuel production facilities, (2) fuel production, including transportation and distribution to fueling locations, and (3) vehicle operation.

Syntroleum utilized the GREET model to compare full fuel-cycle energy use and emissions of synthetic paraffin diesel (similar to S-2) produced from both natural gas and flared gas to the full fuel-cycle energy requirements to produce RFG and RFD. Additionally, Syntroleum used the GREET model in conjunction with calculations external to the GREET model (see Attachment 3) to determine the effects on GHG emissions when producing RFD from other refinery process streams, such as LCO. To make the desired comparisons, Syntroleum modified minor input to the GREET model, as provided for in the model design. Modifications to the GREET model for these calculations are listed in Section 1, which shows both the input change locations and variables modified for each feedstock modeled. Section 2 presents in tabular form the energy and emission results of the GREET for the reference fuels and S-2. Please note that the energy results are expressed in Btu per mile and the emission results are expressed in grams per mile.

Section 1. Modifications and Input into the GREET model

General Model Options

Technology Option	Long
Vehicle Type	LDT2
Feedstock Source	NG/FG

Fuel Specifications

Input	S-2	RFG	RFD	LCO
LHV, btu/gal	121,500	112,265	127,000	128,000
Density, grams/gal	2,919	2,795	3,138	3,270
Carbon Ration	85.0%	82.9%	86.0%	87.0%
Sulfur, ppm	0	30	15	15
Fuel Economy, mpg	21.9	15.4	22.6	23.1

[37] *See supra*, note 22.

Energy Efficiency Factors for Fuel Production

Input	RFG	RFD	LCO
Petroleum worksheet, Section 3	86 %	87 %	87 %

Emission Factors - S-2 versus Diesel Fuels \a

Emission	RFD	LCO
VOC	-25%	-25%
CO	-30%	-30%
NO_x	-10%	-10%
PM_{10}	-20%	-20%
CH_4	0%	0%
N_2O	-8%	-8%

\a\ Used for GREET model Input: Section 11.3

Section 2. Full Fuel-Cycle Energy and Emission Results Predicted by the GREET model

CIDI Vehicle: S-2 Natural Gas \a

	Feedstock	Fuel	Vehicle	Total
Total energy	319	4897	5116	10331
Fossil fuels	315	4883	5116	10313
Petroleum	23	168	0.0	191
VOC	0.005	0.009	0.067	0
CO	0.064	0.150	3.311	4
NO_x	0.054	0.073	0.140	0
PM_{10}	0.002	-0.001	0.036	0
SO_x	0.014	0.009	0.000	0
CH_4	0.531	0.011	0.017	1
N_2O	0.000	-0.001	0.022	0
CO_2	25	132	383	540
GHGs	37	132	393	558

\a\ Energy expressed in Btu/mile; emissions expressed in grams/mile

CIDI Vehicle: S-2 Flared Gas \a

	Feedstock	Fuel	Vehicle	Total
Total energy	319	-4666	5116	769
Fossil fuels	315	-4679	0	-4364
Petroleum	23	165	0	188
VOC	0.005	-0.011	0.067	0.061
CO	0.064	-0.066	3.311	3.309
NO_x	0.054	-0.313	0.140	-0.118
PM_{10}	0.003	-0.031	0.036	0.008
SO_x	0.014	0.009	0.000	0.023
CH_4	0.531	-0.420	0.017	0.128
N_2O	0.000	-0.010	0.022	0.013
CO_2	25	-332	383	76
GHGs	37	-344	393	82

\a\ Energy expressed in Btu/mile; emissions expressed in grams/mile

SIDI Vehicle: RFG \a

	Feed	Fuel	Vehicle	Total
Total energy	266	1606	7290	9162
Fossil fuels	242	1555	7290	9087
Petroleum	69	661	6397	7127
VOC	0.023	0.100	0.158	0.281
CO	0.114	0.107	5.518	5.738
NO_x	0.069	0.197	0.135	0.401
PM_{10}	0.004	0.021	0.041	0.066
SO_x	0.014	0.108	0.011	0.133
CH_4	0.659	0.343	0.091	1.093
N_2O	0.000	0.001	0.040	0.042
CO_2	26	107	552	684
GHGs	40	114	566	720

\a\ Energy expressed in Btu/mile; emissions expressed in grams/mile

CIDI Vehicle: RFD \a

	Feed	Fuel	Vehicle	Total
Total energy	185	943	5060	6188
Fossil fuels	168	911	5060	6140
Petroleum	48	460	5060	5568
VOC	0.016	0.029	0.114	0.159
CO	0.079	0.047	5.631	5.756
NO_x	0.048	0.112	0.184	0.343
PM_{10}	0.003	0.014	0.042	0.058
SO_x	0.010	0.069	0.004	0.082
CH_4	0.458	0.079	0.017	0.554
N_2O	0.000	0.001	0.033	0.034
CO_2	18	67	394	479
GHGs	27	69	405	501

\a\ Energy expressed in Btu/mile; emissions expressed in grams/mile

CIDI Vehicle: LCO \a

	Feed	Fuel	Vehicle	Total
Total energy	181	923	4959	6063
Fossil fuels	165	893	4959	6016
Petroleum	47	450	4959	5456
VOC	0.016	0.029	0.114	0.159
CO	0.077	0.046	5.631	5.754
NO_x	0.047	0.109	0.184	0.340
PM_{10}	0.003	0.013	0.042	0.058
SO_x	0.010	0.067	0.004	0.081
CH_4	0.448	0.078	0.017	0.544
N_2O	0.000	0.001	0.033	0.034
CO_2	17	66	404	487
GHGs	27	68	415	509

\a\ Energy expressed in Btu/mile; emissions expressed in grams/mile

Attachment 3 – Syntroleum Calculations

The demand for diesel fuel in the United States (as well as worldwide demand) is expected to grow at a rate faster than the demand for transportation fuels in general. Thus, refiners will be challenged to meet the growing demand for diesel fuel, while at the same time producing the high quality diesel fuel that is now likely to be established at 15 ppm. While it is possible to purchase diesel blend stocks from other refiners, the supply of these "surplus clean" distillate streams is limited. Alternatively, additional crude processing capacity or reconfiguration of upgrading equipment or cutpoint control could create increased supply of clean blend components to the diesel pool. However, the most likely scenario is the installation of additional processing units to upgrade existing, lower quality (high sulfur and aromatic content) distillate streams within the refinery. These dirtier distillate streams include LCO and coker gasoils, which are commonly sold as heating oil, residual fuel oil, and off-road diesel for which there are less environmental restrictions.

Hydrogen will be the key element for meeting the future diesel specifications. More hydrogen will be required to upgrade the existing pool of diesel (currently estimated to be 350 ppm) to meet the anticipated 15 ppm Tier 2 standard.[38] Even more will be required to upgrade the less-desirable gasoils into more desirable and needed diesel fuels. This situation is further exacerbated by gasoline regulations that limit the aromatic content of reformulated gasoline, which will require reduction of naphtha reforming severity, and thereby a reduction of byproduct hydrogen. This byproduct hydrogen could have been used for desulfurization of the dirty distillate streams. Refiners will need to produce and/or purchase more hydrogen for desulfurization (and de facto aromatization) if lower quality distillate streams are used as feedstock for the production of 15-ppm sulfur on-road diesel.

The GREET model used in our analysis of full fuel-cycle energy and emissions of S-2 includes reformulated gasoline and diesel fuels as long term scenarios. Baseline sulfur levels for these scenarios are 30 ppm for the RFG and 50 ppm for the diesel. In order to calculate the additional energy and emissions that would accompany a reduction of sulfur to the anticipated Tier 2 diesel sulfur level of 15 ppm, Syntroleum estimated the hydrogen and energy demands of a typical stand alone hydrotreater to reduce on-road diesel pool sulfur from 50 ppm to 15 ppm. The energy requirements and emissions of hydrotreating LCO to meet the Tier 2 sulfur specifications are also evaluated.

Although each individual refiner will produce clean diesel based on its own individual resources, Syntroleum believes that to reduce the current diesel pool from approximately 350 ppm to 15 ppm, or to process the additional LCO, additional refining and hydrotreating resources will be required. Section 1 below lists the feed, fuel and operating parameters for hydrotreating and hydrogen production to produce 15 ppm sulfur diesel from selected refinery streams. Section 2 lists the process requirements and the energy requirements and emissions for each diesel stream.

[38] *See supra*, note 26.

Section 3 identifies the references used to develop these parameters and calculations. As mentioned elsewhere, the resulting energy and emissions required to treat these diesel fuels was added to the results of the GREET model shown in Attachment 2.

Section 1. Operating Parameters

A. Hydrotreater
1. Stand alone unit, energy and emissions added to GREET results
2. Purchased pipeline hydrogen
3. Operating severity as required to produce 15 ppm diesel product
4. Aromatics reduction 40 to 70 %, feedstock dependent (see below)
5. Chemical hydrogen consumption, feedstock dependent (see below)
6. Bleed hydrogen and solution loss make-up, 1 # per bbl.
7. Process heat including sulfur recovery, feedstock dependent (see below)
8. Total volumetric gains, 3 to 4%
9. Volumetric loss in diesel boiling range product, 2%
10. Process fuel 50% natural gas; 50% fuel oil
11. Emission factors for hydrotreater based on combustion of process fuel
12. Process fuel combustion emissions based on GREET model

B. Hydrogen Unit
1. Offsite Steam Methane Reformer using natural gas as feed and fuel
2. Natural gas feed quantities (per mmBtu Hydrogen requirement) based on GREET model
3. Process fuel and steam credits based on GREET model
4. Emission factors for SMR based on GREET model

Section 2. Emission results and Process Requirements

Hydrotreater Process Requirements

Hydrogen Consumption, scf/bbl	RFD – 15	LCO
Chemical	400	1,800
Solution loss & Bleed	200	200
Total	600	2,000
Hydrogen, Btu/scf	274	274
Hydrogen Required, Btu/bbl	164,400	548,000
Process Energy, Btu/bbl	120,000	180,000

Energy and Emission Results \a

	RFD -15	LCO
Total energy	93	295
Fossil fuels	81	256
Petroleum	2.333	6.150
VOC	0.001	0.003
CO	0.012	0.030
NO_x	0.022	0.054
PM_{10}	0.001	0.003
SO_x	0.009	0.024
CH_4	0.041	0.097
N_2O	0.000	0.000
CO_2	23	58
GHGs	24	60

\a\ Energy expressed in Btu/mile; emissions expressed in grams/mile

Section 3. References and resources

1. L. Granniss and A. Suchanek, *Cost effective upgrading of middle distillates*, JPI Petroleum Refining Conference, Tokyo, (Oct. 1996)
2. W. F. Baade, G. D. Snyder and J. M. Abrado, *Generate hydrogen for reformulated gasoline and clean diesel requirements*, Hydrocarbon Processing, (Jan. 1993).
3. *Diesel Fuel, Specifications and Demand for the 21st Century*, UOP (1998).
4. Soloman Associates, Inc., *North and South American Fuels Refinery Performance Analysis for Operating Year 1998*, (July 1999).
5. J. H. Gary and G. E. Handwerk, *Petroleum Refining, Technology and Economics, 3rd Edition*, Marcel Dekker, Inc.

Attachment 4 – Reference Tables

Table A. Worldwide Oil and Natural Gas Reserves - 1999

Location	Oil Reserves Barrels x $(10)^9$	Natural Gas Reserves	
		Cubic Ft x $(10)^{12}$	Oil-Equivalent \a\ Barrels x $(10)^9$
North America	73.8	291.4	50.2
United States	21.0	164.0	28.3
Central & South America	89.5	219.1	37.8
Western Europe	18.9	161.5	27.8
E. Europe and Former USSR	58.9	1999.4	344.7
Middle East	673.6	1749.5	301.6
Africa	75.4	361.1	62.3
Far East and Oceania	43.0	359.6	62.0
World Total	1033.2	5141.6	886.4

Source: *International Energy Annual 1998 – Table 8.1*, DOE/EIA, (Jan. 2000), http://www.eia.doe.gov/emeu/iea/res.html

\a\ On a Btu content basis, one barrel of crude is equivalent to 5.8×10^3 ft^3 of natural gas

Table B. World Natural Gas Production – 1997
(Billion cubic feet)

Location	Gross Production	Vented or Flared	Re-injected	Marked Production	Dry Gas Produced
North America	32,666	589	3,952	27,526	25,905
United States	24,213	256	3,492	19,866	18,902
Central & South America	5,024	525	1,186	3,313	2,922
Western Europe	10,956	119	959	9,878	9,718
E. Europe and Former USSR	24,849	0	1	24,848	24,848
Middle East	9,153	563	1,874	6,716	6,223
Africa	8,216	1,523	2,814	3,880	3,517
Far East and Oceania	9,499	281	601	8,617	8,481
World Total	100,363	3,600	11,387	84,777	81,613

Source: *International Energy Annual 1998– Table 4.1*, DOE/EIA, (Jan. 2000), http://www.eia.doe.gov/emeu/iea/table41.html

Table C. Estimated Number of Alternative-Fueled Vehicles in Use in the United States, by Fuel, 1992-1999

Fuel	1992	1993	1994	1995	1996	1997	1998	1999
Liquefied Petroleum Gases (LPG) \a\	221,000	269,000	264,000	259,000	263,000	263,000	269,000	*274,000*
Compressed Natural Gas ("CNG")	23,191	32,714	41,227	50,218	60,144	70,852	85,730	*96,017*
Liquefied Natural Gas ("LNG")	90	299	484	603	663	813	1,358	*1,517*
Methanol, 85% (M85) \b\	4,850	10,263	15,484	18,319	20,265	21,040	21,578	*21,829*
Methanol, Neat (M100)	404	414	415	386	172	172	378	*378*
Ethanol, 85% (E85) \b\ \c\	172	441	605	1,527	4,536	9,130	11,743	*17,892*
Ethanol, 95% (E95) \b\	38	27	33	136	361	347	14	*14*
Electricity	1,607	1,690	2,224	2,860	3,280	4,453	5,824	*6,481*
Non-LPG Subtotal	30,352	45,848	60,472	74,049	89,421	106,807	126,625	*144,128*
Total	251,352	314,848	324,472	333,049	352,421	369,807	395,625	*418,128*

Source: *Alternatives to Traditional Transportation Fuels, 1999 – Table 1*, DOE/EIA, (Jan. 2000), http://www.eia.doe.gov/cneaf/solar.renewables/alt_trans_fuel98/atf_99.html

\a\ Values are rounded to thousands. Accordingly, these estimates are not equal to the sum of Federal fleet data (for which exact counts are available) and non-Federal fleet estimates (rounded to thousands).

\b\ The remaining portion of 85% methanol and both ethanol fuels is gasoline.

\c\ Does not include recently announced plans of some major automakers to make available large numbers of vehicles capable of operating on E85 fuel in the near future.

Note: Estimates for 1997 are revised. Estimates for 1998 are preliminary and estimates for 1999, in Italics, are based on plans or projections. Estimates for historical years may be revised in future reports if new information becomes available.

Table D. Estimated Consumption of Vehicle Fuels in the United States, 1992-1999 (Thousand Gasoline-Equivalent Gallons)

Fuel	1992	1993	1994	1995	1996	1997	1998	1999
Alternative Fuels								
Liquefied Petroleum Gases ("LPG")	208,142	264,655	248,467	232,701	239,158	238,356	245,058	*250,322*
Compressed Natural Gas ("CNG")	16,823	21,603	24,160	35,162	46,923	64,295	76,852	*87,389*
Liquefied Natural Gas ("LNG")	585	1,901	2,345	2,759	3,247	3,714	6,338	*6,888*
Methanol, 85% (M85) \a\,\b\	1,069	1,593	2,340	2,023	1,775	1,554	1,395	*1,301*
Methanol, Neat (M100)	2,547	3,166	3,190	2,150	347	347	1,923	*1,923*
Ethanol, 85% (E85) \a\	21	48	80	190	694	1,280	1,615	*2,243*
Ethanol, 95% (E95) \a\	85	80	140	995	2,699	1,136	59	*59*
Electricity	359	288	430	663	773	1,010	1,301	*1,414*
Subtotal \b	229,631	293,334	281,152	276,643	295,616	311,692	334,541	*351,539*
Oxygenates								
Methyl Tertiary Butyl Ether ("MTBE") \c\	1,175,000	2,069,200	2,018,800	2,691,200	2,749,700	3,104,200	3,080,600	*3,087,100*
Ethanol in Gasohol	701,000	760,000	845,900	910,700	660,200	830,700	857,100	*831,400*
Total Alternative and Replacement Fuels \b	2,105,631	3,122,534	3,145,852	3,878,543	3,705,516	4,246,592	4,272,241	*4,270,039*
Traditional Fuels								
Gasoline \d\	110,135,000	111,323,000	113,144,000	115,943,000	117,783,000	119,336,000	121,465,000	*123,103,000*
Diesel	23,866,000	24,296,630	27,293,370	28,555,040	30,101,430	31,949,270	32,460,640	*33,111,570*
Total Fuel Consumption \b\ \e	134,230,631	135,912,964	140,718,522	144,774,683	148,180,046	151,596,962	154,260,181	*156,566,109*

Source: *Alternatives to Traditional Transportation Fuels, 1999 – Table 10*, DOE/EIA, (Jan. 2000), http://www.eia.doe.gov/cneaf/solar.renewables/alt_trans_fuel98/atf_99.html

\a\ The remaining portion of 85% methanol and both ethanol fuels is gasoline. Consumption data include the gasoline portion of the fuel.

\b\ 1995 and 1996 estimates have been revised.

\c\ Includes a very small amount of other ethers, primarily Tertiary Amyl Methyl Ether (TAME) and Ethyl Tertiary Butyl Ether (ETBE).

\d\ Gasoline consumption includes ethanol in gasohol and MTBE.

\e\ Total fuel consumption is the sum of alternative fuel, gasoline, and diesel consumption. Oxygenate consumption is included in gasoline consumption.

Notes: Fuel quantities are expressed in a common base unit of gasoline-equivalent gallons to allow comparisons of different fuel types. Gasoline-equivalent gallons do not represent gasoline displacement. Gasoline equivalent is computed by dividing the lower heating value of the alternative fuel by the lower heating value of gasoline and multiplying this result by the alternative fuel consumption value. Lower heating value refers to the Btu content per unit of fuel excluding the heat produced by condensation of water vapor in the fuel. Totals may not equal sum of components due to independent rounding. Estimates for 1997 are revised. Estimates for 1998 are preliminary. Estimates for 1999 (in italics) are based on plans or projections. Estimates for historical years may be revised in future reports if new information becomes available.

Attachment 5 – EPA Comments on Diesel Fuel Quality

Prior to making the May 17, 2000 announcement regarding Tier 2 standards for diesel fuel, EPA made the following statements concerning diesel fuel quality in its ANPR:[39]

"These advanced sulfur-sensitive technologies have the potential to reduce diesel engine NO_x emissions by up to 75 percent and PM emissions by 80 percent or more...these promising new technologies may allow a step change in the diesel emissions control of a magnitude comparable to that ushered in by the automotive catalytic converter in the 1970's. However, it appears that changes in diesel fuel quality may be needed to bring this step change about."

"These studies have also determined that engine design and fuel properties are interdependent in their effects on emissions. Combinations of particulate traps, lean NO_x catalysts and fuel reformulation could reduce emissions of particulates by 80 to 95 percent and NO_x by 60 to 90 percent according to a recent assessment."[40]

Although the EPA recognized some benefit to lowering emissions with changes in fuel density, aromatic content and cetane number in its ANPR, it identified sulfur reduction in diesel fuel as being the most important:

"Reducing the sulfur content of diesel fuel has the potential to provide large indirect technology-enabling benefits in addition to some amount of direct emission benefits. In fact, sulfur reduction appears to be the only fuel change with potential to enable new technologies needed to meet Tier 2 light-duty or anticipated future heavy-duty standards."

Additionally, the EPA saw a secondary effect on lowering the sulfur level in fuels:

"Although the impetus for near-term action on diesel fuel quality comes from our efforts set fuel-neutral Tier 2 standards for the light-duty diesel market, any emissions control technologies that prove effective in light-duty diesel applications are likely to be effective with heavy-duty highway engines as well. Thus higher quality diesel fuel for heavy-duty applications, combined with more stringent heavy-duty emission standards that effectively introduce the new technologies, could provide large environmental benefits, though perhaps on a different implementation schedule than that required for the light-duty program. This might take the form of a phased in program, involving a regulated grade of premium fuel that is initially focused on servicing the light-duty diesel fleet, but that gradually widens its market penetration to fulfill the expanding need created by sales of new heavy-duty vehicles that also employ the advanced technologies . . . In addition to enabling new control technologies, the use of higher quality diesel fuel is likely to improve the emissions

[39] *See* 64 Fed. Reg. 26142 (May 13, 1999).

[40] Mark, J. and C. Morey, *Diesel Passenger Vehicles and the Environment*, Union of Concerned Scientists, (Apr. 1999), www.ucsusa.org.

performance of the existing fleet of diesel engines as well . . . . Eventually these advanced technologies could also find applications in nonroad equipment . . . ."

APPENDIX A

HEAVY-DUTY EMISSION TEST RESULTS

Page	Test No.	Test Cycle	Fuel
A-1	CARB-C1	EPA Transient	CARB Diesel
A-2	CARB-H1	EPA Transient	CARB Diesel
A-3	CARB-C1/H1 Composite	EPA Transient	CARB Diesel
A-4	CARB-C3	EPA Transient	CARB Diesel
A-5	CARB-H3	EPA Transient	CARB Diesel
A-6	CARB-C3/H3 Composite	EPA Transient	CARB Diesel
A-7	SWED-C1	EPA Transient	Swedish Diesel
A-8	SWED-H1	EPA Transient	Swedish Diesel
A-9	SWED-C1/H1 Composite	EPA Transient	Swedish Diesel
A-10	SWED-C2	EPA Transient	Swedish Diesel
A-11	SWED-H2B	EPA Transient	Swedish Diesel
A-12	SWED-C2/H2BComposite	EPA Transient	Swedish Diesel

Southwest Research Institute - Department of Emissions Research
EPA Cold Transient Emission Test Results
Project No. 08-2164-001

Engine Mode:	99 Cummins ISB-215	Test No.:	CARB-C1	DIESEL CARB, EM-2790-F	
Engine Desc.:	5.9 L (359 CID) 6	Date: 08/18/1999	Time: 10:00	HCR: 1.908	FID Resp: 1.1
Engine Cycle:	Diesel	Program HDT:	4.04-R	H= 0.138 C= 0.862 O= 0.000 X= 0.000	
Engine S/N:	56541396	Cell: 4	Bag Cart: 1	Oil Code: Mobil Delvac	

Ambient/Test Cell Conditions

Barometer:	29.2	in Hg	98.8 kPa
Engine Inlet Air			
Temperature:	71.0	°F	21.7 °C
Dew Point:	58.2	°F	14.6 °C
Abs. Humidity:	74.5	gr/lb	10.6 g/kg
Rel. Humidity:	64	%	
Dilution Air:			
Temperature:	77.0	°F	25.0 °C
Abs. Humidity	85.2	gr/lb	12.2 g/kg
Rel. Humidity:	60	%	

Sample Flows

	scfm	scmm
Blower 1 Rate:	1,190.1	33.7
Blower 2 Rate:	0.0	0.0
90 mm System:		
Gas Meter 1:	1.7	0.0
Gas Meter 2:	3.3	0.1
Sample Rate:	1.6	0.0
20X20 Sample Rate:	43.8	1.2
47 mm Sample Rate:	2.3	0.1
Chemistry Sample Rate:	0.138	0.079
Total Flow Rate:	1,237.9	35.1

Measured Gaseous Data

	Meter	Range	Concentration		
HC Sample	n/a		7.3	ppm	
HC Bckgrd	n/a		3.0	ppm	
CO Sample	25.3	2	24.5	ppm	(Dry)
CO Bckgrd	n/a	2	0.0	ppm	
NOx Sample	n/a		42.3	ppm	(Dry)
NOx Bckgrd	0.2	2	0.2	ppm	
CO2 Sample	79.0	1	0.7243	%	(Wet)
CO2 Bckgrd	8.2	1	0.0552	%	
CH4 Sample	n/a	n/a	1.8	ppm	(1.1)
CH4 Bckgrd	n/a	n/a	1.9	ppm	

Particulate Data

Filter Number:	3066.0-187 (pair)	
Weight Gain:	1.552	mg
Sample Multiplier:	0.777	

Correction Factors

NOx Humidity CF:	0.999
Dry-to-Wet CF, Sample:	0.974
Dry-to-Wet CF, Bckgrd:	0.981
Dilution Factor:	18.31

Test Cycle Data

Sample Time:	1,207.9	sec		
Work:	13.2	hp-hr	9.9	kW-hr
Reference Work:	13.3	hp-hr	9.9	kW-hr
Total Volume (Vmix):	24,918.5	scf	705.7	scm

Corrected Concentrations

HC	4.5	ppm	
CO	23.7	ppm	
NOx	41.0	ppm	
CO2	0.6721	%	
CH4	0.0	ppm	(1.1)

Mass Emissions

HC	1.845	grams		
CO	19.472	grams		
NOx	55.326	grams		
Particulate	1.205	grams		
CO2	8.677	kg		
CH4	0.006	grams		
Fuel	6.1	lb	2.8	kg

Brake-Specific Emission Results

BSHC (Cell)	0.140	g/hp-hr	0.187	g/kW-hr
CO	1.473	g/hp-hr	1.975	g/kW-hr
NOx (Cell)	4.185	g/hp-hr	5.612	g/kW-hr
Particulate	0.091	g/hp-hr	0.122	g/kW-hr
CO2	656.4	g/hp-hr	880.2	g/kW-hr
BSFC	0.460	lb/hp-hr	0.280	kg/kW-hr
NMHC	0.120	g/hp-hr	0.161	g/kW-hr
CH4	0.000	g/hp-hr	0.001	g/kW-hr

Southwest Research Institute - Department of Emissions Research
EPA Hot Transient Emission Test Results
Project No. 08-2164-001

Engine Mode:	99 Cummins ISB-215	Test No.:	CARB-H1	DIESEL CARB, EM-2790-F	
Engine Desc.:	5.9 L (359 CID) 6	Date: 08/18/1999	Time: 10:45	HCR: 1.908	FID Resp: 1.1
Engine Cycle:	Diesel	Program HDT:	4.04-R	H= 0.138 C= 0.862 O= 0.000 X= 0.000	
Engine S/N:	56541396	Cell: 4	Bag Cart: 1	Oil Code: Mobil Delvac	

Ambient/Test Cell Conditions

Barometer:	29.2	in Hg	98.8 kPa
Engine Inlet Air			
Temperature:	73.0	°F	22.8 °C
Dew Point:	59.3	°F	15.2 °C
Abs. Humidity:	77.6	gr/lb	11.1 g/kg
Rel. Humidity:	62	%	
Dilution Air:			
Temperature:	79.0	°F	26.1 °C
Abs. Humidity	87.2	gr/lb	12.5 g/kg
Rel. Humidity:	57	%	

Sample Flows

	scfm	scmm
Blower 1 Rate:	1,188.3	33.7
Blower 2 Rate:	0.0	0.0
90 mm System:		
Gas Meter 1:	1.7	0.0
Gas Meter 2:	3.3	0.1
Sample Rate:	1.6	0.0
20X20 Sample Rate:	42.8	1.2
47 mm Sample Rate:	2.3	0.1
Chemistry Sample Rate:	0.140	0.080
Total Flow Rate:	1,235.1	35.1

Measured Gaseous Data

	Meter	Range	Concentration		
HC Sample	n/a		7.2	ppm	
HC Bckgrd	n/a		4.7	ppm	
CO Sample	18.3	2	17.6	ppm	(Dry)
CO Bckgrd	0.5	2	0.5	ppm	
NOx Sample	n/a		37.2	ppm	(Dry)
NOx Bckgrd	0.6	2	0.6	ppm	
CO2 Sample	79.2	1	0.7270	%	(Wet)
CO2 Bckgrd	7.0	1	0.0471	%	
CH4 Sample	n/a	n/a	1.7	ppm	(1.1)
CH4 Bckgrd	n/a	n/a	1.9	ppm	

Particulate Data

Filter Number:	3067.0-188 (pair)	
Weight Gain:	1.418	mg
Sample Multiplier:	0.766	

Correction Factors

NOx Humidity CF:	1.007
Dry-to-Wet CF, Sample:	0.973
Dry-to-Wet CF, Bckgrd:	0.980
Dilution Factor:	18.26

Corrected Concentrations

HC	2.8	ppm	
CO	16.6	ppm	
NOx	35.7	ppm	
CO2	0.6825	%	
CH4	-0.1	ppm	(1.1)

Test Cycle Data

Sample Time:	1,208.3	sec		
Work:	13.2	hp-hr	9.9	kW-hr
Reference Work:	13.3	hp-hr	9.9	kW-hr
Total Volume (Vmix):	24,869.4	scf	704.3	scm

Mass Emissions

HC	1.141	grams
CO	13.634	grams
NOx	48.387	grams
Particulate	1.086	grams
CO2	8.794	kg
CH4	0.000	grams
Fuel	6.2 lb	2.8 kg

Brake-Specific Emission Results

BSHC (Cell)	0.086	g/hp-hr	0.116	g/kW-hr
CO	1.031	g/hp-hr	1.383	g/kW-hr
NOx (Cell)	3.660	g/hp-hr	4.908	g/kW-hr
Particulate	0.082	g/hp-hr	0.110	g/kW-hr
CO2	665.2	g/hp-hr	892.0	g/kW-hr
BSFC	0.466	lb/hp-hr	0.283	kg/kW-hr
NMHC	0.074	g/hp-hr	0.100	g/kW-hr
CH4	0.000	g/hp-hr	0.000	g/kW-hr

Southwest Research Institute - Department of Emissions Research
Composite Transient Emission Test Results
Project No. 08-2164-001

Engine Mode:	99 Cummins ISB-215	Date: 08/18/1999 Time: 10:00	DIESEL CARB, EM-2790-F	
Engine Desc.:	5.9 L (359 CID) 6	Program HDT: 4.04-R	HCR: 1.908	FID Resp: 1.1
Engine Cycle:	Diesel	Cell: 4 Bag Cart: 1	H= 0.138 C= 0.862 O= 0.000 X= 0.000	
Engine S/N:	56541396		Oil Code: Mobil Delvac	

Test Numbers
Cold: CARB-C1 Hot: CARB-H1

Brake-Specific Emission Results

BSHC (Cell)	0.094	g/hp-hr	0.126	g/kW-hr
CO	1.094	g/hp-hr	1.468	g/kW-hr
NOx (Cell)	3.735	g/hp-hr	5.009	g/kW-hr
Particulate	0.083	g/hp-hr	0.112	g/kW-hr
CO2	663.9	g/hp-hr	890.3	g/kW-hr
BSFC	0.465	lb/hp-hr	0.283	kg/kW-hr
NMHC	0.081	g/hp-hr	0.109	g/kW-hr
CH4	0.000	g/hp-hr	0.000	g/kW-hr
Work:	13.2	hp-hr	9.9	kW-hr
Reference Work:	13.3	hp-hr	9.9	kW-hr

Analyzed: 09/27/1999 16:23

Southwest Research Institute - Department of Emissions Research
EPA Cold Transient Emission Test Results
Project No. 08-2164-001

Engine Mode:	99 Cummins ISB-215	Test No.:	CARB-C3	DIESEL CARB, EM-2790-F	
Engine Desc.:	5.9 L (359 CID) 6	Date: 08/20/1999	Time: 09:40	HCR: 1.908	FID Resp: 1.1
Engine Cycle:	Diesel	Program HDT:	4.04-R	H= 0.138 C= 0.862 O= 0.000 X= 0.000	
Engine S/N:	56541396	Cell: 4	Bag Cart: 1	Oil Code: Mobil Delvac	

Ambient/Test Cell Conditions

Barometer:	29.1	in Hg	98.7 kPa
Engine Inlet Air			
Temperature:	72.0	°F	22.2 °C
Dew Point:	59.3	°F	15.2 °C
Abs. Humidity:	77.7	gr/lb	11.1 g/kg
Rel. Humidity:	64	%	
Dilution Air:			
Temperature:	77.0	°F	25.0 °C
Abs. Humidity	80.1	gr/lb	11.4 g/kg
Rel. Humidity:	56	%	

Sample Flows

	scfm	scmm
Blower 1 Rate:	1,191.9	33.8
Blower 2 Rate:	0.0	0.0
90 mm System:		
Gas Meter 1:	1.7	0.0
Gas Meter 2:	3.2	0.1
Sample Rate:	1.6	0.0
20X20 Sample Rate:	44.7	1.3
Total Flow Rate:	1,238.1	35.1

Measured Gaseous Data

	Meter	Range	Concentration		
HC Sample	n/a		8.7	ppm	
HC Bckgrd	n/a		4.1	ppm	
CO Sample	27.1	2	26.3	ppm	(Dry)
CO Bckgrd	0.3	2	0.3	ppm	
NOx Sample	n/a		42.2	ppm	(Dry)
NOx Bckgrd	0.4	2	0.4	ppm	
CO2 Sample	78.6	1	0.7189	%	(Wet)
CO2 Bckgrd	6.4	1	0.0430	%	
CH4 Sample	n/a	n/a	2.1	ppm	(1.1)
CH4 Bckgrd	n/a	n/a	2.2	ppm	

Particulate Data

Filter Number:	3100.0-269 (pair)	
Weight Gain:	1.520	mg
Sample Multiplier:	0.790	

Correction Factors

NOx Humidity CF:	1.007
Dry-to-Wet CF, Sample:	0.975
Dry-to-Wet CF, Bckgrd:	0.982
Dilution Factor:	18.44

Test Cycle Data

Sample Time:	1,208.0	sec		
Work:	13.1	hp-hr	9.8	kW-hr
Reference Work:	13.3	hp-hr	9.9	kW-hr
Total Volume (Vmix):	24,927.5	scf	706.0	scm

Corrected Concentrations

HC	4.8	ppm	
CO	25.2	ppm	
NOx	40.8	ppm	
CO2	0.6782	%	
CH4	0.0	ppm	(1.1)

Brake-Specific Emission Results

BSHC (Cell)	0.151	g/hp-hr	0.202	g/kW-hr
CO	1.575	g/hp-hr	2.112	g/kW-hr
NOx (Cell)	4.219	g/hp-hr	5.658	g/kW-hr
Particulate	0.091	g/hp-hr	0.122	g/kW-hr
CO2	666.1	g/hp-hr	893.3	g/kW-hr
BSFC	0.467	lb/hp-hr	0.284	kg/kW-hr
NMHC	0.130	g/hp-hr	0.174	g/kW-hr
CH4	0.001	g/hp-hr	0.002	g/kW-hr

Mass Emissions

HC		1.980	grams	
CO		20.706	grams	
NOx		55.481	grams	
Particulate		1.201	grams	
CO2		8.759	kg	
CH4		0.015	grams	
Fuel	6.1 lb		2.8 kg	

Southwest Research Institute - Department of Emissions Research
EPA Hot Transient Emission Test Results
Project No. 08-2164-001

Engine Mode:	99 Cummins ISB-215	Test No.:	CARB-H3	DIESEL CARB, EM-2790-F	
Engine Desc.:	5.9 L (359 CID) 6	Date: 08/20/1999	Time: 10:20	HCR: 1.908	FID Resp: 1.1
Engine Cycle:	Diesel	Program HDT:	4.04-R	H= 0.138 C= 0.862 O= 0.000 X= 0.000	
Engine S/N:	56541396	Cell: 4	Bag Cart: 1	Oil Code: Mobil Delvac	

Ambient/Test Cell Conditions

Barometer:	29.1	in Hg	98.7 kPa
Engine Inlet Air			
Temperature:	72.0	°F	22.2 °C
Dew Point:	59.2	°F	15.1 °C
Abs. Humidity:	77.4	gr/lb	11.1 g/kg
Rel. Humidity:	64	%	
Dilution Air:			
Temperature:	78.0	°F	25.6 °C
Abs. Humidity	78.4	gr/lb	11.2 g/kg
Rel. Humidity:	53	%	

Measured Gaseous Data

	Meter	Range	Concentration		
HC Sample	n/a		7.3	ppm	
HC Bckgrd	n/a		3.5	ppm	
CO Sample	18.4	2	17.7	ppm	(Dry)
CO Bckgrd	0.3	2	0.3	ppm	
NOx Sample	n/a		36.1	ppm	(Dry)
NOx Bckgrd	0.3	2	0.3	ppm	
CO2 Sample	77.7	1	0.7068	%	(Wet)
CO2 Bckgrd	7.1	1	0.0478	%	
CH4 Sample	n/a	n/a	1.9	ppm	(1.1)
CH4 Bckgrd	n/a	n/a	2.0	ppm	

Corrected Concentrations

HC	4.0	ppm	
CO	16.9	ppm	
NOx	35.0	ppm	
CO2	0.6615	%	
CH4	0.0	ppm	(1.1)

Mass Emissions

HC		1.622	grams	
CO		13.880	grams	
NOx		47.370	grams	
Particulate		1.063	grams	
CO2		8.523	kg	
CH4		0.000	grams	
Fuel	6.0 lb		2.7 kg	

Sample Flows

	scfm	scmm
Blower 1 Rate:	1,189.7	33.7
Blower 2 Rate:	0.0	0.0
90 mm System:		
Gas Meter 1:	1.7	0.0
Gas Meter 2:	3.3	0.1
Sample Rate:	1.6	0.0
20X20 Sample Rate:	43.6	1.2
Total Flow Rate:	1,234.9	35.0

Particulate Data

Filter Number:	3101.0-270 (pair)	
Weight Gain:	1.381	mg
Sample Multiplier:	0.769	

Correction Factors

NOx Humidity CF:	1.006
Dry-to-Wet CF, Sample:	0.976
Dry-to-Wet CF, Bckgrd:	0.982
Dilution Factor:	18.78

Test Cycle Data

Sample Time:	1,208.2	sec		
Work:	13.1	hp-hr	9.8	kW-hr
Reference Work:	13.3	hp-hr	9.9	kW-hr
Total Volume (Vmix):	24,867.2	scf	704.3	scm

Brake-Specific Emission Results

BSHC (Cell)	0.124	g/hp-hr	0.166	g/kW-hr
CO	1.060	g/hp-hr	1.421	g/kW-hr
NOx (Cell)	3.616	g/hp-hr	4.849	g/kW-hr
Particulate	0.081	g/hp-hr	0.109	g/kW-hr
CO2	650.6	g/hp-hr	872.5	g/kW-hr
BSFC	0.456	lb/hp-hr	0.277	kg/kW-hr
NMHC	0.107	g/hp-hr	0.143	g/kW-hr
CH4	0.000	g/hp-hr	0.000	g/kW-hr

Southwest Research Institute - Department of Emissions Research
Composite Transient Emission Test Results
Project No. 08-2164-001

Engine Mode: 99 Cummins ISB-215
Engine Desc.: 5.9 L (359 CID) 6
Engine Cycle: Diesel
Engine S/N: 56541396

Date: 08/20/1999 Time: 09:40
Program HDT: 4.04-R
Cell: 4 Bag Cart: 1

DIESEL CARB, EM-2790-F
HCR: 1.908 FID Resp: 1.1
H= 0.138 C= 0.862 O= 0.000 X= 0.000
Oil Code: Mobil Delvac

Test Numbers
Cold: CARB-C3 Hot: CARB-H3

Brake-Specific Emission Results

BSHC (Cell)	0.128	g/hp-hr	0.171	g/kW-hr
CO	1.133	g/hp-hr	1.520	g/kW-hr
NOx (Cell)	3.702	g/hp-hr	4.965	g/kW-hr
Particulate	0.083	g/hp-hr	0.111	g/kW-hr
CO2	652.8	g/hp-hr	875.5	g/kW-hr
BSFC	0.457	lb/hp-hr	0.278	kg/kW-hr
NMHC	0.110	g/hp-hr	0.148	g/kW-hr
CH4	0.000	g/hp-hr	0.000	g/kW-hr
Work:	13.1	hp-hr	9.8	kW-hr
Reference Work:	13.3	hp-hr	9.9	kW-hr

Analyzed: 09/28/1999 14:09

Southwest Research Institute - Department of Emissions Research
EPA Cold Transient Emission Test Results
Project No. 08-2164-001

Engine Mode:	99 Cummins ISB-215	Test No.:	SWED-C1	DIESEL Swedish, EM-2789-F	
Engine Desc.:	5.9 L (359 CID) 6	Date: 08/23/1999	Time: 10:30	HCR: 1.940	FID Resp: 1.1
Engine Cycle:	Diesel	Program HDT:	4.04-R	H= 0.140 C= 0.860 O= 0.000 X= 0.000	
Engine S/N:	56541396	Cell: 4	Bag Cart: 1	Oil Code: Mobil Delvac	

Ambient/Test Cell Conditions

Barometer:	29.0	in Hg	98.2 kPa
Engine Inlet Air			
Temperature:	74.0	°F	23.3 °C
Dew Point:	58.8	°F	14.9 °C
Abs. Humidity:	76.7	gr/lb	11.0 g/kg
Rel. Humidity:	59	%	
Dilution Air:			
Temperature:	76.0	°F	24.4 °C
Abs. Humidity	92.9	gr/lb	13.3 g/kg
Rel. Humidity:	67	%	

Sample Flows

	scfm	scmm
Blower 1 Rate:	1,183.9	33.5
Blower 2 Rate:	0.0	0.0
90 mm System:		
Gas Meter 1:	1.7	0.0
Gas Meter 2:	3.2	0.1
Sample Rate:	1.6	0.0
20X20 Sample Rate:	44.1	1.2
Chemistry Sample Rate:	0.135	0.077
Total Flow Rate:	1,229.7	34.9

Measured Gaseous Data

	Meter	Range	Concentration		
HC Sample	n/a		7.8	ppm	
HC Bckgrd	n/a		3.3	ppm	
CO Sample	24.7	2	23.9	ppm	(Dry)
CO Bckgrd	0.3	2	0.3	ppm	
NOx Sample	n/a		41.4	ppm	(Dry)
NOx Bckgrd	0.6	2	0.6	ppm	
CO2 Sample	78.6	1	0.7189	%	(Wet)
CO2 Bckgrd	5.8	1	0.0389	%	
CH4 Sample	n/a	n/a	1.8	ppm	(1.1)
CH4 Bckgrd	n/a	n/a	1.9	ppm	

Particulate Data

Filter Number:	3113.0-292 (pair)	
Weight Gain:	1.268	mg
Sample Multiplier:	0.792	

Correction Factors

NOx Humidity CF:	1.004
Dry-to-Wet CF, Sample:	0.972
Dry-to-Wet CF, Bckgrd:	0.979
Dilution Factor:	18.34

Corrected Concentrations

HC	4.6	ppm	
CO	22.8	ppm	
NOx	39.7	ppm	
CO2	0.6821	%	
CH4	0.0	ppm	(1.1)

Test Cycle Data

Sample Time:	1,208.0	sec		
Work:	13.1	hp-hr	9.8	kW-hr
Reference Work:	13.1	hp-hr	9.7	kW-hr
Total Volume (Vmix):	24,755.8	scf	701.1	scm

Mass Emissions

HC	1.892	grams
CO	18.623	grams
NOx	53.430	grams
Particulate	1.004	grams
CO2	8.749	kg
CH4	0.011	grams
Fuel	6.1 lb	2.8 kg

Brake-Specific Emission Results

BSHC	(Cell)	0.144 g/hp-hr	0.193	g/kW-hr
CO		1.418 g/hp-hr	1.902	g/kW-hr
NOx	(Cell)	4.069 g/hp-hr	5.457	g/kW-hr
Particulate		0.076 g/hp-hr	0.103	g/kW-hr
CO2		666.3 g/hp-hr	893.6	g/kW-hr
BSFC		0.468 lb/hp-hr	0.285	kg/kW-hr
NMHC		0.124 g/hp-hr	0.166	g/kW-hr
CH4		0.001 g/hp-hr	0.001	g/kW-hr

Southwest Research Institute - Department of Emissions Research
EPA Hot Transient Emission Test Results
Project No. 08-2164-001

Engine Mode:	99 Cummins ISB-215	Test No.:	SWED-H1	DIESEL Swedish, EM-2789-F	
Engine Desc.:	5.9 L (359 CID) 6	Date: 08/23/1999	Time: 11:10	HCR: 1.940	FID Resp: 1.1
Engine Cycle:	Diesel	Program HDT:	4.04-R	H= 0.140 C= 0.860 O= 0.000 X= 0.000	
Engine S/N:	56541396	Cell: 4	Bag Cart: 1	Oil Code: Mobil Delvac	

Ambient/Test Cell Conditions

Barometer:	29.0	in Hg	98.1 kPa
Engine Inlet Air			
Temperature:	75.0	°F	23.9 °C
Dew Point:	59.3	°F	15.2 °C
Abs. Humidity:	78.1	gr/lb	11.2 g/kg
Rel. Humidity:	58	%	
Dilution Air:			
Temperature:	77.0	°F	25.0 °C
Abs. Humidity	91.3	gr/lb	13.0 g/kg
Rel. Humidity:	63	%	

Sample Flows

	scfm	scmm
Blower 1 Rate:	1,184.6	33.5
Blower 2 Rate:	0.0	0.0
90 mm System:		
Gas Meter 1:	1.7	0.0
Gas Meter 2:	3.2	0.1
Sample Rate:	1.5	0.0
20X20 Sample Rate:	44.0	1.2
Chemistry Sample Rate:	0.135	0.077
Total Flow Rate:	1,230.3	34.9

Measured Gaseous Data

	Meter	Range	Concentration		
HC Sample	n/a		7.5	ppm	
HC Bckgrd	n/a		3.2	ppm	
CO Sample	18.9	2	18.2	ppm	(Dry)
CO Bckgrd	0.6	2	0.6	ppm	
NOx Sample	n/a		35.5	ppm	(Dry)
NOx Bckgrd	0.5	2	0.5	ppm	
CO2 Sample	78.5	1	0.7176	%	(Wet)
CO2 Bckgrd	6.6	1	0.0444	%	
CH4 Sample	n/a	n/a	1.7	ppm	(1.1)
CH4 Bckgrd	n/a	n/a	1.8	ppm	

Particulate Data

Filter Number:	3114.0-293 (pair)	
Weight Gain:	1.188	mg
Sample Multiplier:	0.796	

Correction Factors

NOx Humidity CF:	1.008
Dry-to-Wet CF, Sample:	0.972
Dry-to-Wet CF, Bckgrd:	0.979
Dilution Factor:	18.39

Test Cycle Data

Sample Time:	1,208.6	sec		
Work:	13.0	hp-hr	9.7	kW-hr
Reference Work:	13.1	hp-hr	9.7	kW-hr
Total Volume (Vmix):	24,779.0	scf	701.8	scm

Corrected Concentrations

HC	4.5	ppm	
CO	17.1	ppm	
NOx	34.1	ppm	
CO2	0.6756	%	
CH4	0.0	ppm	(1.1)

Brake-Specific Emission Results

BSHC (Cell)	0.141	g/hp-hr	0.189	g/kW-hr
CO	1.076	g/hp-hr	1.443	g/kW-hr
NOx (Cell)	3.555	g/hp-hr	4.767	g/kW-hr
Particulate	0.073	g/hp-hr	0.098	g/kW-hr
CO2	669.3	g/hp-hr	897.5	g/kW-hr
BSFC	0.470	lb/hp-hr	0.286	kg/kW-hr
NMHC	0.121	g/hp-hr	0.162	g/kW-hr
CH4	0.000	g/hp-hr	0.000	g/kW-hr

Mass Emissions

HC		1.822	grams	
CO		13.946	grams	
NOx		46.071	grams	
Particulate		0.945	grams	
CO2		8.674	kg	
CH4		0.002	grams	
Fuel	6.1 lb		2.8 kg	

Southwest Research Institute - Department of Emissions Research
Composite Transient Emission Test Results
Project No. 08-2164-001

Engine Mode: 99 Cummins ISB-215
Engine Desc.: 5.9 L (359 CID) 6
Engine Cycle: Diesel
Engine S/N: 56541396

Date: 08/23/1999 Time: 10:30
Program HDT: 4.04-R
Cell: 4 Bag Cart: 1

DIESEL Swedish, EM-2789-F
HCR: 1.940 FID Resp: 1.1
H= 0.140 C= 0.860 O= 0.000 X= 0.000
Oil Code: Mobil Delvac

Test Numbers
Cold: SWED-C1 Hot: SWED-H1

Brake-Specific Emission Results

BSHC (Cell)	0.141	g/hp-hr	0.189	g/kW-hr
CO	1.126	g/hp-hr	1.509	g/kW-hr
NOx (Cell)	3.629	g/hp-hr	4.867	g/kW-hr
Particulate	0.073	g/hp-hr	0.098	g/kW-hr
CO2	668.8	g/hp-hr	896.9	g/kW-hr
BSFC	0.470	lb/hp-hr	0.286	kg/kW-hr
NMHC	0.121	g/hp-hr	0.163	g/kW-hr
CH4	0.000	g/hp-hr	0.000	g/kW-hr
Work:	13.0	hp-hr	9.7	kW-hr
Reference Work:	13.1	hp-hr	9.7	kW-hr

Analyzed: 09/27/1999 16:31

Southwest Research Institute - Department of Emissions Research
EPA Cold Transient Emission Test Results
Project No. 08-2164-001

Engine Mode:	99 Cummins ISB-215	Test No.:	SWED-C2	DIESEL Swedish, EM-2789-F	
Engine Desc.:	5.9 L (359 CID) 6	Date: 08/25/1999	Time: 10:00	HCR: 1.940	FID Resp: 1.1
Engine Cycle:	Diesel	Program HDT:	4.04-R	H= 0.140 C= 0.860 O= 0.000 X= 0.000	
Engine S/N:	56541396	Cell: 4	Bag Cart: 1	Oil Code: Mobil Delvac	

Ambient/Test Cell Conditions

Barometer:	29.1	in Hg	98.5 kPa
Engine Inlet Air			
Temperature:	74.0	°F	23.3 °C
Dew Point:	62.4	°F	16.9 °C
Abs. Humidity:	87.1	gr/lb	12.4 g/kg
Rel. Humidity:	67	%	
Dilution Air:			
Temperature:	77.0	°F	25.0 °C
Abs. Humidity	90.9	gr/lb	13.0 g/kg
Rel. Humidity:	63	%	

Sample Flows

	scfm	scmm
Blower 1 Rate:	1,185.9	33.6
Blower 2 Rate:	0.0	0.0
90 mm System:		
Gas Meter 1:	1.7	0.0
Gas Meter 2:	3.2	0.1
Sample Rate:	1.6	0.0
20X20 Sample Rate:	44.6	1.3
Chemistry Sample Rate:	0.135	0.077
Total Flow Rate:	1,232.2	35.0

Measured Gaseous Data

	Meter	Range	Concentration		
HC Sample	n/a		8.9	ppm	
HC Bckgrd	n/a		4.4	ppm	
CO Sample	26.3	2	25.5	ppm	(Dry)
CO Bckgrd	0.9	2	0.9	ppm	
NOx Sample	n/a		39.3	ppm	(Dry)
NOx Bckgrd	0.4	2	0.4	ppm	
CO2 Sample	78.7	1	0.7203	%	(Wet)
CO2 Bckgrd	6.8	1	0.0457	%	
CH4 Sample	n/a	n/a	1.8	ppm	(1.1)
CH4 Bckgrd	n/a	n/a	2.0	ppm	

Particulate Data

Filter Number:	3152.0-305 (pair)	
Weight Gain:	1.332	mg
Sample Multiplier:	0.793	

Correction Factors

NOx Humidity CF:	1.032
Dry-to-Wet CF, Sample:	0.973
Dry-to-Wet CF, Bckgrd:	0.980
Dilution Factor:	18.30

Test Cycle Data

Sample Time:	1,207.8	sec		
Work:	13.0	hp-hr	9.7	kW-hr
Reference Work:	13.1	hp-hr	9.7	kW-hr
Total Volume (Vmix):	24,800.9	scf	702.4	scm

Corrected Concentrations

HC	4.8	ppm	
CO	23.8	ppm	
NOx	37.8	ppm	
CO2	0.6771	%	
CH4	-0.1	ppm	(1.1)

Brake-Specific Emission Results

BSHC (Cell)	0.150	g/hp-hr	0.201	g/kW-hr
CO	1.504	g/hp-hr	2.017	g/kW-hr
NOx (Cell)	4.048	g/hp-hr	5.429	g/kW-hr
Particulate	0.082	g/hp-hr	0.109	g/kW-hr
CO2	671.3	g/hp-hr	900.3	g/kW-hr
BSFC	0.472	lb/hp-hr	0.287	kg/kW-hr
NMHC	0.129	g/hp-hr	0.173	g/kW-hr
CH4	0.000	g/hp-hr	0.000	g/kW-hr

Mass Emissions

HC		1.945	grams	
CO		19.493	grams	
NOx		52.467	grams	
Particulate		1.056	grams	
CO2		8.700	kg	
CH4		0.000	grams	
Fuel	6.1 lb		2.8 kg	

Southwest Research Institute - Department of Emissions Research
EPA Hot Transient Emission Test Results
Project No. 08-2164-001

Engine Mode:	99 Cummins ISB-215	Test No.:	SWED-H2B	DIESEL Swedish, EM-2789-F	
Engine Desc.:	5.9 L (359 CID) 6	Date: 08/25/1999	Time: 10:40	HCR: 1.940	FID Resp: 1.1
Engine Cycle:	Diesel	Program HDT:	4.04-R	H= 0.140 C= 0.860 O= 0.000 X= 0.000	
Engine S/N:	56541396	Cell: 4	Bag Cart: 1	Oil Code: Mobil Delvac	

Ambient/Test Cell Conditions

Barometer:	29.1	in Hg	98.5 kPa
Engine Inlet Air			
Temperature:	74.0	°F	23.3 °C
Dew Point:	59.6	°F	15.3 °C
Abs. Humidity:	78.7	gr/lb	11.2 g/kg
Rel. Humidity:	61	%	
Dilution Air:			
Temperature:	79.0	°F	26.1 °C
Abs. Humidity	98.6	gr/lb	14.1 g/kg
Rel. Humidity:	64	%	

Sample Flows

	scfm	scmm
Blower 1 Rate:	1,182.2	33.5
Blower 2 Rate:	0.0	0.0
90 mm System:		
Gas Meter 1:	1.7	0.0
Gas Meter 2:	3.3	0.1
Sample Rate:	1.6	0.0
20X20 Sample Rate:	43.8	1.2
Chemistry Sample Rate:	0.136	0.077
Total Flow Rate:	1,227.7	34.8

Measured Gaseous Data

	Meter	Range	Concentration		
HC Sample	n/a		8.2	ppm	
HC Bckgrd	n/a		4.3	ppm	
CO Sample	19.2	2	18.5	ppm	(Dry)
CO Bckgrd	0.5	2	0.5	ppm	
NOx Sample	n/a		35.0	ppm	(Dry)
NOx Bckgrd	0.3	2	0.3	ppm	
CO2 Sample	78.7	1	0.7203	%	(Wet)
CO2 Bckgrd	6.7	1	0.0450	%	
CH4 Sample	n/a	n/a	1.8	ppm	(1.1)
CH4 Bckgrd	n/a	n/a	1.9	ppm	

Particulate Data

Filter Number:	3153.0-306 (pair)	
Weight Gain:	1.226	mg
Sample Multiplier:	0.786	

Correction Factors

NOx Humidity CF:	1.010
Dry-to-Wet CF, Sample:	0.971
Dry-to-Wet CF, Bckgrd:	0.978
Dilution Factor:	18.31

Corrected Concentrations

HC	4.1	ppm	
CO	17.4	ppm	
NOx	33.7	ppm	
CO2	0.6778	%	
CH4	0.0	ppm	(1.1)

Test Cycle Data

Sample Time:	1,207.8	sec		
Work:	13.0	hp-hr	9.7	kW-hr
Reference Work:	13.1	hp-hr	9.7	kW-hr
Total Volume (Vmix):	24,710.9	scf	699.8	scm

Mass Emissions

HC	1.684	grams		
CO	14.207	grams		
NOx	45.523	grams		
Particulate	0.963	grams		
CO2	8.677	kg		
CH4	0.000	grams		
Fuel	6.1	lb	2.8	kg

Brake-Specific Emission Results

BSHC (Cell)	0.130	g/hp-hr	0.174	g/kW-hr
CO	1.095	g/hp-hr	1.468	g/kW-hr
NOx (Cell)	3.507	g/hp-hr	4.703	g/kW-hr
Particulate	0.074	g/hp-hr	0.100	g/kW-hr
CO2	668.5	g/hp-hr	896.5	g/kW-hr
BSFC	0.469	lb/hp-hr	0.285	kg/kW-hr
NMHC	0.112	g/hp-hr	0.150	g/kW-hr
CH4	0.000	g/hp-hr	0.000	g/kW-hr

Southwest Research Institute - Department of Emissions Research
Composite Transient Emission Test Results
Project No. 08-2164-001

Engine Mode: 99 Cummins ISB-215
Engine Desc.: 5.9 L (359 CID) 6
Engine Cycle: Diesel
Engine S/N: 56541396

Date: 08/25/1999 Time: 10:00
Program HDT: 4.04-R
Cell: 4 Bag Cart: 1

DIESEL Swedish, EM-2789-F
HCR: 1.940 FID Resp: 1.1
H= 0.140 C= 0.860 O= 0.000 X= 0.000
Oil Code: Mobil Delvac

Test Numbers
Cold: SWED-C2 Hot: SWED-H2B

Brake-Specific Emission Results

BSHC (Cell)	0.133	g/hp-hr	0.178	g/kW-hr
CO	1.153	g/hp-hr	1.546	g/kW-hr
NOx (Cell)	3.584	g/hp-hr	4.807	g/kW-hr
Particulate	0.075	g/hp-hr	0.101	g/kW-hr
CO2	668.9	g/hp-hr	897.0	g/kW-hr
BSFC	0.470	lb/hp-hr	0.286	kg/kW-hr
NMHC	0.114	g/hp-hr	0.153	g/kW-hr
CH4	0.000	g/hp-hr	0.000	g/kW-hr
Work:	13.0	hp-hr	9.7	kW-hr
Reference Work:	13.1	hp-hr	9.7	kW-hr

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APPENDIX B

HEAVY-DUTY HYDROCARBON SPECIATION DATA

Page	Table	Title
B-1	B-1	Cold-Start Hydrocarbon Speciation Data (Background Corrected)
B-5	B-2	Hot-Start Hydrocarbon Speciation Data (Background Corrected)
B-9	B-3	Composite Hydrocarbon Speciation Data (Background Corrected)

COMPOUND	COLD TRANSIENT, mg/hp-hr					
	CARB			SWEDISH		
	8/18/99	8/19/99	AVG.	8/23/99	8/25/99	AVG.
METHANE	0.5	4.1	2.3	0.8	0.0	0.4
ETHANE	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLENE	17.6	17.9	17.7	17.9	19.2	18.6
PROPANE	0.0	0.0	0.0	0.0	1.6	0.8
PROPYLENE	4.2	3.8	4.0	4.1	4.5	4.3
ACETYLENE	4.0	4.1	4.1	3.6	4.1	3.8
PROPADIENE	0.0	0.0	0.0	0.0	0.0	0.0
BUTANE	0.0	0.1	0.1	0.1	trace	trace
TRANS-2-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
1-BUTENE	0.9	1.0	1.0	1.0	1.1	1.1
2-METHYLPROPENE (ISOBUTYLENE)	1.1	1.1	1.1	0.8	1.0	0.9
2,2-DIMETHYLPROPANE (NEOPENTANE)	0.0	0.0	0.0	0.0	0.0	0.0
PROPYNE	0.0	0.0	0.0	0.0	0.0	0.0
1,3-BUTADIENE	1.3	1.6	1.4	1.2	1.4	1.3
2-METHYLPROPANE (ISOBUTANE)	0.0	0.0	0.0	0.0	0.0	0.0
1-BUTYNE	0.0	0.0	0.0	0.0	0.0	0.0
METHANOL	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
ETHANOL	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLBUTANE (ISOPENTANE)	trace	0.0	trace	0.0	0.0	0.0
2-BUTYNE	0.0	0.0	0.0	0.0	0.0	0.0
1-PENTENE	0.0	0.7	0.3	0.0	0.0	0.0
2-METHYL-1-BUTENE	0.6	0.0	0.3	0.0	0.0	0.0
PENTANE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C5 OLEFINS	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-1,3-BUTADIENE	0.4	0.4	0.4	0.0	0.0	0.0
TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.9	0.5
3,3-DIMETHYL-1-BUTENE	0.0	0.0	0.0	0.7	0.0	0.3
CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.6	0.3
2-METHYL-2-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-BUTANOL	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOPENTADIENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLBUTANE	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOPENTENE	0.0	0.0	0.0	0.0	0.5	0.3
4-METHYL-1-PENTENE	0.5	0.6	0.6	0.0	0.4	0.2
3-METHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLBUTANE	0.0	0.0	0.0	0.0	0.0	0.0
MTBE	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLPENTANE	0.0	1.8	0.9	1.4	0.2	0.8
4-METHYL-TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLPENTANE	0.0	0.0	0.0	0.0	1.7	0.8
2-METHYL-1-PENTENE	0.4	0.6	0.5	0.7	0.7	0.7
1-HEXENE	0.4	0.6	0.5	0.7	0.7	0.7
HEXANE	0.0	0.0	0.0	0.7	0.2	0.5
UNIDENTIFIED C6 OLEFINS	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
DI-ISOPROPYL ETHER	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLCYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
ETBE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLPENTANE, NOTE A	0.0	0.0	0.0	0.0	0.0	0.0
METHYLCYCLOPENTANE, NOTE A	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,3-TRIMETHYLBUTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0

COMPOUND	COLD TRANSIENT, mg/hp-hr					
	CARB			SWEDISH		
	8/18/99	8/19/99	AVG.	8/23/99	8/25/99	AVG.
1-METHYLCYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
BENZENE	1.5	1.4	1.4	1.6	1.6	1.6
3-METHYL-1-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLPENTANE	0.0	0.2	0.1	0.5	0.0	0.2
1,1-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.4	0.2
TERT-AMYL METHYL ETHER	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOHEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,3-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,2-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,3-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,4-TRIMETHYLPENTANE	0.5	0.4	0.4	0.1	0.0	trace
2-METHYL-1-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-3-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
HEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C7	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-TRANS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
METHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,2-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1,3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,3-TRIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,5-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLHEXANE	0.4	0.7	0.6	0.0	0.0	0.0
1-TRANS-2-CIS-4-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1-TRANS-2-CIS-3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,4-TRIMETHYLPENTANE	0.0	0.4	0.2	0.0	0.0	0.0
2,3,3-TRIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TOLUENE	0.8	3.0	1.9	2.7	1.0	1.8
2,3-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1,2-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLHEPTANE	0.0	0.0	0.0	0.0	trace	trace
3,4-DIMETHYLHEXANE, NOTE B	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLHEPTANE	0.0	0.0	0.0	0.0	0.1	trace
1-CIS,2-TRANS,3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,3-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,4-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,5-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.2	0.1
TRANS-1-METHYL-3-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1-METHYL-3-ETHYLCYCLOPENTANE	0.0	0.4	0.2	0.0	0.5	0.2
1,1-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1-METHYL-2-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-1-ETHYL-CYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,2-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0

COMPOUND	COLD TRANSIENT, mg/hp-hr					
	CARB			SWEDISH		
	8/18/99	8/19/99	AVG.	8/23/99	8/25/99	AVG.
1-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-4-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
OCTANE	0.3	0.3	0.3	0.4	0.1	0.3
UNIDENTIFIED C8	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,3-DIMETHYLCYCLOHEXANE, NOTE C	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
ISOPROPYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,5-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1-METHYL-2-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
4,4-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,2-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,6-DIMETHYLHEPTANE, NOTE D	0.0	0.0	0.0	0.0	trace	trace
1,1,3-TRIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,5-DIMETHYLHEPTANE, NOTE E	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,5-DIMETHYLHEPTANE, NOTE E	0.6	0.0	0.3	0.0	0.0	0.0
ETHYLBENZENE	0.3	0.2	0.2	0.1	0.5	0.3
2,3,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
m-& p-XYLENE	0.4	0.4	0.4	0.4	0.5	0.5
4-METHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
4-ETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
STYRENE	0.0	0.0	0.0	0.0	0.0	0.0
o-XYLENE	0.0	0.0	0.0	0.0	0.0	0.0
1-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-3-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
NONANE	0.0	0.0	0.0	0.0	0.6	0.3
TRANS-2-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
ISOPROPYLBENZENE (CUMENE)	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLOCTANE	0.0	0.0	0.0	0.0	0.4	0.2
2,4-DIMETHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
n-PROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-3-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	1.8	0.9
1,3,5-TRIMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-2-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,4-TRIMETHYLBENZENE	0.0	0.0	0.0	0.4	0.0	0.2
TERT-BUTYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-DECENE	0.0	0.0	0.0	0.0	0.0	0.0
DECANE, NOTE F	0.0	0.0	0.0	0.0	0.0	0.0
ISOBUTYLBENZENE, NOTE F	0.0	0.0	0.0	0.0	0.0	0.0
1,3,-DIMETHYL-5-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
METHYLPROPYLBENZENE (sec butylbenzene)	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-3-ISOPROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,3-TRIMETHYLBENZENE	0.4	0.0	0.2	0.0	0.0	0.0
1-METHYL-4-ISOPROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
INDAN	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-2-ISOPROPYLBENZENE	0.0	0.4	0.2	0.0	0.0	0.0
1,3-DIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,4-DIETHYLBENZENE	0.0	0.0	0.0	0.7	0.0	0.3
1-METHYL-3-N-PROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-4-N-PROPYLBENZENE, NOTE G	1.3	0.8	1.0	0.0	0.0	0.0
1,2 DIETHYLBENZENE	0.0	0.0	0.0	0.5	0.6	0.5
1-METHYL-2-N-PROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,4-DIMETHYL-2-ETHYLBENZENE	0.0	0.8	0.4	0.0	0.0	0.0

COMPOUND	COLD TRANSIENT, mg/hp-hr					
	CARB			SWEDISH		
	8/18/99	8/19/99	AVG.	8/23/99	8/25/99	AVG.
1,3-DIMETHYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2-DIMETHYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,3-DIMETHYL-2-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
UNDECANE	1.2	1.0	1.1	1.2	0.0	0.6
1,2-DIMETHYL-3-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,4,5-TETRAMETHYLBENZENE	0.7	0.5	0.6	0.9	0.5	0.7
2-METHYLBUTYLBENZENE (sec AMYLBENZENE)	0.0	0.0	0.0	0.0	0.0	0.0
3,4 DIMETHYLCUMENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,3,5-TETRAMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-1-BUT-2-METHYLBENZENE	0.0	0.0	0.0	0.0	0.5	0.2
1,2,3,4-TETRAMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
N-PENT-BENZENE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-1-BUT-3,5-DIMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-1-BUTYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
NAPHTHALENE	0.0	0.0	0.0	0.0	0.0	0.0
DODECANE	0.0	0.0	0.0	1.0	0.0	0.5
1,3,5-TRIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,4-TRIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
HEXYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C9-C12+	0.5	0.0	0.2	0.5	0.0	0.3
FORMALDEHYDE	17.2	15.7	16.5	18.8	18.1	18.4
ACETALDEHYDE	6.6	5.9	6.3	7.2	7.2	7.2
ACROLEIN	1.4	1.4	1.4	2.9	3.4	3.2
ACETONE	2.7	1.9	2.3	1.7	1.7	1.7
PROPIONALDEHYDE	3.4	3.1	3.3	2.1	1.7	1.9
CROTONALDEHYDE	2.5	2.9	2.7	2.4	2.4	2.4
ISOBUTYRALDEHYDE, NOTE H	0.5	0.4	0.4	0.4	0.3	0.3
METHYL ETHYL KETONE, NOTE H	0.5	0.4	0.4	0.4	0.3	0.3
BENZALDEHYDE	0.3	0.3	0.3	0.4	0.1	0.3
ISOVALERALDEHYDE	0.3	0.4	0.4	0.4	0.6	0.5
VALERALDEHYDE	0.5	0.6	0.5	0.4	0.3	0.3
O-TOLUALDEHYDE	0.3	0.3	0.3	0.0	0.0	0.0
M/P-TOLUALDEHYDE	1.8	1.6	1.7	1.9	1.7	1.8
HEXANALDEHYDE	0.0	0.2	0.1	0.0	0.2	0.1
DIMETHYLBENZALDEHYDE	0.0	0.1	0.1	0.0	0.0	0.0
SUMMED SPECIATED VALUES	79	85	81.7	84	86	85.0

A - 2,2-Dimethylpentane and methylcyclopentane co-elute. GC peak area split equally between the two compounds.
B - 3-Methyl-3-ethy-pentane co-elutes with reported compound. Not reported separately.
C - Cis-1,4-Dimethylcyclohexane co-elutes with reported compound. Not reported separately.
D - Propylcyclopentane co-elutes with reported compound. Not reported separately.
E - 2,5-Dimethylheptane and 3,5-dimethylheptane co-elute. GC peak area split equally between the two compounds.
F - Decane and isobutylbenzene co-elute. GC peak area split equally between the two compounds.
G - n-Butylbenzene co-elutes with reported compound. Not reported separately.
H - Isobutyraldehyde and methyl ethyl ketone co-elute. LC peak area split equally between the two compounds.

COMPOUND	HOT TRANSIENT, mg/hp-hr					
	CARB			SWEDISH		
	8/18/99	8/19/99	AVG.	8/23/99	8/25/99	AVG.
METHANE	0.0	8.3	4.2	0.2	0.0	0.1
ETHANE	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLENE	12.7	7.8	10.3	14.1	14.6	14.4
PROPANE	0.0	0.3	0.2	0.0	0.0	0.0
PROPYLENE	3.2	2.1	2.6	3.5	3.6	3.6
ACETYLENE	3.4	2.0	2.7	3.3	3.5	3.4
PROPADIENE	0.0	0.0	0.0	0.0	0.0	0.0
BUTANE	0.1	0.0	0.1	0.1	0.2	trace
TRANS-2-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
1-BUTENE	0.8	0.5	0.7	0.9	0.8	0.9
2-METHYLPROPENE (ISOBUTYLENE)	0.7	0.5	0.6	0.6	0.7	0.6
2,2-DIMETHYLPROPANE (NEOPENTANE)	0.0	0.0	0.0	0.0	0.0	0.0
PROPYNE	0.0	0.0	0.0	0.0	0.4	0.2
1,3-BUTADIENE	1.2	0.7	1.0	1.1	1.1	1.1
2-METHYLPROPANE (ISOBUTANE)	trace	0.0	0.0	0.0	0.0	0.0
1-BUTYNE	0.0	0.0	0.0	0.0	0.0	0.0
METHANOL	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
ETHANOL	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLBUTANE (ISOPENTANE)	1.2	0.1	trace	0.0	0.0	0.0
2-BUTYNE	0.0	0.0	0.0	0.0	0.0	0.0
1-PENTENE	0.0	0.4	0.2	0.0	0.0	0.0
2-METHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
PENTANE	1.1	0.0	0.6	0.0	0.0	0.0
UNIDENTIFIED C5 OLEFINS	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-1,3-BUTADIENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYL-1-BUTENE	0.0	0.0	0.0	0.5	0.2	0.3
CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-2-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-BUTANOL	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOPENTADIENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLBUTANE	0.4	0.0	0.2	0.0	0.4	0.2
CYCLOPENTENE	0.0	0.0	0.0	0.0	0.4	0.2
4-METHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLBUTANE	0.0	0.0	0.0	0.4	0.0	0.2
MTBE	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLPENTANE	0.0	0.4	0.2	0.5	0.2	0.4
4-METHYL-TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-1-PENTENE	0.4	0.0	0.2	0.4	0.5	0.5
1-HEXENE	0.4	0.0	0.2	0.4	0.5	0.5
HEXANE	0.5	0.0	0.2	0.0	0.1	0.1
UNIDENTIFIED C6 OLEFINS	0.0	0.4	0.2	0.0	0.0	0.0
TRANS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
DI-ISOPROPYL ETHER	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLCYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
ETBE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLPENTANE, NOTE A	0.0	0.0	0.0	0.0	0.0	0.0
METHYLCYCLOPENTANE, NOTE A	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,3-TRIMETHYLBUTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0

COMPOUND	HOT TRANSIENT, mg/hp-hr					
	CARB			SWEDISH		
	8/18/99	8/19/99	AVG.	8/23/99	8/25/99	AVG.
1-METHYLCYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
BENZENE	1.2	1.2	1.2	1.1	1.4	1.3
3-METHYL-1-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLPENTANE	0.1	0.0	trace	0.0	0.0	0.0
1,1-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-AMYL METHYL ETHER	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOHEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,3-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,2-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,3-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,4-TRIMETHYLPENTANE	0.6	0.0	0.3	trace	0.0	trace
2-METHYL-1-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-3-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
HEPTANE	0.0	0.0	0.0	0.0	trace	0.0
CIS-3-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C7	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-TRANS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
METHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,2-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1,3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,3-TRIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,5-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLHEXANE	0.0	0.5	0.2	0.0	0.0	0.0
1-TRANS-2-CIS-4-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1-TRANS-2-CIS-3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,4-TRIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,3-TRIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TOLUENE	0.4	0.0	0.2	0.1	0.0	trace
2,3-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1,2-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	trace
3,4-DIMETHYLHEXANE, NOTE B	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLHEPTANE	0.0	0.0	0.0	0.5	0.0	trace
1-CIS,2-TRANS,3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,3-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,4-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,5-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1-METHYL-3-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1-METHYL-3-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.4	0.4	0.4
1,1-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1-METHYL-2-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-1-ETHYL-CYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,2-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0

COMPOUND	HOT TRANSIENT, mg/hp-hr					
	CARB			SWEDISH		
	8/18/99	8/19/99	AVG.	8/23/99	8/25/99	AVG.
1-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-4-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
OCTANE	0.9	0.6	0.7	0.4	0.1	0.3
UNIDENTIFIED C8	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,3-DIMETHYLCYCLOHEXANE, NOTE C	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
ISOPROPYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,5-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1-METHYL-2-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
4,4-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,2-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,6-DIMETHYLHEPTANE, NOTE D	0.0	0.0	0.0	0.0	0.1	trace
1,1,3-TRIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,5-DIMETHYLHEPTANE, NOTE E	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,5-DIMETHYLHEPTANE, NOTE E	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLBENZENE	0.0	0.0	0.0	0.0	0.4	0.2
2,3,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
m-& p-XYLENE	0.0	0.0	0.0	0.0	0.4	0.2
4-METHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
4-ETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
STYRENE	0.0	0.0	0.0	0.0	0.0	0.0
o-XYLENE	0.5	0.0	0.2	0.4	0.0	0.2
1-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-3-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
NONANE	trace	0.0	0.0	0.0	0.0	0.0
TRANS-2-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
ISOPROPYLBENZENE (CUMENE)	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
n-PROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-3-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,3,5-TRIMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-2-ETHYLBENZENE	0.0	0.0	0.0	0.4	0.0	0.2
1,2,4-TRIMETHYLBENZENE	0.0	0.0	0.0	0.4	0.0	0.2
TERT-BUTYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-DECENE	0.0	0.0	0.0	0.0	0.0	0.0
DECANE, NOTE F	0.0	0.0	0.0	0.4	0.0	0.2
ISOBUTYLBENZENE, NOTE F	0.0	0.0	0.0	0.4	0.0	0.2
1,3,-DIMETHYL-5-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
METHYLPROPYLBENZENE (sec butylbenzene)	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-3-ISOPROPYLBENZENE	0.6	0.0	0.3	0.0	0.0	0.0
1,2,3-TRIMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-4-ISOPROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
INDAN	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-2-ISOPROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,3-DIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,4-DIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-3-N-PROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-4-N-PROPYLBENZENE, NOTE G	0.0	0.0	0.0	0.0	0.0	0.0
1,2 DIETHYLBENZENE	0.0	0.0	0.0	0.6	0.3	0.4
1-METHYL-2-N-PROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,4-DIMETHYL-2-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0

COMPOUND	HOT TRANSIENT, mg/hp-hr					
	CARB			SWEDISH		
	8/18/99	8/19/99	AVG.	8/23/99	8/25/99	AVG.
1,3-DIMETHYL-4-ETHYLBENZENE	0.8	0.0	0.4	0.0	0.0	0.0
1,2-DIMETHYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,3-DIMETHYL-2-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
UNDECANE	1.2	0.0	0.6	1.3	0.0	0.6
1,2-DIMETHYL-3-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,4,5-TETRAMETHYLBENZENE	1.4	0.0	0.7	1.0	1.0	1.0
2-METHYLBUTYLBENZENE (sec AMYLBENZENE)	0.0	0.0	0.0	0.0	0.0	0.0
3,4 DIMETHYLCUMENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,3,5-TETRAMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-1-BUT-2-METHYLBENZENE	0.7	0.0	0.4	0.0	0.6	0.3
1,2,3,4-TETRAMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
N-PENT-BENZENE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-1-BUT-3,5-DIMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-1-BUTYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
NAPHTHALENE	0.0	0.0	0.0	0.6	0.0	0.3
DODECANE	0.0	0.0	0.0	1.7	0.0	0.9
1,3,5-TRIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,4-TRIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
HEXYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C9-C12+	1.0	0.0	0.5	0.7	3.1	1.9
FORMALDEHYDE	11.0	9.6	10.3	13.3	12.3	12.8
ACETALDEHYDE	4.5	3.8	4.2	5.3	5.1	5.2
ACROLEIN	1.1	0.9	1.0	2.3	2.5	2.4
ACETONE	1.5	1.1	1.3	1.4	1.2	1.3
PROPIONALDEHYDE	2.4	2.2	2.3	1.8	1.3	1.6
CROTONALDEHYDE	1.6	1.8	1.7	1.8	1.2	1.5
ISOBUTYRALDEHYDE, NOTE H	0.3	0.3	0.3	0.2	0.3	0.3
METHYL ETHYL KETONE, NOTE H	0.3	0.3	0.3	0.2	0.3	0.3
BENZALDEHYDE	0.3	0.1	0.2	0.4	trace	0.2
ISOVALERALDEHYDE	0.3	0.4	0.4	0.4	0.7	0.6
VALERALDEHYDE	0.3	0.4	0.4	0.5	0.3	0.4
O-TOLUALDEHYDE	0.1	0.1	0.1	0.0	0.1	0.1
M/P-TOLUALDEHYDE	0.8	0.7	0.8	1.0	1.0	1.0
HEXANALDEHYDE	0.0	0.1	0.1	0.0	0.2	0.1
DIMETHYLBENZALDEHYDE	0.0	0.0	0.0	0.0	0.1	0.1
SUMMED SPECIATED VALUES	60.0	47.5	53.7	65.2	61.8	63.5

A - 2,2-Dimethylpentane and methylcyclopentane co-elute. GC peak area split equally between the two compounds.
B - 3-Methyl-3-ethy-pentane co-elutes with reported compound. Not reported separately.
C - Cis-1,4-Dimethylcyclohexane co-elutes with reported compound. Not reported separately.
D - Propylcyclopentane co-elutes with reported compound. Not reported separately.
E - 2,5-Dimethylheptane and 3,5-dimethylheptane co-elute. GC peak area split equally between the two compounds.
F - Decane and isobutylbenzene co-elute. GC peak area split equally between the two compounds.
G - n-Butylbenzene co-elutes with reported compound. Not reported separately.
H - Isobutyraldehyde and methyl ethyl ketone co-elute. LC peak area split equally between the two compounds.

COMPOUND	COMPOSITE, mg/hp-hr					
	CARB			SWEDISH		
	8/18/99	8/19/99	AVG.	8/23/99	8/25/99	AVG.
METHANE	0.1	7.7	3.9	0.3	0.0	0.1
ETHANE	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLENE	13.4	9.3	11.3	14.7	15.2	15.0
PROPANE	0.0	0.3	0.1	0.0	0.2	0.1
PROPYLENE	3.3	2.3	2.8	3.6	3.7	3.7
ACETYLENE	3.5	2.3	2.9	3.3	3.6	3.5
PROPADIENE	0.0	0.0	0.0	0.0	0.0	0.0
BUTANE	0.1	trace	0.1	0.1	0.2	0.1
TRANS-2-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
1-BUTENE	0.8	0.6	0.7	0.9	0.9	0.9
2-METHYLPROPENE (ISOBUTYLENE)	0.8	0.5	0.7	0.6	0.7	0.7
2,2-DIMETHYLPROPANE (NEOPENTANE)	0.0	0.0	0.0	0.0	0.0	0.0
PROPYNE	0.0	0.0	0.0	0.0	0.4	0.2
1,3-BUTADIENE	1.2	0.8	1.0	1.1	1.1	1.1
2-METHYLPROPANE (ISOBUTANE)	0.0	0.0	trace	0.0	0.0	0.0
1-BUTYNE	0.0	0.0	0.0	0.0	0.0	0.0
METHANOL	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
ETHANOL	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLBUTANE (ISOPENTANE)	1.0	0.1	0.6	0.0	0.0	0.0
2-BUTYNE	0.0	0.0	0.0	0.0	0.0	0.0
1-PENTENE	0.0	0.4	0.2	0.0	0.0	0.0
2-METHYL-1-BUTENE	0.1	0.0	trace	0.0	0.0	0.0
PENTANE	1.0	0.0	0.5	0.0	0.0	0.0
UNIDENTIFIED C5 OLEFINS	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-1,3-BUTADIENE	0.1	0.1	0.1	0.0	0.0	0.0
TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.1	0.1
3,3-DIMETHYL-1-BUTENE	0.0	0.0	0.0	0.5	0.2	0.3
CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.1	trace
2-METHYL-2-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-BUTANOL	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOPENTADIENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLBUTANE	0.4	0.0	0.2	0.0	0.4	0.2
CYCLOPENTENE	0.0	0.0	0.0	0.0	0.4	0.2
4-METHYL-1-PENTENE	0.1	0.1	0.1	0.0	0.1	trace
3-METHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLBUTANE	0.0	0.0	0.0	0.3	0.0	0.2
MTBE	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLPENTANE	0.0	0.6	0.3	0.7	0.2	0.4
4-METHYL-TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLPENTANE	0.0	0.0	0.0	0.0	0.2	0.1
2-METHYL-1-PENTENE	0.4	0.1	0.2	0.4	0.6	0.5
1-HEXENE	0.4	0.1	0.2	0.4	0.6	0.5
HEXANE	0.4	0.0	0.2	0.1	0.1	0.1
UNIDENTIFIED C6 OLEFINS	0.0	0.3	0.2	0.0	0.0	0.0
TRANS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
DI-ISOPROPYL ETHER	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLCYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
ETBE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLPENTANE, NOTE A	0.0	0.0	0.0	0.0	0.0	0.0
METHYLCYCLOPENTANE, NOTE A	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,3-TRIMETHYLBUTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0

COMPOUND	COMPOSITE, mg/hp-hr					
	CARB			SWEDISH		
	8/18/99	8/19/99	AVG.	8/23/99	8/25/99	AVG.
1-METHYLCYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
BENZENE	1.2	1.2	1.2	1.1	1.5	1.3
3-METHYL-1-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLPENTANE	0.1	trace	trace	0.1	0.0	trace
1,1-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.1	trace
TERT-AMYL METHYL ETHER	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOHEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,3-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,2-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,3-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,4-TRIMETHYLPENTANE	0.6	0.1	0.3	trace	0.0	trace
2-METHYL-1-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-3-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
HEPTANE	0.0	0.0	0.0	0.0	trace	trace
CIS-3-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C7	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-TRANS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
METHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,2-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1,3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,3-TRIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,5-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLHEXANE	0.1	0.5	0.3	0.0	0.0	0.0
1-TRANS-2-CIS-4-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1-TRANS-2-CIS-3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,4-TRIMETHYLPENTANE	0.0	0.1	trace	0.0	0.0	0.0
2,3,3-TRIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TOLUENE	0.4	0.4	0.4	0.4	0.1	0.3
2,3-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1,2-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLHEPTANE	0.0	0.0	0.0	0.0	trace	trace
3,4-DIMETHYLHEXANE, NOTE B	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLHEPTANE	0.0	0.0	0.0	0.4	trace	0.2
1-CIS,2-TRANS,3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,3-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,4-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,5-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	trace	trace
TRANS-1-METHYL-3-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1-METHYL-3-ETHYLCYCLOPENTANE	0.0	0.1	trace	0.3	0.4	0.4
1,1-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1-METHYL-2-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-1-ETHYL-CYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,2-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0

COMPOUND	COMPOSITE, mg/hp-hr					
	CARB			SWEDISH		
	8/18/99	8/19/99	AVG.	8/23/99	8/25/99	AVG.
1-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-4-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
OCTANE	0.8	0.5	0.7	0.4	0.1	0.3
UNIDENTIFIED C8	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,3-DIMETHYLCYCLOHEXANE, NOTE C	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
ISOPROPYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,5-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1-METHYL-2-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
4,4-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,2-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,6-DIMETHYLHEPTANE, NOTE D	0.0	0.0	0.0	0.0	0.1	trace
1,1,3-TRIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,5-DIMETHYLHEPTANE, NOTE E	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,5-DIMETHYLHEPTANE, NOTE E	0.1	0.0	trace	0.0	0.0	0.0
ETHYLBENZENE	trace	trace	trace	trace	0.4	0.2
2,3,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
m-& p-XYLENE	0.1	0.1	0.1	0.1	0.5	0.3
4-METHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
4-ETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
STYRENE	0.0	0.0	0.0	0.0	0.0	0.0
o-XYLENE	0.4	0.0	0.2	0.3	0.0	0.2
1-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-3-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
NONANE	trace	0.0	trace	0.0	0.1	trace
TRANS-2-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
ISOPROPYLBENZENE (CUMENE)	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLOCTANE	0.0	0.0	0.0	0.0	0.1	trace
2,4-DIMETHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
n-PROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-3-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.3	0.1
1,3,5-TRIMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-2-ETHYLBENZENE	0.0	0.0	0.0	0.4	0.0	0.2
1,2,4-TRIMETHYLBENZENE	0.0	0.0	0.0	0.4	0.0	0.2
TERT-BUTYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-DECENE	0.0	0.0	0.0	0.0	0.0	0.0
DECANE, NOTE F	0.0	0.0	0.0	0.4	0.0	0.2
ISOBUTYLBENZENE, NOTE F	0.0	0.0	0.0	0.3	0.0	0.2
1,3,-DIMETHYL-5-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
METHYLPROPYLBENZENE (sec butylbenzene)	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-3-ISOPROPYLBENZENE	0.5	0.0	0.3	0.0	0.0	0.0
1,2,3-TRIMETHYLBENZENE	0.1	0.0	trace	0.0	0.0	0.0
1-METHYL-4-ISOPROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
INDAN	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-2-ISOPROPYLBENZENE	0.0	0.1	trace	0.0	0.0	0.0
1,3-DIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,4-DIETHYLBENZENE	0.0	0.0	0.0	0.1	0.0	trace
1-METHYL-3-N-PROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-4-N-PROPYLBENZENE, NOTE G	0.2	0.1	0.1	0.0	0.0	0.0
1,2 DIETHYLBENZENE	0.0	0.0	0.0	0.5	0.3	0.4
1-METHYL-2-N-PROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,4-DIMETHYL-2-ETHYLBENZENE	0.0	0.1	0.1	0.0	0.0	0.0

COMPOUND	COMPOSITE, mg/hp-hr					
	CARB			SWEDISH		
	8/18/99	8/19/99	AVG.	8/23/99	8/25/99	AVG.
1,3-DIMETHYL-4-ETHYLBENZENE	0.7	0.0	0.3	0.0	0.0	0.0
1,2-DIMETHYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,3-DIMETHYL-2-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
UNDECANE	1.2	0.1	0.7	1.3	0.0	0.6
1,2-DIMETHYL-3-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,4,5-TETRAMETHYLBENZENE	1.3	0.1	0.7	1.0	0.9	1.0
2-METHYLBUTYLBENZENE (sec AMYLBENZENE)	0.0	0.0	0.0	0.0	0.0	0.0
3,4 DIMETHYLCUMENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,3,5-TETRAMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-1-BUT-2-METHYLBENZENE	0.6	0.0	0.3	0.0	0.5	0.3
1,2,3,4-TETRAMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
N-PENT-BENZENE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-1-BUT-3,5-DIMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-1-BUTYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
NAPHTHALENE	0.0	0.0	0.0	0.6	0.0	0.3
DODECANE	0.0	0.0	0.0	1.6	0.0	0.8
1,3,5-TRIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,4-TRIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
HEXYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C9-C12+	1.0	0.0	0.5	0.7	2.7	1.7
FORMALDEHYDE	11.9	10.5	11.2	14.1	13.1	13.6
ACETALDEHYDE	4.8	4.1	4.5	5.6	5.4	5.5
ACROLEIN	1.1	0.9	1.0	2.4	2.6	2.5
ACETONE	1.6	1.2	1.4	1.4	1.2	1.3
PROPIONALDEHYDE	2.6	2.3	2.4	1.8	1.4	1.6
CROTONALDEHYDE	1.7	2.0	1.9	1.9	1.4	1.6
ISOBUTYRALDEHYDE, NOTE H	0.3	0.3	0.3	0.3	0.3	0.3
METHYL ETHYL KETONE, NOTE H	0.3	0.3	0.3	0.3	0.3	0.3
BENZALDEHYDE	0.3	0.1	0.2	0.4	trace	0.2
ISOVALERALDEHYDE	0.3	0.4	0.4	0.4	0.7	0.6
VALERALDEHYDE	0.4	0.5	0.4	0.5	0.3	0.4
O-TOLUALDEHYDE	0.2	0.1	0.2	0.0	0.1	trace
M/P-TOLUALDEHYDE	1.0	0.8	0.9	1.1	1.1	1.1
HEXANALDEHYDE	0.0	0.1	0.1	0.0	0.2	0.1
DIMETHYLBENZALDEHYDE	trace	trace	trace	0.0	0.1	trace
SUMMED SPECIATED VALUES	63	53	57.8	68	65	66.6

A - 2,2-Dimethylpentane and methylcyclopentane co-elute. GC peak area split equally between the two compounds.
B - 3-Methyl-3-ethy-pentane co-elutes with reported compound. Not reported separately.
C - Cis-1,4-Dimethylcyclohexane co-elutes with reported compound. Not reported separately.
D - Propylcyclopentane co-elutes with reported compound. Not reported separately.
E - 2,5-Dimethylheptane and 3,5-dimethylheptane co-elute. GC peak area split equally between the two compounds.
F - Decane and isobutylbenzene co-elute. GC peak area split equally between the two compounds.
G - n-Butylbenzene co-elutes with reported compound. Not reported separately.
H - Isobutyraldehyde and methyl ethyl ketone co-elute. LC peak area split equally between the two compounds.

APPENDIX C

LIGHT-DUTY EMISSION TEST RESULTS

Page	Test No.	Test Cycle	Fuel
C-1	CARB-1	FTP	CARB Diesel
C-2	CARB-1	US06	CARB Diesel
C-3	CARB-1	HFET	CARB Diesel
C-4	CARB-2	FTP	CARB Diesel
C-5	CARB-2	US06	CARB Diesel
C-6	CARB-2	HFET	CARB Diesel
C-7	SWED-1	FTP	Swedish Diesel
C-8	SWED-1	US06	Swedish Diesel
C-9	SWED-1	HFET	Swedish Diesel
C-10	SWED-2	FTP	Swedish Diesel
C-11	SWED-2	US06	Swedish Diesel
C-12	SWED-2	HFET	Swedish Diesel

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.2-R 3-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER	8	TEST CARB-1	DIESEL EM-2790-F
VEHICLE MODEL	99 VW GOLF GL TDI	DATE 10/18/1999 RUN	FUEL DENSITY 6.962 LB/GAL
ENGINE	1.9 L (114 CID)-4	DYNO 7 BAG CART 1	H .138 C .862 O .000 X .000
TRANSMISSION	A4	ACTUAL ROAD LOAD 7.80 HP (5.82 KW)	FTP
ODOMETER	770 MILES (1238 KM)	TEST WEIGHT 3250 LBS (1473 KG)	

BAROMETER 29.28 IN HG (743.7 MM HG) DRY BULB TEMPERATURE 70.0°F (21.1°C) NOX HUMIDITY C.F. .909

RELATIVE HUMIDITY 48.0 PCT.

BAG NUMBER	1	2	3
BAG DESCRIPTION	COLD TRANSIENT (0-505 SEC.)	STABILIZED (505-1372 SEC.)	HOT TRANSIENT (0- 505 SEC.)
RUN TIME SECONDS	505.0	870.4	505.4
DRY/WET CORRECTION FACTOR, SAMP/BACK	.983/.988	.985/.988	.984/.988
MEASURED DISTANCE MILES (KM)	3.59 (5.77)	3.86 (6.21)	3.58 (5.77)
BLOWER FLOW RATE SCFM (SCMM)	584.4 (16.55)	584.1 (16.54)	585.6 (16.58)
GAS METER FLOW RATE SCFM (SCMM)	1.28 (.04)	1.21 (.03)	1.28 (.04)
TOTAL FLOW SCF (SCM)	4930. (139.6)	8490. (240.5)	4943. (140.0)
HC SAMPLE METER/RANGE/PPM (CONT)	6.7/1071/ 6.68	7.4/1071/ 7.40	7.9/1071/ 7.90
HC BCKGRD METER/RANGE/PPM	5.0/1071/ 5.00	6.3/1071/ 6.30	6.8/1071/ 6.80
CO SAMPLE METER/RANGE/PPM	2.9/ 12/ 2.99	.3/ 12/ .31	.4/ 12/ .41
CO BCKGRD METER/RANGE/PPM	.6/ 12/ .62	.3/ 12/ .31	.3/ 12/ .31
CO2 SAMPLE METER/RANGE/PCT	56.8/ 11/ .4577	39.5/ 11/ .2924	49.8/ 11/ .3869
CO2 BCKGRD METER/RANGE/PCT	6.2/ 11/ .0417	6.1/ 11/ .0410	6.2/ 11/ .0417
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	4.6/1072/ 11.66	2.9/1072/ 7.39	5.2/1072/ 12.94
NOX BCKGRD METER/RANGE/PPM	.4/ 2/ .40	.2/ 2/ .20	.2/ 2/ .20
CH4 SAMPLE PPM (1.200)	2.35	2.31	2.20
CH4 BCKGRD PPM	2.18	2.15	2.09
DILUTION FACTOR	29.05	45.45	34.36
HC CONCENTRATION PPM	1.85	1.23	1.29
CO CONCENTRATION PPM	2.32	.00	.11
CO2 CONCENTRATION PCT	.4175	.2523	.3464
NOX CONCENTRATION PPM	11.08	7.08	12.54
CH4 CONCENTRATION PPM	.24	.20	.18
NMHC CONCENTRATION PPM	1.56	.99	1.08
HC MASS GRAMS	.149	.172	.105
CO MASS GRAMS	.377	.001	.018
CO2 MASS GRAMS	1067.15	1110.70	887.95
NOX MASS GRAMS	2.688	2.959	3.050
PM MASS GRAMS	.128	.138	.105
CH4 MASS GRAMS	.022	.033	.016
NMHC MASS GRAMS (FID)	.125	.137	.087
FUEL MASS KG	.338	.352	.281
FUEL ECONOMY MPG (L/100KM)	33.47 (7.03)	34.66 (6.79)	40.23 (5.85)

3-BAG COMPOSITE RESULTS

HC	G/MI	.040	CH4	G/MI	.007
CO	G/MI	.023	NMHC	G/MI	.032
NOX	G/MI	.786			
PM	G/MI	.034			
FUEL ECONOMY MPG (L/100KM)		35.82 (6.57)			

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.2-R 1-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER	8	TEST CARB-1	DIESEL EM-2790-F
VEHICLE MODEL	99 VW GOLF GL TDI	DATE 10/18/1999 RUN	FUEL DENSITY 6.962 LB/GAL
ENGINE	1.9 L (114 CID)-4	DYNO 7 BAG CART 1	H .138 C .862 O .000 X .000
TRANSMISSION	A4	ACTUAL ROAD LOAD 7.80 HP (5.82 KW)	US06
ODOMETER	790 MILES (1271 KM)	TEST WEIGHT 3250 LBS (1473 KG)	

BAROMETER 29.28 IN HG (743.7 MM HG) DRY BULB TEMPERATURE 70.0°F (21.1°C) NOX HUMIDITY C.F. .893

RELATIVE HUMIDITY 44.3 PCT.

BAG NUMBER	1
BAG DESCRIPTION	
RUN TIME SECONDS	595.4
DRY/WET CORRECTION FACTOR, SAMP/BACK	.981/.989
MEASURED DISTANCE MILES (KM)	7.98 (12.84)
BLOWER FLOW RATE SCFM (SCMM)	579.0 (16.40)
GAS METER FLOW RATE SCFM (SCMM)	1.25 (.04)
TOTAL FLOW SCF (SCM)	5757. (163.1)
HC SAMPLE METER/RANGE/PPM (CONT)	6.6/1071/ 6.56
HC BCKGRD METER/RANGE/PPM	3.6/1071/ 3.60
CO SAMPLE METER/RANGE/PPM	.5/ 12/ .52
CO BCKGRD METER/RANGE/PPM	.1/ 12/ .10
CO2 SAMPLE METER/RANGE/PCT	82.8/ 11/ .7768
CO2 BCKGRD METER/RANGE/PCT	6.2/ 11/ .0417
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	21.4/1072/ 53.57
NOX BCKGRD METER/RANGE/PPM	.2/ 2/ .20
CH4 SAMPLE PPM (1.200)	2.09
CH4 BCKGRD PPM	2.14
DILUTION FACTOR	17.13
HC CONCENTRATION PPM	3.17
CO CONCENTRATION PPM	.41
CO2 CONCENTRATION PCT	.7376
NOX CONCENTRATION PPM	52.38
CH4 CONCENTRATION PPM	.08
NMHC CONCENTRATION PPM	3.07
HC MASS GRAMS	.299
CO MASS GRAMS	.077
CO2 MASS GRAMS	2201.82
NOX MASS GRAMS	14.579
PM MASS GRAMS	1.413
CH4 MASS GRAMS	.009
NMHC MASS GRAMS (FID)	.289
FUEL MASS KG	.698
FUEL ECONOMY MPG (L/100KM)	36.14 (6.51)

1-BAG COMPOSITE RESULTS

HC	G/MI	.037	CH4	G/MI	.001
CO	G/MI	.010	NMHC	G/MI	.036
NOX	G/MI	1.826			
PM	G/MI	.177			
FUEL ECONOMY MPG (L/100KM)		36.14 (6.51)			

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.2-R 1-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER	8	TEST CARB-1	DIESEL EM-2790-F
VEHICLE MODEL	99 VW GOLF GL TDI	DATE 10/18/1999 RUN	FUEL DENSITY 6.962 LB/GAL
ENGINE	1.9 L (114 CID)-4	DYNO 7 BAG CART 1	H .138 C .862 O .000 X .000
TRANSMISSION	A4	ACTUAL ROAD LOAD 7.80 HP (5.82 KW)	HFET
ODOMETER	808 MILES (1300 KM)	TEST WEIGHT 3250 LBS (1473 KG)	

BAROMETER 29.28 IN HG (743.7 MM HG) DRY BULB TEMPERATURE 72.0°F (22.2°C) NOX HUMIDITY C.F. .896

RELATIVE HUMIDITY 42.1 PCT.

BAG NUMBER	1
BAG DESCRIPTION	
RUN TIME SECONDS	765.3
DRY/WET CORRECTION FACTOR, SAMP/BACK	.984/.989
MEASURED DISTANCE MILES (KM)	10.26 (16.50)
BLOWER FLOW RATE SCFM (SCMM)	574.0 (16.26)
GAS METER FLOW RATE SCFM (SCMM)	1.26 (.04)
TOTAL FLOW SCF (SCM)	7338. (207.8)
HC SAMPLE METER/RANGE/PPM (CONT)	6.9/1071/ 6.89
HC BCKGRD METER/RANGE/PPM	5.2/1071/ 5.20
CO SAMPLE METER/RANGE/PPM	.9/ 12/ .93
CO BCKGRD METER/RANGE/PPM	.2/ 12/ .21
CO2 SAMPLE METER/RANGE/PCT	62.4/ 11/ .5187
CO2 BCKGRD METER/RANGE/PCT	6.1/ 11/ .0410
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	5.9/1072/ 14.77
NOX BCKGRD METER/RANGE/PPM	.3/ 2/ .30
CH4 SAMPLE PPM (1.200)	2.20
CH4 BCKGRD PPM	2.12
DILUTION FACTOR	25.64
HC CONCENTRATION PPM	1.89
CO CONCENTRATION PPM	.71
CO2 CONCENTRATION PCT	.4793
NOX CONCENTRATION PPM	14.24
CH4 CONCENTRATION PPM	.17
NMHC CONCENTRATION PPM	1.69
HC MASS GRAMS	.228
CO MASS GRAMS	.172
CO2 MASS GRAMS	1823.66
NOX MASS GRAMS	5.072
PM MASS GRAMS	.381
CH4 MASS GRAMS	.023
NMHC MASS GRAMS (FID)	.202
FUEL MASS KG	.578
FUEL ECONOMY MPG (L/100KM)	56.05 (4.20)

1-BAG COMPOSITE RESULTS

HC	G/MI	.022	CH4	G/MI	.002
CO	G/MI	.017	NMHC	G/MI	.020
NOX	G/MI	.495			
PM	G/MI	.037			
FUEL ECONOMY MPG (L/100KM)		56.05 (4.20)			

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.2-R 3-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER	8	TEST CARB-2	DIESEL EM-2790-F
VEHICLE MODEL	99 VW GOLF GL TDI	DATE 10/19/1999 RUN	FUEL DENSITY 6.962 LB/GAL
ENGINE	1.9 L (114 CID)-4	DYNO 7 BAG CART 1	H .138 C .862 O .000 X .000
TRANSMISSION	A4	ACTUAL ROAD LOAD 7.80 HP (5.82 KW)	FTP
ODOMETER	818 MILES (1316 KM)	TEST WEIGHT 3250 LBS (1473 KG)	

BAROMETER 29.41 IN HG (747.0 MM HG) DRY BULB TEMPERATURE 73.0°F (22.8°C) NOX HUMIDITY C.F. 1.004

RELATIVE HUMIDITY 61.4 PCT.

BAG NUMBER	1	2	3
BAG DESCRIPTION	COLD TRANSIENT (0-505 SEC.)	STABILIZED (505-1372 SEC.)	HOT TRANSIENT (0- 505 SEC.)
RUN TIME SECONDS	505.1	868.9	505.6
DRY/WET CORRECTION FACTOR, SAMP/BACK	.978/.983	.980/.983	.979/.983
MEASURED DISTANCE MILES (KM)	3.58 (5.76)	3.85 (6.20)	3.59 (5.77)
BLOWER FLOW RATE SCFM (SCMM)	580.7 (16.45)	581.6 (16.47)	579.5 (16.41)
GAS METER FLOW RATE SCFM (SCMM)	1.09 (.03)	1.05 (.03)	1.09 (.03)
TOTAL FLOW SCF (SCM)	4898. (138.7)	8438. (239.0)	4892. (138.6)
HC SAMPLE METER/RANGE/PPM (CONT)	10.4/1071/ 10.38	12.5/1071/ 12.55	11.3/1071/ 11.31
HC BCKGRD METER/RANGE/PPM	8.0/1071/ 8.00	10.6/1071/ 10.61	9.7/1071/ 9.71
CO SAMPLE METER/RANGE/PPM	3.8/ 12/ 3.90	1.4/ 12/ 1.45	1.8/ 12/ 1.86
CO BCKGRD METER/RANGE/PPM	.3/ 12/ .31	.8/ 12/ .83	.4/ 12/ .41
CO2 SAMPLE METER/RANGE/PCT	57.8/ 11/ .4683	40.0/ 11/ .2967	51.6/ 11/ .4046
CO2 BCKGRD METER/RANGE/PCT	6.3/ 11/ .0423	6.0/ 11/ .0403	6.3/ 11/ .0423
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	4.4/1072/ 11.16	2.8/1072/ 6.90	4.8/1072/ 11.93
NOX BCKGRD METER/RANGE/PPM	.4/ 2/ .40	.3/ 2/ .30	.3/ 2/ .30
CH4 SAMPLE PPM (1.200)	2.53	2.37	2.27
CH4 BCKGRD PPM	2.33	2.24	2.18
DILUTION FACTOR	28.36	44.69	32.82
HC CONCENTRATION PPM	2.66	2.18	1.90
CO CONCENTRATION PPM	3.49	.62	1.41
CO2 CONCENTRATION PCT	.4275	.2573	.3635
NOX CONCENTRATION PPM	10.53	6.47	11.39
CH4 CONCENTRATION PPM	.28	.19	.16
NMHC CONCENTRATION PPM	2.33	1.96	1.72
HC MASS GRAMS	.214	.302	.153
CO MASS GRAMS	.564	.171	.228
CO2 MASS GRAMS	1085.57	1125.77	922.11
NOX MASS GRAMS	2.805	2.969	3.031
PM MASS GRAMS	.128	.137	.112
CH4 MASS GRAMS	.026	.029	.014
NMHC MASS GRAMS (FID)	.186	.270	.137
FUEL MASS KG	.344	.357	.292
FUEL ECONOMY MPG (L/100KM)	32.86 (7.16)	34.09 (6.90)	38.74 (6.07)

3-BAG COMPOSITE RESULTS

HC	G/MI	.065	CH4	G/MI	.007
CO	G/MI	.073	NMHC	G/MI	.058
NOX	G/MI	.794			
PM	G/MI	.034			
FUEL ECONOMY MPG (L/100KM)		35.03 (6.72)			

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.2-R 1-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER	8	TEST CARB-2	DIESEL EM-2790-F
VEHICLE MODEL	99 VW GOLF GL TDI	DATE 10/19/1999 RUN	FUEL DENSITY 6.962 LB/GAL
ENGINE	1.9 L (114 CID)-4	DYNO 7 BAG CART 1	H .138 C .862 O .000 X .000
TRANSMISSION	A4	ACTUAL ROAD LOAD 7.80 HP (5.82 KW)	US06
ODOMETER	837 MILES (1346 KM)	TEST WEIGHT 3250 LBS (1473 KG)	

BAROMETER 29.42 IN HG (747.3 MM HG) DRY BULB TEMPERATURE 76.0°F (24.4°C) NOX HUMIDITY C.F. .921

RELATIVE HUMIDITY 41.6 PCT.

BAG NUMBER	1
BAG DESCRIPTION	
RUN TIME SECONDS	600.0
DRY/WET CORRECTION FACTOR, SAMP/BACK	.980/.987
MEASURED DISTANCE MILES (KM)	7.98 (12.84)
BLOWER FLOW RATE SCFM (SCMM)	575.9 (16.31)
GAS METER FLOW RATE SCFM (SCMM)	1.05 (.03)
TOTAL FLOW SCF (SCM)	5770. (163.4)
HC SAMPLE METER/RANGE/PPM (CONT)	9.7/1071/ 9.68
HC BCKGRD METER/RANGE/PPM	7.7/1071/ 7.70
CO SAMPLE METER/RANGE/PPM	2.7/ 12/ 2.78
CO BCKGRD METER/RANGE/PPM	.3/ 12/ .31
CO2 SAMPLE METER/RANGE/PCT	83.3/ 11/ .7838
CO2 BCKGRD METER/RANGE/PCT	6.3/ 11/ .0423
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	20.7/1072/ 51.83
NOX BCKGRD METER/RANGE/PPM	.3/ 2/ .30
CH4 SAMPLE PPM (1.200)	2.13
CH4 BCKGRD PPM	2.18
DILUTION FACTOR	16.97
HC CONCENTRATION PPM	2.43
CO CONCENTRATION PPM	2.41
CO2 CONCENTRATION PCT	.7440
NOX CONCENTRATION PPM	50.49
CH4 CONCENTRATION PPM	.07
NMHC CONCENTRATION PPM	2.34
HC MASS GRAMS	.230
CO MASS GRAMS	.459
CO2 MASS GRAMS	2225.71
NOX MASS GRAMS	14.525
PM MASS GRAMS	2.001
CH4 MASS GRAMS	.008
NMHC MASS GRAMS (FID)	.220
FUEL MASS KG	.705
FUEL ECONOMY MPG (L/100KM)	35.74 (6.58)

1-BAG COMPOSITE RESULTS

HC	G/MI	.029	CH4	G/MI	.001
CO	G/MI	.057	NMHC	G/MI	.028
NOX	G/MI	1.819			
PM	G/MI	.251			
FUEL ECONOMY MPG (L/100KM)		35.74 (6.58)			

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.2-R 1-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER	8	TEST CARB-2		DIESEL	EM-2790-F
VEHICLE MODEL	99 VW GOLF GL TDI	DATE 10/19/1999 RUN		FUEL DENSITY	6.962 LB/GAL
ENGINE	1.9 L (114 CID)-4	DYNO 7	BAG CART 1	H .138 C .862 O .000 X .000	
TRANSMISSION	A4	ACTUAL ROAD LOAD 7.80 HP (5.82 KW)		HFET	
ODOMETER	855 MILES (1375 KM)	TEST WEIGHT 3250 LBS (1473 KG)			

BAROMETER 29.44 IN HG (747.8 MM HG) DRY BULB TEMPERATURE 75.0°F (23.9°C) NOX HUMIDITY C.F. .927

RELATIVE HUMIDITY 44.2 PCT.

BAG NUMBER	1
BAG DESCRIPTION	
RUN TIME SECONDS	765.2
DRY/WET CORRECTION FACTOR, SAMP/BACK	.982/.987
MEASURED DISTANCE MILES (KM)	10.28 (16.55)
BLOWER FLOW RATE SCFM (SCMM)	575.8 (16.31)
GAS METER FLOW RATE SCFM (SCMM)	1.05 (.03)
TOTAL FLOW SCF (SCM)	7357. (208.4)
HC SAMPLE METER/RANGE/PPM (CONT)	9.6/1071/ 9.58
HC BCKGRD METER/RANGE/PPM	7.7/1071/ 7.70
CO SAMPLE METER/RANGE/PPM	2.2/ 12/ 2.27
CO BCKGRD METER/RANGE/PPM	.3/ 12/ .31
CO2 SAMPLE METER/RANGE/PCT	64.0/ 11/ .5369
CO2 BCKGRD METER/RANGE/PCT	6.2/ 11/ .0417
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	5.3/1072/ 13.36
NOX BCKGRD METER/RANGE/PPM	.3/ 2/ .30
CH4 SAMPLE PPM (1.200)	2.17
CH4 BCKGRD PPM	2.09
DILUTION FACTOR	24.76
HC CONCENTRATION PPM	2.19
CO CONCENTRATION PPM	1.92
CO2 CONCENTRATION PCT	.4969
NOX CONCENTRATION PPM	12.82
CH4 CONCENTRATION PPM	.17
NMHC CONCENTRATION PPM	1.99
HC MASS GRAMS	.264
CO MASS GRAMS	.465
CO2 MASS GRAMS	1895.47
NOX MASS GRAMS	4.737
PM MASS GRAMS	.412
CH4 MASS GRAMS	.023
NMHC MASS GRAMS (FID)	.239
FUEL MASS KG	.601
FUEL ECONOMY MPG (L/100KM)	54.06 (4.35)

1-BAG COMPOSITE RESULTS

HC	G/MI	.026	CH4	G/MI	.002
CO	G/MI	.045	NMHC	G/MI	.023
NOX	G/MI	.461			
PM	G/MI	.040			
FUEL ECONOMY MPG (L/100KM)		54.06 (4.35)			

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.2-R 3-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER	8	TEST SWED-1	DIESEL EM-2789-F
VEHICLE MODEL	99 VW GOLF GL TDI	DATE 10/28/1999 RUN	FUEL DENSITY 6.838 LB/GAL
ENGINE	1.9 L (114 CID)-4	DYNO 7 BAG CART 1	H .140 C .860 O .000 X .000
TRANSMISSION	A4	ACTUAL ROAD LOAD 7.80 HP (5.82 KW)	FTP
ODOMETER	1196 MILES (1924 KM)	TEST WEIGHT 3250 LBS (1473 KG)	

BAROMETER 29.30 IN HG (744.2 MM HG) DRY BULB TEMPERATURE 75.0°F (23.9°C) NOX HUMIDITY C.F. .968

RELATIVE HUMIDITY 51.3 PCT.

BAG NUMBER	1	2	3
BAG DESCRIPTION	COLD TRANSIENT (0-505 SEC.)	STABILIZED (505-1372 SEC.)	HOT TRANSIENT (0- 505 SEC.)
RUN TIME SECONDS	505.3	869.4	505.5
DRY/WET CORRECTION FACTOR, SAMP/BACK	.980/.985	.982/.985	.981/.985
MEASURED DISTANCE MILES (KM)	3.56 (5.72)	3.82 (6.15)	3.57 (5.74)
BLOWER FLOW RATE SCFM (SCMM)	578.2 (16.38)	581.4 (16.47)	578.8 (16.39)
GAS METER FLOW RATE SCFM (SCMM)	1.09 (.03)	1.09 (.03)	1.07 (.03)
TOTAL FLOW SCF (SCM)	4879. (138.2)	8440. (239.0)	4885. (138.3)
HC SAMPLE METER/RANGE/PPM (CONT)	6.8/1071/ 6.79	6.9/1071/ 6.88	6.9/1071/ 6.87
HC BCKGRD METER/RANGE/PPM	5.5/1071/ 5.50	6.6/1071/ 6.60	6.2/1071/ 6.20
CO SAMPLE METER/RANGE/PPM	1.9/ 12/ 1.96	.8/ 12/ .83	.9/ 12/ .93
CO BCKGRD METER/RANGE/PPM	.7/ 12/ .73	.6/ 12/ .62	1.0/ 12/ 1.04
CO2 SAMPLE METER/RANGE/PCT	56.1/ 11/ .4504	38.8/ 11/ .2863	49.6/ 11/ .3849
CO2 BCKGRD METER/RANGE/PCT	6.6/ 11/ .0444	6.9/ 11/ .0464	7.1/ 11/ .0478
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	4.4/1072/ 11.08	2.6/1072/ 6.56	4.2/1072/ 10.50
NOX BCKGRD METER/RANGE/PPM	.1/ 2/ .10	.2/ 2/ .20	.3/ 2/ .30
CH4 SAMPLE PPM (1.200)	2.40	2.32	2.31
CH4 BCKGRD PPM	2.19	2.23	2.24
DILUTION FACTOR	29.34	46.12	34.33
HC CONCENTRATION PPM	1.47	.42	.85
CO CONCENTRATION PPM	1.22	.21	-.08
CO2 CONCENTRATION PCT	.4075	.2409	.3386
NOX CONCENTRATION PPM	10.76	6.25	10.01
CH4 CONCENTRATION PPM	.28	.13	.13
NMHC CONCENTRATION PPM	1.13	.26	.69
HC MASS GRAMS	.118	.058	.068
CO MASS GRAMS	.197	.059	.000
CO2 MASS GRAMS	1030.90	1054.41	857.60
NOX MASS GRAMS	2.754	2.766	2.565
PM MASS GRAMS	.112	.093	.090
CH4 MASS GRAMS	.026	.021	.012
NMHC MASS GRAMS (FID)	.090	.035	.055
FUEL MASS KG	.327	.335	.272
FUEL ECONOMY MPG (L/100KM)	33.70 (6.98)	35.42 (6.64)	40.66 (5.79)

3-BAG COMPOSITE RESULTS

HC	G/MI	.020	CH4	G/MI	.005
CO	G/MI	.019	NMHC	G/MI	.014
NOX	G/MI	.733			
PM	G/MI	.026			
FUEL ECONOMY MPG (L/100KM)		36.39 (6.46)			

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.2-R 1-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER	8	TEST SWED-1	DIESEL EM-2789-F
VEHICLE MODEL	99 VW GOLF GL TDI	DATE 10/28/1999 RUN	FUEL DENSITY 6.838 LB/GAL
ENGINE	1.9 L (114 CID)-4	DYNO 7 BAG CART 1	H .140 C .860 O .000 X .000
TRANSMISSION	A4	ACTUAL ROAD LOAD 7.80 HP (5.82 KW)	US06
ODOMETER	1214 MILES (1953 KM)	TEST WEIGHT 3250 LBS (1473 KG)	

BAROMETER 29.31 IN HG (744.5 MM HG) DRY BULB TEMPERATURE 77.0°F (25.0°C) NOX HUMIDITY C.F. .954

RELATIVE HUMIDITY 45.7 PCT.

BAG NUMBER	1
BAG DESCRIPTION	
RUN TIME SECONDS	599.8
DRY/WET CORRECTION FACTOR, SAMP/BACK	.978/.985
MEASURED DISTANCE MILES (KM)	7.95 (12.80)
BLOWER FLOW RATE SCFM (SCMM)	571.7 (16.19)
GAS METER FLOW RATE SCFM (SCMM)	1.05 (.03)
TOTAL FLOW SCF (SCM)	5725. (162.1)
HC SAMPLE METER/RANGE/PPM (CONT)	6.9/1071/ 6.87
HC BCKGRD METER/RANGE/PPM	6.2/1071/ 6.20
CO SAMPLE METER/RANGE/PPM	.4/ 12/ .41
CO BCKGRD METER/RANGE/PPM	.4/ 12/ .41
CO2 SAMPLE METER/RANGE/PCT	81.3/ 11/ .7558
CO2 BCKGRD METER/RANGE/PCT	6.0/ 11/ .0403
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	18.5/1072/ 46.37
NOX BCKGRD METER/RANGE/PPM	.2/ 2/ .20
CH4 SAMPLE PPM (1.200)	2.21
CH4 BCKGRD PPM	2.07
DILUTION FACTOR	17.50
HC CONCENTRATION PPM	1.02
CO CONCENTRATION PPM	.02
CO2 CONCENTRATION PCT	.7178
NOX CONCENTRATION PPM	45.16
CH4 CONCENTRATION PPM	.26
NMHC CONCENTRATION PPM	.71
HC MASS GRAMS	.096
CO MASS GRAMS	.003
CO2 MASS GRAMS	2130.89
NOX MASS GRAMS	13.354
PM MASS GRAMS	.860
CH4 MASS GRAMS	.028
NMHC MASS GRAMS (FID)	.066
FUEL MASS KG	.677
FUEL ECONOMY MPG (L/100KM)	36.46 (6.45)

1-BAG COMPOSITE RESULTS

HC	G/MI	.012	CH4	G/MI	.004
CO	G/MI	.000	NMHC	G/MI	.008
NOX	G/MI	1.679			
PM	G/MI	.108			
FUEL ECONOMY MPG (L/100KM)		36.46 (6.45)			

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.2-R 1-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER	8	TEST SWED-1	DIESEL EM-2789-F
VEHICLE MODEL	99 VW GOLF GL TDI	DATE 10/28/1999 RUN	FUEL DENSITY 6.838 LB/GAL
ENGINE	1.9 L (114 CID)-4	DYNO 7 BAG CART 1	H .140 C .860 O .000 X .000
TRANSMISSION	A4	ACTUAL ROAD LOAD 7.80 HP (5.82 KW)	HFET
ODOMETER	1232 MILES (1982 KM)	TEST WEIGHT 3250 LBS (1473 KG)	

BAROMETER 29.31 IN HG (744.5 MM HG) DRY BULB TEMPERATURE 78.0°F (25.6°C) NOX HUMIDITY C.F. .967

RELATIVE HUMIDITY 46.3 PCT.

BAG NUMBER	1
BAG DESCRIPTION	
RUN TIME SECONDS	765.6
DRY/WET CORRECTION FACTOR, SAMP/BACK	.980/.985
MEASURED DISTANCE MILES (KM)	10.23 (16.47)
BLOWER FLOW RATE SCFM (SCMM)	574.4 (16.27)
GAS METER FLOW RATE SCFM (SCMM)	1.04 (.03)
TOTAL FLOW SCF (SCM)	7343. (208.0)
HC SAMPLE METER/RANGE/PPM (CONT)	7.2/1071/ 7.19
HC BCKGRD METER/RANGE/PPM	6.4/1071/ 6.40
CO SAMPLE METER/RANGE/PPM	.2/ 12/ .21
CO BCKGRD METER/RANGE/PPM	.2/ 12/ .21
CO2 SAMPLE METER/RANGE/PCT	62.3/ 11/ .5176
CO2 BCKGRD METER/RANGE/PCT	6.8/ 11/ .0457
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	5.2/1072/ 13.07
NOX BCKGRD METER/RANGE/PPM	.3/ 2/ .30
CH4 SAMPLE PPM (1.200)	2.21
CH4 BCKGRD PPM	2.07
DILUTION FACTOR	25.55
HC CONCENTRATION PPM	1.04
CO CONCENTRATION PPM	.01
CO2 CONCENTRATION PCT	.4736
NOX CONCENTRATION PPM	12.51
CH4 CONCENTRATION PPM	.22
NMHC CONCENTRATION PPM	.77
HC MASS GRAMS	.125
CO MASS GRAMS	.001
CO2 MASS GRAMS	1803.32
NOX MASS GRAMS	4.814
PM MASS GRAMS	.254
CH4 MASS GRAMS	.031
NMHC MASS GRAMS (FID)	.092
FUEL MASS KG	.573
FUEL ECONOMY MPG (L/100KM)	55.44 (4.24)

1-BAG COMPOSITE RESULTS

HC	G/MI	.012	CH4	G/MI	.003
CO	G/MI	.000	NMHC	G/MI	.009
NOX	G/MI	.470			
PM	G/MI	.025			

FUEL ECONOMY MPG (L/100KM) 55.44 (4.24)

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.2-R 3-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER	8	TEST SWED-2	DIESEL EM-2789-F
VEHICLE MODEL	99 VW GOLF GL TDI	DATE 10/29/1999 RUN	FUEL DENSITY 6.838 LB/GAL
ENGINE	1.9 L (114 CID)-4	DYNO 7 BAG CART 1	H .140 C .860 O .000 X .000
TRANSMISSION	A4	ACTUAL ROAD LOAD 7.80 HP (5.82 KW)	FTP
ODOMETER	1243 MILES (1999 KM)	TEST WEIGHT 3250 LBS (1473 KG)	

BAROMETER 29.18 IN HG (741.2 MM HG) DRY BULB TEMPERATURE 76.0°F (24.4°C) NOX HUMIDITY C.F. .984

RELATIVE HUMIDITY 52.0 PCT.

BAG NUMBER	1	2	3
BAG DESCRIPTION	COLD TRANSIENT (0-505 SEC.)	STABILIZED (505-1372 SEC.)	HOT TRANSIENT (0- 505 SEC.)
RUN TIME SECONDS	505.3	869.4	505.2
DRY/WET CORRECTION FACTOR, SAMP/BACK	.979/.984	.981/.984	.980/.984
MEASURED DISTANCE MILES (KM)	3.55 (5.72)	3.84 (6.17)	3.59 (5.77)
BLOWER FLOW RATE SCFM (SCMM)	576.7 (16.33)	577.1 (16.34)	575.9 (16.31)
GAS METER FLOW RATE SCFM (SCMM)	1.08 (.03)	1.09 (.03)	1.09 (.03)
TOTAL FLOW SCF (SCM)	4866. (137.8)	8378. (237.3)	4858. (137.6)
HC SAMPLE METER/RANGE/PPM (CONT)	7.4/1071/ 7.39	7.0/1071/ 6.99	7.4/1071/ 7.39
HC BCKGRD METER/RANGE/PPM	5.7/1071/ 5.70	6.8/1071/ 6.80	6.4/1071/ 6.40
CO SAMPLE METER/RANGE/PPM	2.2/ 12/ 2.27	.6/ 12/ .62	.4/ 12/ .41
CO BCKGRD METER/RANGE/PPM	.6/ 12/ .62	.5/ 12/ .52	.6/ 12/ .62
CO2 SAMPLE METER/RANGE/PCT	55.7/ 11/ .4462	38.4/ 11/ .2829	49.4/ 11/ .3830
CO2 BCKGRD METER/RANGE/PCT	6.7/ 11/ .0450	6.2/ 11/ .0417	6.2/ 11/ .0417
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	4.3/1072/ 10.72	2.2/1072/ 5.61	4.3/1072/ 10.80
NOX BCKGRD METER/RANGE/PPM	.1/ 2/ .10	.2/ 2/ .20	.3/ 2/ .30
CH4 SAMPLE PPM (1.200)	2.49	2.37	2.37
CH4 BCKGRD PPM	2.59	2.22	2.14
DILUTION FACTOR	29.61	46.68	34.50
HC CONCENTRATION PPM	1.87	.34	1.17
CO CONCENTRATION PPM	1.62	.11	-.19
CO2 CONCENTRATION PCT	.4027	.2421	.3426
NOX CONCENTRATION PPM	10.40	5.31	10.29
CH4 CONCENTRATION PPM	-.01	.19	.29
NMHC CONCENTRATION PPM	1.89	.10	.83
HC MASS GRAMS	.150	.046	.093
CO MASS GRAMS	.260	.030	.000
CO2 MASS GRAMS	1016.02	1051.83	862.95
NOX MASS GRAMS	2.699	2.370	2.665
PM MASS GRAMS	.102	.105	.087
CH4 MASS GRAMS	.000	.031	.026
NMHC MASS GRAMS (FID)	.150	.014	.066
FUEL MASS KG	.323	.334	.274
FUEL ECONOMY MPG (L/100KM)	34.15 (6.89)	35.64 (6.60)	40.60 (5.79)

3-BAG COMPOSITE RESULTS

HC	G/MI	.022	CH4	G/MI	.006
CO	G/MI	.019	NMHC	G/MI	.016
NOX	G/MI	.681			
PM	G/MI	.027			

FUEL ECONOMY MPG (L/100KM) 36.60 (6.43)

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.2-R 1-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER	8	TEST SWED-2	DIESEL EM-2789-F
VEHICLE MODEL	99 VW GOLF GL TDI	DATE 10/29/1999 RUN	FUEL DENSITY 6.838 LB/GAL
ENGINE	1.9 L (114 CID)-4	DYNO 7 BAG CART 1	H .140 C .860 O .000 X .000
TRANSMISSION	A4	ACTUAL ROAD LOAD 7.80 HP (5.82 KW)	US06
ODOMETER	1261 MILES (2028 KM)	TEST WEIGHT 3250 LBS (1473 KG)	

BAROMETER 29.20 IN HG (741.7 MM HG) DRY BULB TEMPERATURE 71.0°F (21.7°C) NOX HUMIDITY C.F. 1.000

RELATIVE HUMIDITY 64.5 PCT.

BAG NUMBER	1
BAG DESCRIPTION	
RUN TIME SECONDS	600.2
DRY/WET CORRECTION FACTOR, SAMP/BACK	.976/.983
MEASURED DISTANCE MILES (KM)	7.97 (12.83)
BLOWER FLOW RATE SCFM (SCMM)	569.9 (16.14)
GAS METER FLOW RATE SCFM (SCMM)	1.05 (.03)
TOTAL FLOW SCF (SCM)	5712. (161.8)
HC SAMPLE METER/RANGE/PPM (CONT)	6.8/1071/ 6.77
HC BCKGRD METER/RANGE/PPM	6.5/1071/ 6.50
CO SAMPLE METER/RANGE/PPM	.7/ 12/ .73
CO BCKGRD METER/RANGE/PPM	.2/ 12/ .21
CO2 SAMPLE METER/RANGE/PCT	81.8/ 11/ .7628
CO2 BCKGRD METER/RANGE/PCT	6.4/ 11/ .0430
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	18.3/1072/ 45.92
NOX BCKGRD METER/RANGE/PPM	.2/ 2/ .20
CH4 SAMPLE PPM (1.200)	2.04
CH4 BCKGRD PPM	2.07
DILUTION FACTOR	17.34
HC CONCENTRATION PPM	.64
CO CONCENTRATION PPM	.51
CO2 CONCENTRATION PCT	.7223
NOX CONCENTRATION PPM	44.61
CH4 CONCENTRATION PPM	.08
NMHC CONCENTRATION PPM	.54
HC MASS GRAMS	.060
CO MASS GRAMS	.096
CO2 MASS GRAMS	2138.94
NOX MASS GRAMS	13.804
PM MASS GRAMS	.793
CH4 MASS GRAMS	.009
NMHC MASS GRAMS (FID)	.051
FUEL MASS KG	.679
FUEL ECONOMY MPG (L/100KM)	36.42 (6.46)

1-BAG COMPOSITE RESULTS

HC	G/MI	.008	CH4	G/MI	.001
CO	G/MI	.012	NMHC	G/MI	.006
NOX	G/MI	1.731			
PM	G/MI	.099			
FUEL ECONOMY MPG (L/100KM)		36.42 (6.46)			

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.2-R 1-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER	8	TEST SWED-2		DIESEL	EM-2789-F
VEHICLE MODEL	99 VW GOLF GL TDI	DATE 10/29/1999 RUN		FUEL DENSITY	6.838 LB/GAL
ENGINE	1.9 L (114 CID)-4	DYNO 7	BAG CART 1	H .140 C .860 O .000 X .000	
TRANSMISSION	A4	ACTUAL ROAD LOAD 7.80 HP (5.82 KW)		HFET	
ODOMETER	1279 MILES (2057 KM)	TEST WEIGHT 3250 LBS (1473 KG)			

BAROMETER 29.20 IN HG (741.7 MM HG) DRY BULB TEMPERATURE 77.0°F (25.0°C) NOX HUMIDITY C.F. .976

RELATIVE HUMIDITY 49.1 PCT.

BAG NUMBER	1
BAG DESCRIPTION	
RUN TIME SECONDS	765.2
DRY/WET CORRECTION FACTOR, SAMP/BACK	.979/.984
MEASURED DISTANCE MILES (KM)	10.24 (16.48)
BLOWER FLOW RATE SCFM (SCMM)	568.6 (16.10)
GAS METER FLOW RATE SCFM (SCMM)	1.06 (.03)
TOTAL FLOW SCF (SCM)	7265. (205.7)
HC SAMPLE METER/RANGE/PPM (CONT)	7.2/1071/ 7.23
HC BCKGRD METER/RANGE/PPM	6.6/1071/ 6.60
CO SAMPLE METER/RANGE/PPM	.5/ 12/ .52
CO BCKGRD METER/RANGE/PPM	.3/ 12/ .31
CO2 SAMPLE METER/RANGE/PCT	62.2/ 11/ .5165
CO2 BCKGRD METER/RANGE/PCT	6.6/ 11/ .0444
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	5.0/1072/ 12.56
NOX BCKGRD METER/RANGE/PPM	.2/ 2/ .20
CH4 SAMPLE PPM (1.200)	2.31
CH4 BCKGRD PPM	2.08
DILUTION FACTOR	25.60
HC CONCENTRATION PPM	.88
CO CONCENTRATION PPM	.21
CO2 CONCENTRATION PCT	.4738
NOX CONCENTRATION PPM	12.10
CH4 CONCENTRATION PPM	.31
NMHC CONCENTRATION PPM	.51
HC MASS GRAMS	.106
CO MASS GRAMS	.050
CO2 MASS GRAMS	1784.85
NOX MASS GRAMS	4.649
PM MASS GRAMS	.245
CH4 MASS GRAMS	.042
NMHC MASS GRAMS (FID)	.061
FUEL MASS KG	.567
FUEL ECONOMY MPG (L/100KM)	56.06 (4.20)

1-BAG COMPOSITE RESULTS

HC	G/MI	.010	CH4	G/MI	.004
CO	G/MI	.005	NMHC	G/MI	.006
NOX	G/MI	.454			
PM	G/MI	.024			
FUEL ECONOMY MPG (L/100KM)		56.06 (4.20)			

APPENDIX D

LIGHT-DUTY HYDROCARBON SPECIATION DATA

Page	Table	Title
D-1	D-1	A Comparison of Weighted Composite Results During FTP
D-5	D-2	A Comparison of Weighted Composite Results During US06
D-9	D-3	A Comparison of Weighted Composite Results During HFET

COMPOUND	FTP COMPOSITE, mg/mi					
	CARB			SWEDISH		
	10/18/99	10/19/99	AVG.	10/28/99	10/29/99	AVG.
METHANE	6.9	6.5	6.7	5.3	7.2	6.2
ETHANE	0.6	0.5	0.5	0.4	1.1	0.8
ETHYLENE	1.3	1.2	1.2	0.7	0.8	0.7
PROPANE	trace	0.0	trace	trace	1.9	1.0
PROPYLENE	0.2	0.2	0.2	0.1	0.1	0.1
ACETYLENE	0.6	3.7	2.2	0.2	0.0	0.1
PROPADIENE	0.0	0.0	0.0	0.0	0.0	0.0
BUTANE	0.0	0.2	0.1	0.0	3.7	1.8
TRANS-2-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLPROPENE (ISOBUTYLENE)	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLPROPANE (NEOPENTANE)	0.0	0.0	0.0	0.0	0.0	0.0
PROPYNE	0.0	0.0	0.0	0.0	0.0	0.0
1,3-BUTADIENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLPROPANE (ISOBUTANE)	0.0	trace	trace	trace	0.7	0.4
1-BUTYNE	0.0	0.0	0.0	0.0	0.0	0.0
METHANOL	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
ETHANOL	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLBUTANE (ISOPENTANE)	0.0	0.2	0.1	0.0	0.0	0.0
2-BUTYNE	0.0	0.0	0.0	0.0	0.0	0.0
1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
PENTANE	0.6	0.6	0.6	0.4	0.5	0.4
UNIDENTIFIED C5 OLEFINS	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-1,3-BUTADIENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-PENTENE	0.0	0.1	trace	0.0	0.0	0.0
3,3-DIMETHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-PENTENE	0.0	0.4	0.2	0.0	0.0	0.0
2-METHYL-2-BUTENE	0.0	0.1	0.1	trace	0.2	0.1
TERT-BUTANOL	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOPENTADIENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLBUTANE	0.0	0.1	0.1	0.3	0.0	0.2
CYCLOPENTENE	0.0	1.6	0.8	0.0	0.0	0.0
4-METHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOPENTANE	0.0	0.1	trace	0.0	0.0	0.0
2,3-DIMETHYLBUTANE	trace	0.1	trace	0.0	trace	trace
MTBE	0.0	0.5	0.2	0.0	0.0	0.0
4-METHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLPENTANE	trace	0.1	0.1	0.0	0.0	0.0
4-METHYL-TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLPENTANE	0.3	0.0	0.2	0.0	0.1	trace
2-METHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
1-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
HEXANE	0.4	0.2	0.3	0.0	0.0	0.0
UNIDENTIFIED C6 OLEFINS	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
DI-ISOPROPYL ETHER	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-TRANS-2-PENTENE	0.0	0.1	trace	0.0	0.0	0.0
2-METHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLCYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
ETBE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-CIS-2-PENTENE	0.0	trace	trace	0.0	0.0	0.0
2,2-DIMETHYLPENTANE, NOTE A	0.0	0.0	0.0	0.0	0.0	0.0
METHYLCYCLOPENTANE, NOTE A	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLPENTANE	0.0	trace	trace	0.0	0.0	0.0
2,2,3-TRIMETHYLBUTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0

COMPOUND	FTP COMPOSITE, mg/mi					
	CARB			SWEDISH		
	10/18/99	10/19/99	AVG.	10/28/99	10/29/99	AVG.
1-METHYLCYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
BENZENE	0.2	0.2	0.2	0.0	0.2	0.1
3-METHYL-1-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLPENTANE	0.0	0.1	0.1	0.0	0.0	0.0
1,1-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-AMYL METHYL ETHER	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOHEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLHEXANE	0.0	trace	trace	0.0	0.0	0.0
CIS-1,3-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,2-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,3-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,4-TRIMETHYLPENTANE	0.0	0.3	0.1	0.0	0.0	0.0
2-METHYL-1-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-3-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
HEPTANE	0.0	trace	trace	0.0	0.4	0.2
CIS-3-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C7	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-TRANS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
METHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,2-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1,3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,3-TRIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,5-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLHEXANE	0.0	trace	trace	0.0	0.0	0.0
1-TRANS-2-CIS-4-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1-TRANS-2-CIS-3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.1	0.0	0.1
2,3,4-TRIMETHYLPENTANE	0.0	0.2	0.1	0.0	0.0	0.0
2,3,3-TRIMETHYLPENTANE	0.0	0.5	0.2	0.0	0.4	0.2
TOLUENE	0.8	1.1	0.9	0.0	0.0	0.0
2,3-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1,2-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYLHEXANE, NOTE B	0.0	0.0	0.0	0.0	0.2	0.1
4-METHYLHEPTANE	0.0	trace	trace	0.1	0.0	trace
3-METHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-CIS,2-TRANS,3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,3-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,4-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,5-TRIMETHYLHEXANE	0.0	0.1	0.1	0.0	0.0	0.0
TRANS-1-METHYL-3-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1-METHYL-3-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1-METHYL-2-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-1-ETHYL-CYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,2-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0

COMPOUND	FTP COMPOSITE, mg/mi					
	CARB			SWEDISH		
	10/18/99	10/19/99	AVG.	10/28/99	10/29/99	AVG.
1-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-4-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
OCTANE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C8	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,3-DIMETHYLCYCLOHEXANE, NOTE C	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
ISOPROPYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,5-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.2	0.1
CIS-1-METHYL-2-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLHEPTANE	1.3	0.7	1.0	0.2	0.7	0.4
4,4-DIMETHYLHEPTANE	0.2	0.1	0.2	0.6	0.0	0.3
CIS-1,2-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,6-DIMETHYLHEPTANE, NOTE D	0.0	0.0	0.0	0.0	0.5	0.2
1,1,3-TRIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,5-DIMETHYLHEPTANE, NOTE E	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,5-DIMETHYLHEPTANE, NOTE E	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLBENZENE	0.0	0.4	0.2	0.0	0.0	0.0
2,3,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
m-& p-XYLENE	0.0	0.2	0.1	0.8	0.0	0.4
4-METHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
4-ETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
STYRENE	0.0	0.0	0.0	0.0	0.0	0.0
o-XYLENE	0.0	0.3	0.2	trace	trace	trace
1-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-3-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
NONANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
ISOPROPYLBENZENE (CUMENE)	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLOCTANE	0.0	0.0	0.0	0.2	0.0	0.1
n-PROPYLBENZENE	0.0	0.4	0.2	0.0	0.0	0.0
1-METHYL-3-ETHYLBENZENE	0.0	2.3	1.2	0.1	trace	trace
1-METHYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.3	0.0	0.2
1,3,5-TRIMETHYLBENZENE	0.0	0.9	0.4	0.5	0.0	0.2
1-METHYL-2-ETHYLBENZENE	0.0	0.8	0.4	0.3	0.0	0.1
1,2,4-TRIMETHYLBENZENE	0.1	2.0	1.1	trace	0.0	trace
TERT-BUTYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-DECENE	0.0	0.0	0.0	0.0	0.0	0.0
DECANE, NOTE F	4.5	1.4	3.0	1.5	1.1	1.3
ISOBUTYLBENZENE, NOTE F	4.3	1.3	2.8	1.4	1.1	1.3
1,3,-DIMETHYL-5-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
METHYLPROPYLBENZENE (sec butylbenzene)	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-3-ISOPROPYLBENZENE	0.0	2.7	1.3	0.0	0.0	0.0
1,2,3-TRIMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-4-ISOPROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
INDAN	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-2-ISOPROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,3-DIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,4-DIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-3-N-PROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-4-N-PROPYLBENZENE, NOTE G	0.0	0.0	0.0	0.0	0.0	0.0
1,2 DIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-2-N-PROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,4-DIMETHYL-2-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0

COMPOUND	FTP COMPOSITE, mg/mi					
	CARB			SWEDISH		
	10/18/99	10/19/99	AVG.	10/28/99	10/29/99	AVG.
1,3-DIMETHYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2-DIMETHYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,3-DIMETHYL-2-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
UNDECANE	0.1	0.0	trace	0.0	0.0	0.0
1,2-DIMETHYL-3-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,4,5-TETRAMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLBUTYLBENZENE (sec AMYLBENZENE)	0.0	0.0	0.0	0.0	0.0	0.0
3,4 DIMETHYLCUMENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,3,5-TETRAMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-1-BUT-2-METHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,3,4-TETRAMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
N-PENT-BENZENE	1.4	1.0	1.2	1.6	0.8	1.2
TERT-1-BUT-3,5-DIMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-1-BUTYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
NAPHTHALENE	0.0	0.0	0.0	0.0	0.0	0.0
DODECANE	0.1	0.0	trace	0.0	0.0	0.0
1,3,5-TRIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,4-TRIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
HEXYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C9-C12+	2.2	0.0	1.1	0.8	0.0	0.4
FORMALDEHYDE	3.5	2.6	3.1	2.0	2.0	2.0
ACETALDEHYDE	2.6	2.9	2.7	3.1	2.2	2.6
ACROLEIN	0.1	0.1	0.1	trace	trace	trace
ACETONE	0.4	2.1	1.2	0.4	0.2	0.3
PROPIONALDEHYDE	0.1	0.2	0.1	0.3	0.2	0.3
CROTONALDEHYDE	0.1	0.1	0.1	trace	0.1	0.1
ISOBUTYRALDEHYDE, NOTE H	trace	trace	trace	0.0	0.1	trace
METHYL ETHYL KETONE, NOTE H	trace	trace	trace	0.0	0.1	trace
BENZALDEHYDE	0.4	0.5	0.5	trace	trace	trace
ISOVALERALDEHYDE	0.1	trace	trace	0.1	0.1	0.1
VALERALDEHYDE	0.1	0.1	0.1	0.0	0.1	0.1
O-TOLUALDEHYDE	0.3	0.0	0.1	0.0	0.0	0.0
M/P-TOLUALDEHYDE	0.4	0.0	0.2	0.0	0.0	0.0
HEXANALDEHYDE	0.1	0.4	0.2	0.1	0.2	0.1
DIMETHYLBENZALDEHYDE	0.2	0.2	0.2	0.1	0.1	0.1
SUMMED SPECIATED VALUES	34	43	38.5	22	27	24.6

A - 2,2-Dimethylpentane and methylcyclopentane co-elute. GC peak area split equally between the two compounds.
B - 3-Methyl-3-ethy-pentane co-elutes with reported compound. Not reported separately.
C - Cis-1,4-Dimethylcyclohexane co-elutes with reported compound. Not reported separately.
D - Propylcyclopentane co-elutes with reported compound.. Not reported separately.
E - 2,5-Dimethylheptane and 3,5-dimethylheptane co-elute. GC peak area split equally between the two compounds.
F - Decane and isobutylbenzene co-elute. GC peak area split equally between the two compounds.
G - n-Butylbenzene co-elutes with reported compound. Not reported separately.
H - Isobutyraldehyde and methyl ethyl ketone co-elute. LC peak area split equally between the two compounds.

COMPOUND	US06, mg/mi					
	CARB			SWEDISH		
	10/18/99	10/19/99	AVG.	10/28/99	10/29/99	AVG.
METHANE	1.1	1.0	1.1	3.5	1.1	2.3
ETHANE	0.2	0.0	0.1	0.3	0.0	0.1
ETHYLENE	0.0	0.0	0.0	0.0	0.0	0.0
PROPANE	trace	0.1	trace	0.5	0.7	0.6
PROPYLENE	0.0	0.0	0.0	0.0	0.0	0.0
ACETYLENE	0.0	0.0	0.0	0.0	0.0	0.0
PROPADIENE	0.0	0.0	0.0	0.0	0.0	0.0
BUTANE	0.0	0.0	0.0	1.6	1.7	1.7
TRANS-2-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLPROPENE (ISOBUTYLENE)	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLPROPANE (NEOPENTANE)	0.0	0.0	0.0	0.0	0.0	0.0
PROPYNE	0.0	0.0	0.0	0.0	0.0	0.0
1,3-BUTADIENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLPROPANE (ISOBUTANE)	0.0	0.0	0.0	0.2	0.4	0.3
1-BUTYNE	0.0	0.0	0.0	0.0	0.0	0.0
METHANOL	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
ETHANOL	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLBUTANE (ISOPENTANE)	0.0	0.3	0.2	0.0	0.0	0.0
2-BUTYNE	0.0	0.0	0.0	0.0	0.0	0.0
1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
PENTANE	0.3	0.1	0.2	0.1	0.1	0.1
UNIDENTIFIED C5 OLEFINS	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-1,3-BUTADIENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-PENTENE	0.0	0.2	0.1	0.0	0.0	0.0
3,3-DIMETHYL-1-BUTENE	0.2	0.0	0.1	0.0	0.0	0.0
CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-2-BUTENE	0.2	0.0	0.1	0.0	0.0	0.0
TERT-BUTANOL	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOPENTADIENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLBUTANE	0.0	0.0	0.0	0.5	0.0	0.2
CYCLOPENTENE	0.0	0.0	0.0	0.2	0.0	0.1
4-METHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLBUTANE	0.0	0.0	0.0	0.0	0.0	0.0
MTBE	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLPENTANE	0.0	trace	trace	0.0	0.0	0.0
4-METHYL-TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLPENTANE	0.0	trace	trace	0.2	0.1	0.1
2-METHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
1-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
HEXANE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C6 OLEFINS	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
DI-ISOPROPYL ETHER	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLCYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
ETBE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLPENTANE, NOTE A	0.0	0.0	0.0	0.0	0.0	0.0
METHYLCYCLOPENTANE, NOTE A	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,3-TRIMETHYLBUTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0

COMPOUND	US06, mg/mi					
	CARB			SWEDISH		
	10/18/99	10/19/99	AVG.	10/28/99	10/29/99	AVG.
1-METHYLCYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
BENZENE	0.0	0.3	0.1	0.0	0.3	0.2
3-METHYL-1-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLPENTANE	0.0	trace	trace	0.0	0.0	0.0
1,1-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-AMYL METHYL ETHER	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOHEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLHEXANE	0.0	trace	trace	0.0	0.0	0.0
CIS-1,3-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,2-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,3-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,4-TRIMETHYLPENTANE	trace	0.0	trace	0.0	0.0	0.0
2-METHYL-1-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-3-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
HEPTANE	0.0	trace	trace	0.0	0.0	0.0
CIS-3-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C7	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-TRANS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
METHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,2-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1,3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,3-TRIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,5-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLHEXANE	0.0	0.0	0.0	0.6	0.0	0.3
1-TRANS-2-CIS-4-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1-TRANS-2-CIS-3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,4-TRIMETHYLPENTANE	0.0	0.4	0.2	0.0	0.0	0.0
2,3,3-TRIMETHYLPENTANE	0.0	trace	trace	0.0	0.0	0.0
TOLUENE	0.4	0.9	0.6	0.0	0.0	0.0
2,3-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1,2-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYLHEXANE, NOTE B	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-CIS,2-TRANS,3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,3-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,4-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,5-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1-METHYL-3-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1-METHYL-3-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1-METHYL-2-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-1-ETHYL-CYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,2-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0

COMPOUND	US06, mg/mi					
	CARB			SWEDISH		
	10/18/99	10/19/99	AVG.	10/28/99	10/29/99	AVG.
1-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-4-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
OCTANE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C8	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,3-DIMETHYLCYCLOHEXANE, NOTE C	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
ISOPROPYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,5-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1-METHYL-2-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLHEPTANE	0.2	0.3	0.3	0.0	0.0	0.0
4,4-DIMETHYLHEPTANE	0.4	0.5	0.4	0.2	0.0	0.1
CIS-1,2-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,6-DIMETHYLHEPTANE, NOTE D	0.0	0.0	0.0	0.0	0.0	0.0
1,1,3-TRIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,5-DIMETHYLHEPTANE, NOTE E	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,5-DIMETHYLHEPTANE, NOTE E	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLBENZENE	0.0	0.2	0.1	0.0	0.0	0.0
2,3,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
m-& p-XYLENE	0.0	0.7	0.3	0.0	0.0	0.0
4-METHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
4-ETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
STYRENE	0.0	0.0	0.0	0.0	0.0	0.0
o-XYLENE	0.0	0.5	0.3	0.0	0.0	0.0
1-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-3-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
NONANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
ISOPROPYLBENZENE (CUMENE)	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLOCTANE	0.0	0.0	0.0	0.0	0.1	0.1
2,4-DIMETHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
n-PROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-3-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,3,5-TRIMETHYLBENZENE	0.0	0.6	0.3	0.0	0.0	0.0
1-METHYL-2-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,4-TRIMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-BUTYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-DECENE	0.0	0.0	0.0	0.0	0.0	0.0
DECANE, NOTE F	0.6	0.5	0.5	0.3	0.5	0.4
ISOBUTYLBENZENE, NOTE F	0.6	0.4	0.5	0.2	0.4	0.3
1,3,-DIMETHYL-5-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
METHYLPROPYLBENZENE (sec butylbenzene)	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-3-ISOPROPYLBENZENE	0.0	1.0	0.5	0.0	0.0	0.0
1,2,3-TRIMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-4-ISOPROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
INDAN	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-2-ISOPROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,3-DIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,4-DIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-3-N-PROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-4-N-PROPYLBENZENE, NOTE G	0.0	0.0	0.0	0.0	0.0	0.0
1,2 DIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-2-N-PROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,4-DIMETHYL-2-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0

COMPOUND	US06, mg/mi					
	CARB			SWEDISH		
	10/18/99	10/19/99	AVG.	10/28/99	10/29/99	AVG.
1,3-DIMETHYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2-DIMETHYL-4-ETHYLBENZENE	0.3	0.0	0.2	0.0	0.0	0.0
1,3-DIMETHYL-2-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
UNDECANE	0.0	0.0	0.0	0.0	0.0	0.0
1,2-DIMETHYL-3-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,4,5-TETRAMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLBUTYLBENZENE (sec AMYLBENZENE)	0.0	0.0	0.0	0.0	0.0	0.0
3,4 DIMETHYLCUMENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,3,5-TETRAMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-1-BUT-2-METHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,3,4-TETRAMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
N-PENT-BENZENE	0.0	0.5	0.2	0.0	0.4	0.2
TERT-1-BUT-3,5-DIMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-1-BUTYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.4	0.0	0.2
NAPHTHALENE	0.0	0.0	0.0	0.0	0.0	0.0
DODECANE	0.0	0.0	0.0	0.0	0.0	0.0
1,3,5-TRIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,4-TRIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
HEXYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C9-C12+	0.5	1.1	0.8	0.2	0.0	0.1
FORMALDEHYDE	1.4	1.6	1.5	1.1	1.1	1.1
ACETALDEHYDE	1.2	1.2	1.2	1.5	1.4	1.4
ACROLEIN	0.1	trace	0.1	trace	trace	trace
ACETONE	0.1	0.8	0.5	0.0	0.1	0.1
PROPIONALDEHYDE	0.1	0.1	0.1	0.1	0.1	0.1
CROTONALDEHYDE	0.1	0.0	0.1	trace	trace	trace
ISOBUTYRALDEHYDE, NOTE H	0.0	0.1	trace	0.0	trace	trace
METHYL ETHYL KETONE, NOTE H	0.0	0.1	trace	0.0	trace	trace
BENZALDEHYDE	0.0	0.2	0.1	0.0	0.0	0.0
ISOVALERALDEHYDE	0.1	0.0	trace	trace	0.0	trace
VALERALDEHYDE	0.1	0.1	0.1	0.0	0.2	0.1
O-TOLUALDEHYDE	0.3	trace	0.2	0.0	0.1	0.1
M/P-TOLUALDEHYDE	0.3	0.0	0.2	0.0	0.0	0.0
HEXANALDEHYDE	0.2	0.1	0.1	0.1	0.0	trace
DIMETHYLBENZALDEHYDE	0.5	0.2	0.3	0.2	0.1	0.2
SUMMED SPECIATED VALUES	10	14	11.8	12	9	10.4

A - 2,2-Dimethylpentane and methylcyclopentane co-elute. GC peak area split equally between the two compounds.
B - 3-Methyl-3-ethy-pentane co-elutes with reported compound. Not reported separately.
C - Cis-1,4-Dimethylcyclohexane co-elutes with reported compound. Not reported separately.
D - Propylcyclopentane co-elutes with reported compound. Not reported separately.
E - 2,5-Dimethylheptane and 3,5-dimethylheptane co-elute. GC peak area split equally between the two compounds.
F - Decane and isobutylbenzene co-elute. GC peak area split equally between the two compounds.
G - n-Butylbenzene co-elutes with reported compound. Not reported separately.
H - Isobutyraldehyde and methyl ethyl ketone co-elute. LC peak area split equally between the two compounds.

COMPOUND	HFET, mg/mi					
	CARB			SWEDISH		
	10/18/99	10/19/99	AVG.	10/28/99	10/29/99	AVG.
METHANE	2.2	2.2	2.2	3.0	4.1	3.6
ETHANE	0.3	0.0	0.1	0.3	0.0	0.2
ETHYLENE	0.0	0.0	0.0	0.0	0.0	0.0
PROPANE	0.0	0.6	0.3	0.3	0.0	0.2
PROPYLENE	0.0	0.0	0.0	0.0	0.0	0.0
ACETYLENE	0.0	0.0	0.0	0.0	0.0	0.0
PROPADIENE	0.0	0.0	0.0	0.0	0.0	0.0
BUTANE	0.0	0.0	0.0	1.5	0.0	0.7
TRANS-2-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLPROPENE (ISOBUTYLENE)	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLPROPANE (NEOPENTANE)	0.0	0.0	0.0	1.5	0.0	0.8
PROPYNE	0.0	0.0	0.0	0.0	0.0	0.0
1,3-BUTADIENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLPROPANE (ISOBUTANE)	0.0	0.1	trace	0.2	0.0	0.1
1-BUTYNE	0.0	0.0	0.0	0.0	0.0	0.0
METHANOL	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
ETHANOL	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLBUTANE (ISOPENTANE)	0.0	0.0	0.0	0.0	0.0	0.0
2-BUTYNE	0.0	0.0	0.0	0.0	0.0	0.0
1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
PENTANE	0.3	0.1	0.2	0.1	0.2	0.1
UNIDENTIFIED C5 OLEFINS	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-1,3-BUTADIENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-PENTENE	0.0	0.1	0.1	0.0	0.0	0.0
3,3-DIMETHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-2-BUTENE	0.0	0.0	0.0	trace	trace	trace
TERT-BUTANOL	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOPENTADIENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLBUTANE	0.0	0.0	0.0	0.5	0.0	0.3
CYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLBUTANE	0.0	0.0	0.0	0.0	0.0	0.0
MTBE	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYL-TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLPENTANE	0.0	0.0	0.0	0.1	0.2	0.1
2-METHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
1-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
HEXANE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C6 OLEFINS	0.0	0.0	0.0	0.1	0.0	trace
TRANS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
DI-ISOPROPYL ETHER	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLCYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
ETBE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLPENTANE, NOTE A	0.0	0.0	0.0	0.0	0.0	0.0
METHYLCYCLOPENTANE, NOTE A	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,3-TRIMETHYLBUTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0

COMPOUND	HFET, mg/mi					
	CARB			SWEDISH		
	10/18/99	10/19/99	AVG.	10/28/99	10/29/99	AVG.
1-METHYLCYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
BENZENE	0.0	0.2	0.1	0.0	0.0	0.0
3-METHYL-1-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLPENTANE	0.2	0.0	0.1	0.0	0.0	0.0
1,1-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-AMYL METHYL ETHER	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOHEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,3-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,2-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,3-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,4-TRIMETHYLPENTANE	0.4	0.4	0.4	0.0	0.0	0.0
2-METHYL-1-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-3-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
HEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C7	0.2	0.0	0.1	0.0	0.0	0.0
2-METHYL-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-TRANS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
METHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,2-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1,3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,3-TRIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,5-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1-TRANS-2-CIS-4-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1-TRANS-2-CIS-3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,4-TRIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,3-TRIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TOLUENE	0.8	0.0	0.4	0.0	0.0	0.0
2,3-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1,2-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYLHEXANE, NOTE B	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-CIS,2-TRANS,3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,3-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,4-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,5-TRIMETHYLHEXANE	0.0	0.0	0.0	0.4	0.0	0.2
TRANS-1-METHYL-3-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1-METHYL-3-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1-METHYL-2-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-1-ETHYL-CYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,2-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0

COMPOUND	HFET, mg/mi					
	CARB			SWEDISH		
	10/18/99	10/19/99	AVG.	10/28/99	10/29/99	AVG.
1-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-4-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
OCTANE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C8	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,3-DIMETHYLCYCLOHEXANE, NOTE C	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
ISOPROPYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,5-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1-METHYL-2-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLHEPTANE	0.3	0.2	0.3	0.5	0.6	0.6
4,4-DIMETHYLHEPTANE	0.0	0.2	0.1	0.7	0.0	0.3
CIS-1,2-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,6-DIMETHYLHEPTANE, NOTE D	0.0	0.0	0.0	0.0	0.0	0.0
1,1,3-TRIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,5-DIMETHYLHEPTANE, NOTE E	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,5-DIMETHYLHEPTANE, NOTE E	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLBENZENE	0.0	0.2	0.1	0.0	0.0	0.0
2,3,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
m-& p-XYLENE	0.0	0.5	0.3	0.0	0.0	0.0
4-METHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
4-ETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
STYRENE	0.0	0.0	0.0	0.0	0.0	0.0
o-XYLENE	0.0	0.3	0.2	0.0	0.0	0.0
1-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-3-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
NONANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
ISOPROPYLBENZENE (CUMENE)	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
n-PROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-3-ETHYLBENZENE	0.0	0.6	0.3	0.0	0.0	0.0
1-METHYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,3,5-TRIMETHYLBENZENE	0.0	0.2	0.1	0.0	0.0	0.0
1-METHYL-2-ETHYLBENZENE	0.0	0.3	0.1	0.0	0.0	0.0
1,2,4-TRIMETHYLBENZENE	0.0	0.4	0.2	0.0	0.0	0.0
TERT-BUTYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-DECENE	0.0	0.0	0.0	0.0	0.0	0.0
DECANE, NOTE F	0.4	0.2	0.3	0.4	0.2	0.3
ISOBUTYLBENZENE, NOTE F	0.4	0.2	0.3	0.4	0.2	0.3
1,3,-DIMETHYL-5-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
METHYLPROPYLBENZENE (sec butylbenzene)	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-3-ISOPROPYLBENZENE	0.0	0.2	0.1	0.0	0.0	0.0
1,2,3-TRIMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-4-ISOPROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
INDAN	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-2-ISOPROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,3-DIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,4-DIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-3-N-PROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-4-N-PROPYLBENZENE, NOTE G	0.0	0.0	0.0	0.0	0.0	0.0
1,2 DIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-2-N-PROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,4-DIMETHYL-2-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0

COMPOUND	HFET, mg/mi					
	CARB			SWEDISH		
	10/18/99	10/19/99	AVG.	10/28/99	10/29/99	AVG.
1,3-DIMETHYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2-DIMETHYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.4	0.2
1,3-DIMETHYL-2-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
UNDECANE	0.0	0.0	0.0	0.0	0.0	0.0
1,2-DIMETHYL-3-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,4,5-TETRAMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLBUTYLBENZENE (sec AMYLBENZENE)	0.0	0.0	0.0	0.0	0.0	0.0
3,4 DIMETHYLCUMENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,3,5-TETRAMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-1-BUT-2-METHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,3,4-TETRAMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
N-PENT-BENZENE	0.0	0.3	0.1	0.3	0.3	0.3
TERT-1-BUT-3,5-DIMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-1-BUTYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
NAPHTHALENE	0.0	0.0	0.0	0.0	0.0	0.0
DODECANE	0.0	0.0	0.0	0.0	0.0	0.0
1,3,5-TRIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,4-TRIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
HEXYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C9-C12+	0.8	0.0	0.4	0.0	0.2	0.1
FORMALDEHYDE	1.0	1.1	1.0	0.7	0.7	0.7
ACETALDEHYDE	0.9	0.7	0.8	0.8	0.8	0.8
ACROLEIN	trace	trace	trace	0.0	trace	trace
ACETONE	0.1	0.6	0.4	0.0	0.0	0.0
PROPIONALDEHYDE	trace	0.1	trace	0.1	0.0	trace
CROTONALDEHYDE	0.0	trace	trace	trace	0.0	trace
ISOBUTYRALDEHYDE, NOTE H	0.0	trace	trace	0.0	0.1	trace
METHYL ETHYL KETONE, NOTE H	0.0	trace	trace	0.0	0.1	trace
BENZALDEHYDE	0.0	0.0	0.0	0.0	0.0	0.0
ISOVALERALDEHYDE	0.0	0.3	0.1	0.0	0.0	0.0
VALERALDEHYDE	0.2	0.1	0.1	0.0	0.1	trace
O-TOLUALDEHYDE	0.0	0.0	0.0	0.0	0.1	trace
M/P-TOLUALDEHYDE	trace	0.0	trace	0.0	0.0	0.0
HEXANALDEHYDE	0.0	0.2	0.1	0.0	0.0	0.0
DIMETHYLBENZALDEHYDE	0.2	0.0	0.1	0.1	0.2	0.1
SUMMED SPECIATED VALUES	9	11	9.7	12	8	10.1

A - 2,2-Dimethylpentane and methylcyclopentane co-elute. GC peak area split equally between the two compounds.
B - 3-Methyl-3-ethy-pentane co-elutes with reported compound. Not reported separately.
C - Cis-1,4-Dimethylcyclohexane co-elutes with reported compound. Not reported separately.
D - Propylcyclopentane co-elutes with reported compound. Not reported separately.
E - 2,5-Dimethylheptane and 3,5-dimethylheptane co-elute. GC peak area split equally between the two compounds.
F - Decane and isobutylbenzene co-elute. GC peak area split equally between the two compounds.
G - n-Butylbenzene co-elutes with reported compound. Not reported separately.
H - Isobutyraldehyde and methyl ethyl ketone co-elute. LC peak area split equally between the two compounds.

APPENDIX E

HEAVY LIGHT-DUTY EMISSION TEST RESULTS

Page	Test No.	Test Cycle	Fuel
E-1	CARB-1	FTP	CARB Diesel
E-2	CARB-1	US06	CARB Diesel
E-3	CARB-1	HFET	CARB Diesel
E-4	CARB-2	FTP	CARB Diesel
E-5	CARB-2	US06	CARB Diesel
E-6	CARB-2	HFET	CARB Diesel
E-7	SWED-2	FTP	Swedish Diesel
E-8	SWED-1	US06	Swedish Diesel
E-9	SWED-1	HFET	Swedish Diesel
E-10	SWED-3	FTP	Swedish Diesel
E-11	SWED-2	US06	Swedish Diesel
E-12	SWED-2	HFET	Swedish Diesel

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.3-R 3-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER 100	TEST CARB-1	DIESEL EM-2790-F
VEHICLE MODEL 0 DODGE RAM 2500	DATE 12/16/1999 RUN	FUEL DENSITY 6.962 LB/GAL
ENGINE 5.9 L (359 CID)-6	DYNO 7 BAG CART 2	H .138 C .862 O .000 X .000
TRANSMISSION A4	ACTUAL ROAD LOAD 12.44 HP (9.28 KW)	FTP
ODOMETER 518 MILES (833 KM)	TEST WEIGHT 6250 LBS (2834 KG)	

BAROMETER 29.44 IN HG (747.8 MM HG) DRY BULB TEMPERATURE 72.0°F (22.2°C) NOX HUMIDITY C.F. .864

RELATIVE HUMIDITY 35.0 PCT.

BAG NUMBER	1	2	3
BAG DESCRIPTION	COLD TRANSIENT (0-505 SEC.)	STABILIZED (505-1372 SEC.)	HOT TRANSIENT (0- 505 SEC.)
RUN TIME SECONDS	505.3	869.9	505.5
DRY/WET CORRECTION FACTOR, SAMP/BACK	.982/.991	.985/.991	.983/.991
MEASURED DISTANCE MILES (KM)	3.61 (5.81)	3.87 (6.23)	3.60 (5.80)
BLOWER FLOW RATE SCFM (SCMM)	573.5 (16.24)	570.8 (16.16)	569.8 (16.14)
GAS METER FLOW RATE SCFM (SCMM)	1.10 (.03)	1.10 (.03)	1.09 (.03)
TOTAL FLOW SCF (SCM)	4839. (137.0)	8291. (234.8)	4810. (136.2)
HC SAMPLE METER/RANGE/PPM (CONT)	16.2/1071/ 16.20	16.6/1071/ 16.58	16.7/1071/ 16.70
HC BCKGRD METER/RANGE/PPM	4.0/1071/ 4.00	5.4/1071/ 5.40	5.0/1071/ 5.00
CO SAMPLE METER/RANGE/PPM	45.1/ 12/ 43.58	22.0/ 12/ 20.90	22.6/ 12/ 21.48
CO BCKGRD METER/RANGE/PPM	3.8/ 12/ 3.50	3.8/ 12/ 3.50	3.2/ 12/ 2.95
CO2 SAMPLE METER/RANGE/PCT	92.2/ 11/ .9210	62.9/ 11/ .6126	79.6/ 11/ .7869
CO2 BCKGRD METER/RANGE/PCT	5.7/ 11/ .0516	5.7/ 11/ .0516	5.8/ 11/ .0525
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	54.8/1072/ 137.53	33.8/1072/ 84.70	43.0/1072/ 107.75
NOX BCKGRD METER/RANGE/PPM	1.3/ 1/ .34	1.7/ 1/ .44	1.7/ 1/ .44
CH4 SAMPLE PPM (1.210)	2.51	2.38	2.25
CH4 BCKGRD PPM	2.84	2.63	2.55
DILUTION FACTOR	14.37	21.62	16.85
HC CONCENTRATION PPM	12.47	11.43	12.00
CO CONCENTRATION PPM	39.08	17.11	18.17
CO2 CONCENTRATION PCT	.8730	.5634	.7375
NOX CONCENTRATION PPM	134.70	82.99	105.51
CH4 CONCENTRATION PPM	-.13	-.12	-.14
NMHC CONCENTRATION PPM	12.47	11.43	12.00
HC MASS GRAMS	.990	1.554	.946
CO MASS GRAMS	6.235	4.676	2.881
CO2 MASS GRAMS	2190.32	2422.02	1839.11
NOX MASS GRAMS	30.504	32.200	23.749
PM MASS GRAMS	.175	.190	.163
CH4 MASS GRAMS	.000	.000	.000
NMHC MASS GRAMS (FID)	.986	1.547	.942
FUEL MASS KG	.698	.771	.585
FUEL ECONOMY MPG (L/100KM)	16.33 (14.40)	15.87 (14.82)	19.46 (12.09)

3-BAG COMPOSITE RESULTS

HC	G/MI	.337	CH4	G/MI	.000
CO	G/MI	1.203	NMHC	G/MI	.335
NOX	G/MI	7.868			
PM	G/MI	.048			
FUEL ECONOMY MPG (L/100KM)		16.85 (13.96)			

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.3-R 1-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER 100	TEST CARB-1	DIESEL EM-2790-F
VEHICLE MODEL 0 DODGE RAM 2500	DATE 12/16/1999 RUN	FUEL DENSITY 6.962 LB/GAL
ENGINE 5.9 L (359 CID)-6	DYNO 7 BAG CART 2	H .138 C .862 O .000 X .000
TRANSMISSION A4	ACTUAL ROAD LOAD 12.44 HP (9.28 KW)	US06
ODOMETER 537 MILES (864 KM)	TEST WEIGHT 6250 LBS (2834 KG)	

BAROMETER 29.45 IN HG (748.0 MM HG) DRY BULB TEMPERATURE 72.0°F (22.2°C) NOX HUMIDITY C.F. .864

RELATIVE HUMIDITY 35.0 PCT.

BAG NUMBER	1
BAG DESCRIPTION	
RUN TIME SECONDS	600.2
DRY/WET CORRECTION FACTOR, SAMP/BACK	.977/.991
MEASURED DISTANCE MILES (KM)	8.00 (12.86)
BLOWER FLOW RATE SCFM (SCMM)	569.4 (16.13)
GAS METER FLOW RATE SCFM (SCMM)	1.06 (.03)
TOTAL FLOW SCF (SCM)	5706. (161.6)
HC SAMPLE METER/RANGE/PPM (CONT)	19.1/1071/ 19.16
HC BCKGRD METER/RANGE/PPM	4.9/1071/ 4.90
CO SAMPLE METER/RANGE/PPM	28.0/ 12/ 26.76
CO BCKGRD METER/RANGE/PPM	2.1/ 12/ 1.93
CO2 SAMPLE METER/RANGE/PCT	73.0/ 1/ 1.4469
CO2 BCKGRD METER/RANGE/PCT	2.7/ 1/ .0541
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	59.4/1072/ 148.88
NOX BCKGRD METER/RANGE/PPM	1.9/ 1/ .49
CH4 SAMPLE PPM (1.210)	1.91
CH4 BCKGRD PPM	2.36
DILUTION FACTOR	9.18
HC CONCENTRATION PPM	14.79
CO CONCENTRATION PPM	24.00
CO2 CONCENTRATION PCT	1.3987
NOX CONCENTRATION PPM	144.98
CH4 CONCENTRATION PPM	-.19
NMHC CONCENTRATION PPM	14.79
HC MASS GRAMS	1.384
CO MASS GRAMS	4.516
CO2 MASS GRAMS	4138.44
NOX MASS GRAMS	38.714
PM MASS GRAMS	.470
CH4 MASS GRAMS	.000
NMHC MASS GRAMS (FID)	1.378
FUEL MASS KG	1.314
FUEL ECONOMY MPG (L/100KM)	19.21 (12.25)

1-BAG COMPOSITE RESULTS

HC	G/MI	.173	CH4	G/MI	.000
CO	G/MI	.565	NMHC	G/MI	.172
NOX	G/MI	4.842			
PM	G/MI	.059			

FUEL ECONOMY MPG (L/100KM) 19.21 (12.25)

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.3-R 1-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER 100	TEST CARB-1	DIESEL EM-2790-F
VEHICLE MODEL 0 DODGE RAM 2500	DATE 12/16/1999 RUN	FUEL DENSITY 6.962 LB/GAL
ENGINE 5.9 L (359 CID)-6	DYNO 7 BAG CART 2	H .138 C .862 O .000 X .000
TRANSMISSION A4	ACTUAL ROAD LOAD 12.44 HP (9.28 KW)	HFET
ODOMETER 556 MILES (894 KM)	TEST WEIGHT 6250 LBS (2834 KG)	

BAROMETER 29.44 IN HG (747.8 MM HG) DRY BULB TEMPERATURE 74.0°F (23.3°C) NOX HUMIDITY C.F. .867

RELATIVE HUMIDITY 33.4 PCT.

BAG NUMBER	1
BAG DESCRIPTION	
RUN TIME SECONDS	766.3
DRY/WET CORRECTION FACTOR, SAMP/BACK	.981/.990
MEASURED DISTANCE MILES (KM)	10.27 (16.53)
BLOWER FLOW RATE SCFM (SCMM)	570.1 (16.15)
GAS METER FLOW RATE SCFM (SCMM)	1.08 (.03)
TOTAL FLOW SCF (SCM)	7295. (206.6)
HC SAMPLE METER/RANGE/PPM (CONT)	18.8/1071/ 18.78
HC BCKGRD METER/RANGE/PPM	5.4/1071/ 5.40
CO SAMPLE METER/RANGE/PPM	22.9/ 12/ 21.78
CO BCKGRD METER/RANGE/PPM	1.5/ 12/ 1.38
CO2 SAMPLE METER/RANGE/PCT	47.3/ 1/ .9493
CO2 BCKGRD METER/RANGE/PCT	2.7/ 1/ .0541
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	54.2/1072/ 135.89
NOX BCKGRD METER/RANGE/PPM	1.9/ 1/ .49
CH4 SAMPLE PPM (1.210)	1.97
CH4 BCKGRD PPM	2.33
DILUTION FACTOR	13.97
HC CONCENTRATION PPM	13.77
CO CONCENTRATION PPM	19.87
CO2 CONCENTRATION PCT	.8991
NOX CONCENTRATION PPM	132.89
CH4 CONCENTRATION PPM	-.19
NMHC CONCENTRATION PPM	13.77
HC MASS GRAMS	1.647
CO MASS GRAMS	4.780
CO2 MASS GRAMS	3400.50
NOX MASS GRAMS	45.524
PM MASS GRAMS	.298
CH4 MASS GRAMS	.000
NMHC MASS GRAMS (FID)	1.640
FUEL MASS KG	1.081
FUEL ECONOMY MPG (L/100KM)	30.01 (7.84)

1-BAG COMPOSITE RESULTS

HC	G/MI	.160	CH4	G/MI	.000
CO	G/MI	.465	NMHC	G/MI	.160
NOX	G/MI	4.432			
PM	G/MI	.029			

FUEL ECONOMY MPG (L/100KM) 30.01 (7.84)

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.3-R 3-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER 100	TEST CARB-2	DIESEL EM-2790-F
VEHICLE MODEL 0 DODGE RAM 2500	DATE 12/17/1999 RUN	FUEL DENSITY 6.962 LB/GAL
ENGINE 5.9 L (359 CID)-6	DYNO 7 BAG CART 2	H .138 C .862 O .000 X .000
TRANSMISSION A4	ACTUAL ROAD LOAD 12.44 HP (9.28 KW)	FTP
ODOMETER 566 MILES (910 KM)	TEST WEIGHT 6250 LBS (2834 KG)	

BAROMETER 29.20 IN HG (741.7 MM HG) DRY BULB TEMPERATURE 71.0°F (21.7°C) NOX HUMIDITY C.F. .887

RELATIVE HUMIDITY 41.4 PCT.

BAG NUMBER	1	2	3
BAG DESCRIPTION	COLD TRANSIENT (0-505 SEC.)	STABILIZED (505-1372 SEC.)	HOT TRANSIENT (0- 505 SEC.)
RUN TIME SECONDS	505.2	869.3	505.4
DRY/WET CORRECTION FACTOR, SAMP/BACK	.980/.989	.983/.989	.982/.989
MEASURED DISTANCE MILES (KM)	3.60 (5.79)	3.87 (6.22)	3.59 (5.78)
BLOWER FLOW RATE SCFM (SCMM)	572.2 (16.21)	567.1 (16.06)	566.0 (16.03)
GAS METER FLOW RATE SCFM (SCMM)	1.09 (.03)	1.11 (.03)	1.10 (.03)
TOTAL FLOW SCF (SCM)	4827. (136.7)	8232. (233.1)	4777. (135.3)
HC SAMPLE METER/RANGE/PPM (CONT)	16.4/1071/ 16.37	16.3/1071/ 16.31	17.0/1071/ 17.02
HC BCKGRD METER/RANGE/PPM	4.1/1071/ 4.10	5.0/1071/ 5.00	5.0/1071/ 5.00
CO SAMPLE METER/RANGE/PPM	45.3/ 12/ 43.78	20.0/ 12/ 18.95	22.2/ 12/ 21.09
CO BCKGRD METER/RANGE/PPM	1.3/ 12/ 1.19	1.3/ 12/ 1.19	1.1/ 12/ 1.01
CO2 SAMPLE METER/RANGE/PCT	92.8/ 11/ .9275	62.8/ 11/ .6116	78.8/ 11/ .7784
CO2 BCKGRD METER/RANGE/PCT	5.2/ 11/ .0470	5.3/ 11/ .0479	5.4/ 11/ .0489
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	55.9/1072/ 140.20	34.2/1072/ 85.72	47.5/1072/ 119.21
NOX BCKGRD METER/RANGE/PPM	1.0/ 1/ .26	1.3/ 1/ .34	1.5/ 1/ .39
CH4 SAMPLE PPM (1.210)	2.34	2.22	2.18
CH4 BCKGRD PPM	2.42	2.55	2.40
DILUTION FACTOR	14.27	21.66	17.03
HC CONCENTRATION PPM	12.56	11.54	12.31
CO CONCENTRATION PPM	41.31	17.35	19.55
CO2 CONCENTRATION PCT	.8837	.5659	.7324
NOX CONCENTRATION PPM	137.19	83.96	116.65
CH4 CONCENTRATION PPM	.09	-.21	-.09
NMHC CONCENTRATION PPM	12.44	11.54	12.31
HC MASS GRAMS	.994	1.558	.964
CO MASS GRAMS	6.574	4.709	3.080
CO2 MASS GRAMS	2211.88	2415.35	1814.15
NOX MASS GRAMS	31.819	33.211	26.775
PM MASS GRAMS	.179	.223	.169
CH4 MASS GRAMS	.008	.000	.000
NMHC MASS GRAMS (FID)	.981	1.551	.960
FUEL MASS KG	.705	.769	.577
FUEL ECONOMY MPG (L/100KM)	16.13 (14.59)	15.88 (14.81)	19.65 (11.97)

3-BAG COMPOSITE RESULTS

HC	G/MI	.340	CH4	G/MI	.000
CO	G/MI	1.245	NMHC	G/MI	.338
NOX	G/MI	8.331			
PM	G/MI	.053			
FUEL ECONOMY MPG (L/100KM)		16.85 (13.96)			

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.3-R 1-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER 100	TEST CARB-2	DIESEL EM-2790-F
VEHICLE MODEL 0 DODGE RAM 2500	DATE 12/17/1999 RUN	FUEL DENSITY 6.962 LB/GAL
ENGINE 5.9 L (359 CID)-6	DYNO 7 BAG CART 2	H .138 C .862 O .000 X .000
TRANSMISSION A4	ACTUAL ROAD LOAD 12.44 HP (9.28 KW)	US06
ODOMETER 585 MILES (941 KM)	TEST WEIGHT 6250 LBS (2834 KG)	

BAROMETER 29.21 IN HG (741.9 MM HG) DRY BULB TEMPERATURE 74.0°F (23.3°C) NOX HUMIDITY C.F. .884

RELATIVE HUMIDITY 36.9 PCT.

BAG NUMBER	1
BAG DESCRIPTION	
RUN TIME SECONDS	600.2
DRY/WET CORRECTION FACTOR, SAMP/BACK	.975/.989
MEASURED DISTANCE MILES (KM)	8.02 (12.90)
BLOWER FLOW RATE SCFM (SCMM)	565.8 (16.02)
GAS METER FLOW RATE SCFM (SCMM)	1.08 (.03)
TOTAL FLOW SCF (SCM)	5670. (160.6)
HC SAMPLE METER/RANGE/PPM (CONT)	19.4/1071/ 19.37
HC BCKGRD METER/RANGE/PPM	5.0/1071/ 5.00
CO SAMPLE METER/RANGE/PPM	29.3/ 12/ 28.04
CO BCKGRD METER/RANGE/PPM	1.1/ 12/ 1.01
CO2 SAMPLE METER/RANGE/PCT	74.2/ 1/ 1.4701
CO2 BCKGRD METER/RANGE/PCT	2.8/ 1/ .0561
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	58.9/1072/ 147.68
NOX BCKGRD METER/RANGE/PPM	1.6/ 1/ .41
CH4 SAMPLE PPM (1.210)	1.81
CH4 BCKGRD PPM	2.23
DILUTION FACTOR	9.03
HC CONCENTRATION PPM	14.92
CO CONCENTRATION PPM	26.01
CO2 CONCENTRATION PCT	1.4202
NOX CONCENTRATION PPM	143.65
CH4 CONCENTRATION PPM	-.18
NMHC CONCENTRATION PPM	14.92
HC MASS GRAMS	1.388
CO MASS GRAMS	4.863
CO2 MASS GRAMS	4175.54
NOX MASS GRAMS	39.020
PM MASS GRAMS	.491
CH4 MASS GRAMS	.000
NMHC MASS GRAMS (FID)	1.382
FUEL MASS KG	1.326
FUEL ECONOMY MPG (L/100KM)	19.09 (12.32)

1-BAG COMPOSITE RESULTS

HC	G/MI	.173	CH4	G/MI	.000
CO	G/MI	.607	NMHC	G/MI	.172
NOX	G/MI	4.868			
PM	G/MI	.061			
FUEL ECONOMY MPG (L/100KM)		19.09 (12.32)			

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.3-R 1-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER 100	TEST CARB-2	DIESEL EM-2790-F
VEHICLE MODEL 0 DODGE RAM 2500	DATE 12/17/1999 RUN	FUEL DENSITY 6.962 LB/GAL
ENGINE 5.9 L (359 CID)-6	DYNO 7 BAG CART 2	H .138 C .862 O .000 X .000
TRANSMISSION A4	ACTUAL ROAD LOAD 12.44 HP (9.28 KW)	HFET
ODOMETER 604 MILES (971 KM)	TEST WEIGHT 6250 LBS (2834 KG)	

BAROMETER 29.22 IN HG (742.2 MM HG) DRY BULB TEMPERATURE 75.0°F (23.9°C) NOX HUMIDITY C.F. .894

RELATIVE HUMIDITY 37.7 PCT.

BAG NUMBER	1
BAG DESCRIPTION	
RUN TIME SECONDS	765.4
DRY/WET CORRECTION FACTOR, SAMP/BACK	.979/.989
MEASURED DISTANCE MILES (KM)	10.27 (16.52)
BLOWER FLOW RATE SCFM (SCMM)	565.2 (16.01)
GAS METER FLOW RATE SCFM (SCMM)	1.08 (.03)
TOTAL FLOW SCF (SCM)	7224. (204.6)
HC SAMPLE METER/RANGE/PPM (CONT)	18.8/1071/ 18.81
HC BCKGRD METER/RANGE/PPM	5.4/1071/ 5.40
CO SAMPLE METER/RANGE/PPM	23.4/ 12/ 22.26
CO BCKGRD METER/RANGE/PPM	.6/ 12/ .55
CO2 SAMPLE METER/RANGE/PCT	48.1/ 1/ .9650
CO2 BCKGRD METER/RANGE/PCT	2.7/ 1/ .0541
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	54.1/1072/ 135.67
NOX BCKGRD METER/RANGE/PPM	1.7/ 1/ .44
CH4 SAMPLE PPM (1.210)	1.92
CH4 BCKGRD PPM	2.38
DILUTION FACTOR	13.75
HC CONCENTRATION PPM	13.80
CO CONCENTRATION PPM	21.07
CO2 CONCENTRATION PCT	.9148
NOX CONCENTRATION PPM	132.47
CH4 CONCENTRATION PPM	-.29
NMHC CONCENTRATION PPM	13.80
HC MASS GRAMS	1.634
CO MASS GRAMS	5.018
CO2 MASS GRAMS	3426.48
NOX MASS GRAMS	46.357
PM MASS GRAMS	.310
CH4 MASS GRAMS	.000
NMHC MASS GRAMS (FID)	1.627
FUEL MASS KG	1.089
FUEL ECONOMY MPG (L/100KM)	29.76 (7.90)

1-BAG COMPOSITE RESULTS

HC	G/MI	.159	CH4	G/MI	.000
CO	G/MI	.489	NMHC	G/MI	.159
NOX	G/MI	4.516			
PM	G/MI	.030			

FUEL ECONOMY MPG (L/100KM) 29.76 (7.90)

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.3-R 3-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER 100	TEST SWED-2	DIESEL EM-2789-F
VEHICLE MODEL 0 DODGE RAM 2500	DATE 12/14/1999 RUN	FUEL DENSITY 6.838 LB/GAL
ENGINE 5.9 L (359 CID)-6	DYNO 7 BAG CART 2	H .140 C .860 O .000 X .000
TRANSMISSION A4	ACTUAL ROAD LOAD 12.44 HP (9.28 KW)	FTP
ODOMETER 435 MILES (699 KM)	TEST WEIGHT 6250 LBS (2834 KG)	

BAROMETER 29.09 IN HG (738.9 MM HG) DRY BULB TEMPERATURE 72.0°F (22.2°C) NOX HUMIDITY C.F. .867

RELATIVE HUMIDITY 35.3 PCT.

BAG NUMBER	1	2	3
BAG DESCRIPTION	COLD TRANSIENT (0-505 SEC.)	STABILIZED (505-1372 SEC.)	HOT TRANSIENT (0- 505 SEC.)
RUN TIME SECONDS	505.4	869.6	505.4
DRY/WET CORRECTION FACTOR, SAMP/BACK	.981/.990	.984/.990	.983/.990
MEASURED DISTANCE MILES (KM)	3.59 (5.77)	3.85 (6.20)	3.60 (5.79)
BLOWER FLOW RATE SCFM (SCMM)	568.4 (16.10)	565.0 (16.00)	565.7 (16.02)
GAS METER FLOW RATE SCFM (SCMM)	1.10 (.03)	1.08 (.03)	1.08 (.03)
TOTAL FLOW SCF (SCM)	4797. (135.9)	8204. (232.4)	4774. (135.2)
HC SAMPLE METER/RANGE/PPM (CONT)	14.8/1071/ 14.77	15.7/1071/ 15.67	16.0/1071/ 16.05
HC BCKGRD METER/RANGE/PPM	3.7/1071/ 3.70	4.7/1071/ 4.70	4.3/1071/ 4.30
CO SAMPLE METER/RANGE/PPM	42.8/ 12/ 41.32	19.4/ 12/ 18.37	20.8/ 12/ 19.73
CO BCKGRD METER/RANGE/PPM	.3/ 12/ .27	.3/ 12/ .27	.2/ 12/ .18
CO2 SAMPLE METER/RANGE/PCT	94.1/ 11/ .9415	63.8/ 11/ .6219	81.0/ 11/ .8016
CO2 BCKGRD METER/RANGE/PCT	5.0/ 11/ .0452	4.9/ 11/ .0443	4.9/ 11/ .0443
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	56.2/1072/ 141.08	33.8/1072/ 84.82	41.9/1072/ 104.99
NOX BCKGRD METER/RANGE/PPM	.7/ 1/ .18	1.0/ 1/ .26	1.3/ 1/ .34
CH4 SAMPLE PPM (1.210)	1.94	1.93	1.82
CH4 BCKGRD PPM	2.11	2.12	2.12
DILUTION FACTOR	13.98	21.18	16.44
HC CONCENTRATION PPM	11.33	11.19	12.01
CO CONCENTRATION PPM	39.83	17.68	19.02
CO2 CONCENTRATION PCT	.8995	.5797	.7600
NOX CONCENTRATION PPM	138.26	83.24	102.84
CH4 CONCENTRATION PPM	-.02	-.09	-.17
NMHC CONCENTRATION PPM	11.33	11.19	12.01
HC MASS GRAMS	.893	1.510	.942
CO MASS GRAMS	6.299	4.782	2.994
CO2 MASS GRAMS	2237.24	2466.05	1881.38
NOX MASS GRAMS	31.141	32.067	23.053
PM MASS GRAMS	.146	.166	.134
CH4 MASS GRAMS	.000	.000	.000
NMHC MASS GRAMS (FID)	.888	1.500	.936
FUEL MASS KG	.714	.787	.600
FUEL ECONOMY MPG (L/100KM)	15.58 (15.10)	15.18 (15.49)	18.61 (12.64)

3-BAG COMPOSITE RESULTS

HC	G/MI	.327	CH4	G/MI	.000
CO	G/MI	1.236	NMHC	G/MI	.324
NOX	G/MI	7.872			
PM	G/MI	.041			
FUEL ECONOMY MPG (L/100KM)		16.11 (14.60)			

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.3-R 1-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER 100	TEST SWED-1	DIESEL EM-2789-F
VEHICLE MODEL 0 DODGE RAM 2500	DATE 12/10/1999 RUN	FUEL DENSITY 6.838 LB/GAL
ENGINE 5.9 L (359 CID)-6	DYNO 7 BAG CART 2	H .140 C .860 O .000 X .000
TRANSMISSION A4	ACTUAL ROAD LOAD 12.44 HP (9.28 KW)	US06
ODOMETER 399 MILES (641 KM)	TEST WEIGHT 6250 LBS (2834 KG)	

BAROMETER 29.30 IN HG (744.2 MM HG) DRY BULB TEMPERATURE 74.0°F (23.3°C) NOX HUMIDITY C.F. .868

RELATIVE HUMIDITY 33.5 PCT.

BAG NUMBER	1
BAG DESCRIPTION	
RUN TIME SECONDS	600.6
DRY/WET CORRECTION FACTOR, SAMP/BACK	.976/.990
MEASURED DISTANCE MILES (KM)	8.00 (12.87)
BLOWER FLOW RATE SCFM (SCMM)	566.2 (16.04)
GAS METER FLOW RATE SCFM (SCMM)	1.09 (.03)
TOTAL FLOW SCF (SCM)	5679. (160.8)
HC SAMPLE METER/RANGE/PPM (CONT)	18.0/1071/ 17.99
HC BCKGRD METER/RANGE/PPM	3.8/1071/ 3.80
CO SAMPLE METER/RANGE/PPM	29.4/ 12/ 28.14
CO BCKGRD METER/RANGE/PPM	.7/ 12/ .64
CO2 SAMPLE METER/RANGE/PCT	74.3/ 1/ 1.4720
CO2 BCKGRD METER/RANGE/PCT	2.4/ 1/ .0481
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	57.8/1072/ 144.94
NOX BCKGRD METER/RANGE/PPM	2.9/ 1/ .75
CH4 SAMPLE PPM (1.210)	1.75
CH4 BCKGRD PPM	2.07
DILUTION FACTOR	8.97
HC CONCENTRATION PPM	14.61
CO CONCENTRATION PPM	26.45
CO2 CONCENTRATION PCT	1.4293
NOX CONCENTRATION PPM	140.79
CH4 CONCENTRATION PPM	-.09
NMHC CONCENTRATION PPM	14.61
HC MASS GRAMS	1.364
CO MASS GRAMS	4.952
CO2 MASS GRAMS	4208.46
NOX MASS GRAMS	37.597
PM MASS GRAMS	.873
CH4 MASS GRAMS	.000
NMHC MASS GRAMS (FID)	1.355
FUEL MASS KG	1.340
FUEL ECONOMY MPG (L/100KM)	18.52 (12.70)

1-BAG COMPOSITE RESULTS

HC	G/MI	.171	CH4	G/MI	.000
CO	G/MI	.619	NMHC	G/MI	.169
NOX	G/MI	4.701			
PM	G/MI	.109			

FUEL ECONOMY MPG (L/100KM) 18.52 (12.70)

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.3-R 1-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER 100	TEST SWED-1	DIESEL EM-2789-F
VEHICLE MODEL 0 DODGE RAM 2500	DATE 12/10/1999 RUN	FUEL DENSITY 6.838 LB/GAL
ENGINE 5.9 L (359 CID)-6	DYNO 7 BAG CART 2	H .140 C .860 O .000 X .000
TRANSMISSION A4	ACTUAL ROAD LOAD 12.44 HP (9.28 KW)	HFET
ODOMETER 417 MILES (670 KM)	TEST WEIGHT 6250 LBS (2834 KG)	

BAROMETER 29.28 IN HG (743.7 MM HG) DRY BULB TEMPERATURE 74.0°F (23.3°C) NOX HUMIDITY C.F. .868

RELATIVE HUMIDITY 33.5 PCT.

BAG NUMBER	1
BAG DESCRIPTION	
RUN TIME SECONDS	765.4
DRY/WET CORRECTION FACTOR, SAMP/BACK	.981/.990
MEASURED DISTANCE MILES (KM)	10.28 (16.54)
BLOWER FLOW RATE SCFM (SCMM)	565.7 (16.02)
GAS METER FLOW RATE SCFM (SCMM)	1.14 (.03)
TOTAL FLOW SCF (SCM)	7231. (204.8)
HC SAMPLE METER/RANGE/PPM (CONT)	17.3/1071/ 17.28
HC BCKGRD METER/RANGE/PPM	4.0/1071/ 4.00
CO SAMPLE METER/RANGE/PPM	21.7/ 12/ 20.61
CO BCKGRD METER/RANGE/PPM	.7/ 12/ .64
CO2 SAMPLE METER/RANGE/PCT	46.6/ 1/ .9356
CO2 BCKGRD METER/RANGE/PCT	2.2/ 1/ .0441
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	53.1/1072/ 133.22
NOX BCKGRD METER/RANGE/PPM	2.5/ 1/ .65
CH4 SAMPLE PPM (1.210)	2.48
CH4 BCKGRD PPM	2.03
DILUTION FACTOR	14.10
HC CONCENTRATION PPM	13.56
CO CONCENTRATION PPM	19.41
CO2 CONCENTRATION PCT	.8946
NOX CONCENTRATION PPM	130.11
CH4 CONCENTRATION PPM	.59
NMHC CONCENTRATION PPM	12.84
HC MASS GRAMS	1.612
CO MASS GRAMS	4.629
CO2 MASS GRAMS	3354.27
NOX MASS GRAMS	44.253
PM MASS GRAMS	.224
CH4 MASS GRAMS	.081
NMHC MASS GRAMS (FID)	1.517
FUEL MASS KG	1.069
FUEL ECONOMY MPG (L/100KM)	29.83 (7.89)

1-BAG COMPOSITE RESULTS

HC	G/MI	.157	CH4	G/MI	.008
CO	G/MI	.450	NMHC	G/MI	.148
NOX	G/MI	4.305			
PM	G/MI	.022			

FUEL ECONOMY MPG (L/100KM) 29.83 (7.89)

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.3-R 3-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER 100	TEST SWED-3	DIESEL EM-2789-F
VEHICLE MODEL 0 DODGE RAM 2500	DATE 12/15/1999 RUN	FUEL DENSITY 6.838 LB/GAL
ENGINE 5.9 L (359 CID)-6	DYNO 7 BAG CART 2	H .140 C .860 O .000 X .000
TRANSMISSION A4	ACTUAL ROAD LOAD 12.44 HP (9.28 KW)	FTP
ODOMETER 483 MILES (777 KM)	TEST WEIGHT 6250 LBS (2834 KG)	

BAROMETER 29.50 IN HG (749.3 MM HG) DRY BULB TEMPERATURE 71.0°F (21.7°C) NOX HUMIDITY C.F. .869

RELATIVE HUMIDITY 37.6 PCT.

BAG NUMBER	1	2	3
BAG DESCRIPTION	COLD TRANSIENT (0-505 SEC.)	STABILIZED (505-1372 SEC.)	HOT TRANSIENT (0- 505 SEC.)
RUN TIME SECONDS	505.2	869.3	505.4
DRY/WET CORRECTION FACTOR, SAMP/BACK	.981/.990	.984/.990	.983/.990
MEASURED DISTANCE MILES (KM)	3.60 (5.80)	3.87 (6.23)	3.61 (5.80)
BLOWER FLOW RATE SCFM (SCMM)	581.3 (16.46)	577.8 (16.37)	577.6 (16.36)
GAS METER FLOW RATE SCFM (SCMM)	1.06 (.03)	1.08 (.03)	1.04 (.03)
TOTAL FLOW SCF (SCM)	4904. (138.9)	8388. (237.5)	4874. (138.0)
HC SAMPLE METER/RANGE/PPM (CONT)	14.2/1071/ 14.23	15.6/1071/ 15.61	15.3/1071/ 15.31
HC BCKGRD METER/RANGE/PPM	5.0/1071/ 5.00	4.7/1071/ 4.70	4.2/1071/ 4.20
CO SAMPLE METER/RANGE/PPM	39.8/ 12/ 38.36	18.2/ 12/ 17.21	19.6/ 12/ 18.56
CO BCKGRD METER/RANGE/PPM	.2/ 12/ .18	.8/ 12/ .73	1.0/ 12/ .92
CO2 SAMPLE METER/RANGE/PCT	92.8/ 11/ .9275	62.6/ 11/ .6095	79.0/ 11/ .7805
CO2 BCKGRD METER/RANGE/PCT	5.0/ 11/ .0452	5.2/ 11/ .0470	4.9/ 11/ .0443
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	54.9/1072/ 137.63	32.6/1072/ 81.69	40.9/1072/ 102.63
NOX BCKGRD METER/RANGE/PPM	.7/ 1/ .18	1.2/ 1/ .31	.8/ 1/ .21
CH4 SAMPLE PPM (1.210)	2.61	2.56	2.19
CH4 BCKGRD PPM	3.14	2.85	2.66
DILUTION FACTOR	14.20	21.61	16.89
HC CONCENTRATION PPM	9.58	11.13	11.36
CO CONCENTRATION PPM	37.03	16.10	17.20
CO2 CONCENTRATION PCT	.8855	.5647	.7389
NOX CONCENTRATION PPM	134.87	80.11	100.65
CH4 CONCENTRATION PPM	-.31	-.15	-.32
NMHC CONCENTRATION PPM	9.58	11.13	11.36
HC MASS GRAMS	.772	1.534	.910
CO MASS GRAMS	5.986	4.453	2.764
CO2 MASS GRAMS	2251.34	2455.78	1867.22
NOX MASS GRAMS	31.143	31.639	23.099
PM MASS GRAMS	.158	.162	.157
CH4 MASS GRAMS	.000	.000	.000
NMHC MASS GRAMS (FID)	.767	1.524	.904
FUEL MASS KG	.718	.783	.595
FUEL ECONOMY MPG (L/100KM)	15.56 (15.12)	15.34 (15.33)	18.80 (12.51)

3-BAG COMPOSITE RESULTS

HC	G/MI	.319	CH4	G/MI	.000
CO	G/MI	1.150	NMHC	G/MI	.317
NOX	G/MI	7.781			
PM	G/MI	.043			
FUEL ECONOMY MPG (L/100KM)		16.24 (14.49)			

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.3-R 1-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER 100	TEST SWED-2	DIESEL EM-2789-F
VEHICLE MODEL 0 DODGE RAM 2500	DATE 12/14/1999 RUN	FUEL DENSITY 6.838 LB/GAL
ENGINE 5.9 L (359 CID)-6	DYNO 7 BAG CART 2	H .140 C .860 O .000 X .000
TRANSMISSION A4	ACTUAL ROAD LOAD 12.44 HP (9.28 KW)	US06
ODOMETER 454 MILES (730 KM)	TEST WEIGHT 6250 LBS (2834 KG)	

BAROMETER 29.08 IN HG (738.6 MM HG) DRY BULB TEMPERATURE 73.0°F (22.8°C) NOX HUMIDITY C.F. .861

RELATIVE HUMIDITY 32.8 PCT.

BAG NUMBER	1
BAG DESCRIPTION	
RUN TIME SECONDS	600.5
DRY/WET CORRECTION FACTOR, SAMP/BACK	.976/.991
MEASURED DISTANCE MILES (KM)	8.02 (12.91)
BLOWER FLOW RATE SCFM (SCMM)	562.7 (15.94)
GAS METER FLOW RATE SCFM (SCMM)	1.06 (.03)
TOTAL FLOW SCF (SCM)	5643. (159.8)
HC SAMPLE METER/RANGE/PPM (CONT)	19.1/1071/ 19.12
HC BCKGRD METER/RANGE/PPM	4.5/1071/ 4.50
CO SAMPLE METER/RANGE/PPM	26.5/ 12/ 25.29
CO BCKGRD METER/RANGE/PPM	.1/ 12/ .09
CO2 SAMPLE METER/RANGE/PCT	74.6/ 1/ 1.4778
CO2 BCKGRD METER/RANGE/PCT	2.4/ 1/ .0481
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	57.3/1072/ 143.70
NOX BCKGRD METER/RANGE/PPM	1.3/ 1/ .34
CH4 SAMPLE PPM (1.210)	1.67
CH4 BCKGRD PPM	2.02
DILUTION FACTOR	8.93
HC CONCENTRATION PPM	15.12
CO CONCENTRATION PPM	24.21
CO2 CONCENTRATION PCT	1.4351
NOX CONCENTRATION PPM	140.00
CH4 CONCENTRATION PPM	-.13
NMHC CONCENTRATION PPM	15.12
HC MASS GRAMS	1.403
CO MASS GRAMS	4.504
CO2 MASS GRAMS	4198.68
NOX MASS GRAMS	36.850
PM MASS GRAMS	.501
CH4 MASS GRAMS	.000
NMHC MASS GRAMS (FID)	1.394
FUEL MASS KG	1.336
FUEL ECONOMY MPG (L/100KM)	18.62 (12.64)

1-BAG COMPOSITE RESULTS

HC	G/MI	.175	CH4	G/MI	.000
CO	G/MI	.561	NMHC	G/MI	.174
NOX	G/MI	4.594			
PM	G/MI	.062			
FUEL ECONOMY MPG (L/100KM)		18.62 (12.64)			

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.3-R 1-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER 100	TEST SWED-2	DIESEL EM-2789-F
VEHICLE MODEL 0 DODGE RAM 2500	DATE 12/14/1999 RUN	FUEL DENSITY 6.838 LB/GAL
ENGINE 5.9 L (359 CID)-6	DYNO 7 BAG CART 2	H .140 C .860 O .000 X .000
TRANSMISSION A4	ACTUAL ROAD LOAD 12.44 HP (9.28 KW)	HFET
ODOMETER 473 MILES (761 KM)	TEST WEIGHT 6250 LBS (2834 KG)	

BAROMETER 29.08 IN HG (738.6 MM HG) DRY BULB TEMPERATURE 74.0°F (23.3°C) NOX HUMIDITY C.F. .856

RELATIVE HUMIDITY 30.4 PCT.

BAG NUMBER	1
BAG DESCRIPTION	
RUN TIME SECONDS	765.6
DRY/WET CORRECTION FACTOR, SAMP/BACK	.982/.991
MEASURED DISTANCE MILES (KM)	10.28 (16.55)
BLOWER FLOW RATE SCFM (SCMM)	564.6 (15.99)
GAS METER FLOW RATE SCFM (SCMM)	1.08 (.03)
TOTAL FLOW SCF (SCM)	7218. (204.4)
HC SAMPLE METER/RANGE/PPM (CONT)	18.1/1071/ 18.12
HC BCKGRD METER/RANGE/PPM	4.6/1071/ 4.60
CO SAMPLE METER/RANGE/PPM	19.7/ 12/ 18.66
CO BCKGRD METER/RANGE/PPM	.2/ 12/ .18
CO2 SAMPLE METER/RANGE/PCT	47.7/ 1/ .9571
CO2 BCKGRD METER/RANGE/PCT	2.2/ 1/ .0441
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	52.8/1072/ 132.38
NOX BCKGRD METER/RANGE/PPM	1.7/ 1/ .44
CH4 SAMPLE PPM (1.210)	1.89
CH4 BCKGRD PPM	2.11
DILUTION FACTOR	13.78
HC CONCENTRATION PPM	13.85
CO CONCENTRATION PPM	17.96
CO2 CONCENTRATION PCT	.9163
NOX CONCENTRATION PPM	129.56
CH4 CONCENTRATION PPM	-.07
NMHC CONCENTRATION PPM	13.85
HC MASS GRAMS	1.644
CO MASS GRAMS	4.274
CO2 MASS GRAMS	3429.27
NOX MASS GRAMS	43.336
PM MASS GRAMS	.250
CH4 MASS GRAMS	.000
NMHC MASS GRAMS (FID)	1.633
FUEL MASS KG	1.092
FUEL ECONOMY MPG (L/100KM)	29.20 (8.06)

1-BAG COMPOSITE RESULTS

HC	G/MI	.160	CH4	G/MI	.000
CO	G/MI	.416	NMHC	G/MI	.159
NOX	G/MI	4.214			
PM	G/MI	.024			
FUEL ECONOMY MPG (L/100KM)		29.20 (8.06)			

APPENDIX F

HEAVY LIGHT-DUTY HYDROCARBON SPECIATION DATA

Page	Table	Title
F-1	F-1	A Comparison of Weighted Composite Results During FTP
F-5	F-2	A Comparison of Weighted Composite Results During US06
F-9	F-3	A Comparison of Weighted Composite Results During HFET

COMPOUND	FTP COMPOSITE, mg/mi					
	CARB			SWEDISH		
	12/16/99	12/17/99	AVG.	12/14/99	12/15/99	AVG.
METHANE	0.0	0.0	0.0	0.0	0.0	0.0
ETHANE	0.3	0.9	0.6	0.1	0.5	0.3
ETHYLENE	12.9	13.0	13.0	13.6	12.5	13.0
PROPANE	0.1	trace	0.1	0.0	trace	trace
PROPYLENE	2.8	3.2	3.0	2.5	2.9	2.7
ACETYLENE	2.9	3.4	3.1	3.2	2.6	2.9
PROPADIENE	0.0	0.0	0.0	0.0	0.0	0.0
BUTANE	trace	0.0	trace	0.1	0.0	trace
TRANS-2-BUTENE	0.0	0.0	0.0	0.0	0.6	0.3
1-BUTENE	0.6	0.7	0.6	0.7	0.9	0.8
2-METHYLPROPENE (ISOBUTYLENE)	0.6	0.6	0.6	0.5	0.5	0.5
2,2-DIMETHYLPROPANE (NEOPENTANE)	0.0	0.0	0.0	0.0	0.0	0.0
PROPYNE	0.0	0.0	0.0	0.0	0.0	0.0
1,3-BUTADIENE	0.2	0.4	0.3	0.8	0.7	0.8
2-METHYLPROPANE (ISOBUTANE)	0.0	0.3	0.2	0.0	0.0	0.0
1-BUTYNE	0.0	0.0	0.0	0.0	0.0	0.0
METHANOL	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
ETHANOL	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLBUTANE (ISOPENTANE)	0.3	0.9	0.6	0.0	0.7	0.4
2-BUTYNE	0.0	0.0	0.0	0.0	0.0	0.0
1-PENTENE	0.1	0.6	0.4	0.0	0.0	0.0
2-METHYL-1-BUTENE	0.1	0.1	0.1	0.0	0.1	trace
PENTANE	0.4	0.4	0.4	trace	0.1	0.1
UNIDENTIFIED C5 OLEFINS	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-1,3-BUTADIENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-2-BUTENE	0.0	0.1	trace	0.4	0.0	0.2
TERT-BUTANOL	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOPENTADIENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLBUTANE	0.1	0.1	0.1	0.0	0.0	0.0
CYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOPENTANE	0.0	0.0	0.0	0.3	0.1	0.2
2,3-DIMETHYLBUTANE	0.1	0.0	0.1	0.1	0.0	trace
MTBE	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLPENTANE	1.9	1.4	1.6	0.0	1.7	0.9
4-METHYL-TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLPENTANE	0.0	0.0	0.0	0.2	0.0	0.1
2-METHYL-1-PENTENE	0.3	0.3	0.3	0.2	0.2	0.2
1-HEXENE	0.3	0.3	0.3	0.2	0.2	0.2
HEXANE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C6 OLEFINS	0.6	0.4	0.5	1.7	0.4	1.0
TRANS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
DI-ISOPROPYL ETHER	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLCYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
ETBE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLPENTANE, NOTE A	0.0	0.0	0.0	0.0	0.0	0.0
METHYLCYCLOPENTANE, NOTE A	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,3-TRIMETHYLBUTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0

COMPOUND	FTP COMPOSITE, mg/mi					
	CARB			SWEDISH		
	12/16/99	12/17/99	AVG.	12/14/99	12/15/99	AVG.
1-METHYLCYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
BENZENE	1.5	1.2	1.4	1.3	1.2	1.3
3-METHYL-1-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLPENTANE	0.0	0.0	0.0	0.1	0.0	trace
1,1-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-AMYL METHYL ETHER	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOHEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,3-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,2-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,3-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,4-TRIMETHYLPENTANE	0.3	0.4	0.4	0.0	0.6	0.3
2-METHYL-1-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-3-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
HEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C7	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-TRANS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
METHYLCYCLOHEXANE	0.0	0.2	0.1	0.3	0.0	0.2
CIS-1,2-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1,3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,3-TRIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,5-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLHEXANE	0.4	0.3	0.3	0.3	0.0	0.2
1-TRANS-2-CIS-4-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLHEXANE,	0.0	0.0	0.0	0.0	0.0	0.0
1-TRANS-2-CIS-3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,4-TRIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,3-TRIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TOLUENE	0.4	0.2	0.3	3.3	1.0	2.1
2,3-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1,2-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYLHEXANE, NOTE B	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-CIS,2-TRANS,3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,3-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,4-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYLHEXANE	0.0	0.0	0.0	0.4	0.1	0.3
2,2,5-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1-METHYL-3-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1-METHYL-3-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1-METHYL-2-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-1-ETHYL-CYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,2-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0

COMPOUND	FTP COMPOSITE, mg/mi					
	CARB			SWEDISH		
	12/16/99	12/17/99	AVG.	12/14/99	12/15/99	AVG.
1-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-4-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
OCTANE	0.0	0.0	0.0	trace	0.0	trace
UNIDENTIFIED C8	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,3-DIMETHYLCYCLOHEXANE, NOTE C	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
ISOPROPYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,5-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.2	0.1
CIS-1-METHYL-2-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLHEPTANE	0.5	0.7	0.6	0.9	0.3	0.6
4,4-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,2-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,6-DIMETHYLHEPTANE, NOTE D	0.0	0.0	0.0	0.3	0.4	0.4
1,1,3-TRIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,5-DIMETHYLHEPTANE, NOTE E	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,5-DIMETHYLHEPTANE, NOTE E	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
m-& p-XYLENE	0.4	0.3	0.3	0.1	0.0	0.1
4-METHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
4-ETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLOCTANE	0.0	0.0	0.0	0.1	0.0	trace
3-METHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
STYRENE	0.0	0.0	0.0	0.0	0.0	0.0
o-XYLENE	0.0	0.0	0.0	0.0	0.3	0.1
1-NONENE	0.0	0.0	0.0	0.5	0.1	0.3
TRANS-3-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
NONANE	0.0	0.0	0.0	0.7	0.6	0.7
TRANS-2-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
ISOPROPYLBENZENE (CUMENE)	0.0	0.0	0.0	0.5	0.0	0.3
2,2-DIMETHYLOCTANE	0.0	0.0	0.0	0.0	0.5	0.2
2,4-DIMETHYLOCTANE	0.0	0.0	0.0	0.4	0.4	0.4
n-PROPYLBENZENE	0.3	0.0	0.2	0.6	0.4	0.5
1-METHYL-3-ETHYLBENZENE	0.4	0.0	0.2	0.0	0.0	0.0
1-METHYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,3,5-TRIMETHYLBENZENE	0.1	0.1	0.1	1.4	0.2	0.8
1-METHYL-2-ETHYLBENZENE	0.3	0.0	0.1	0.4	0.4	0.4
1,2,4-TRIMETHYLBENZENE	1.3	0.9	1.1	1.5	0.3	0.9
TERT-BUTYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-DECENE	0.0	0.0	0.0	0.0	0.0	0.0
DECANE, NOTE F	2.0	2.1	2.0	5.5	2.2	3.9
ISOBUTYLBENZENE, NOTE F	1.9	2.0	1.9	5.2	2.1	3.7
1,3,-DIMETHYL-5-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
METHYLPROPYLBENZENE (sec butylbenzene)	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-3-ISOPROPYLBENZENE	0.0	1.3	0.7	0.0	0.0	0.0
1,2,3-TRIMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-4-ISOPROPYLBENZENE	0.7	0.6	0.7	0.0	0.0	0.0
INDAN	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-2-ISOPROPYLBENZENE	0.0	0.0	0.0	0.8	0.0	0.4
1,3-DIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,4-DIETHYLBENZENE	0.7	0.5	0.6	0.5	0.0	0.3
1-METHYL-3-N-PROPYLBENZENE	1.7	1.4	1.6	0.0	0.0	0.0
1-METHYL-4-N-PROPYLBENZENE, NOTE G	0.0	0.0	0.0	0.0	0.7	0.3
1,2 DIETHYLBENZENE	0.9	0.8	0.8	1.1	0.1	0.6
1-METHYL-2-N-PROPYLBENZENE	0.0	0.0	0.0	0.0	1.1	0.5
1,4-DIMETHYL-2-ETHYLBENZENE	1.6	1.3	1.5	0.4	0.0	0.2

COMPOUND	FTP COMPOSITE, mg/mi					
	CARB			SWEDISH		
	12/16/99	12/17/99	AVG.	12/14/99	12/15/99	AVG.
1,3-DIMETHYL-4-ETHYLBENZENE	0.1	0.1	0.1	0.0	0.1	trace
1,2-DIMETHYL-4-ETHYLBENZENE	1.4	1.0	1.2	0.0	0.0	0.0
1,3-DIMETHYL-2-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
UNDECANE	1.3	1.3	1.3	2.8	2.4	2.6
1,2-DIMETHYL-3-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,4,5-TETRAMETHYLBENZENE	0.0	3.1	1.5	0.0	0.1	0.1
2-METHYLBUTYLBENZENE (sec AMYLBENZENE)	0.0	0.0	0.0	0.0	0.0	0.0
3,4 DIMETHYLCUMENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,3,5-TETRAMETHYLBENZENE	3.3	0.0	1.7	3.7	2.0	2.8
TERT-1-BUT-2-METHYLBENZENE	1.0	0.8	0.9	1.7	1.4	1.5
1,2,3,4-TETRAMETHYLBENZENE	0.5	0.0	0.3	0.0	0.0	0.0
N-PENT-BENZENE	0.0	0.4	0.2	1.8	0.7	1.2
TERT-1-BUT-3,5-DIMETHYLBENZENE	0.5	0.0	0.2	0.0	0.0	0.0
TERT-1-BUTYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
NAPHTHALENE	0.0	0.0	0.0	1.4	0.0	0.7
DODECANE	0.7	0.2	0.5	3.4	2.2	2.8
1,3,5-TRIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,4-TRIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
HEXYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C9-C12+	5.4	2.9	4.2	4.2	4.5	4.4
FORMALDEHYDE	18.8	16.5	17.7	15.5	16.6	16.1
ACETALDEHYDE	8.3	7.2	7.8	7.2	12.0	9.6
ACROLEIN	0.3	0.2	0.3	0.4	0.2	0.3
ACETONE	0.0	0.4	0.2	trace	0.0	trace
PROPIONALDEHYDE	4.0	2.7	3.4	3.6	2.9	3.3
CROTONALDEHYDE	2.7	2.5	2.6	2.2	2.5	2.4
ISOBUTYRALDEHYDE, NOTE H	0.5	0.1	0.3	0.6	0.5	0.5
METHYL ETHYL KETONE, NOTE H	0.5	0.1	0.3	0.6	0.5	0.5
BENZALDEHYDE	1.0	0.8	0.9	0.5	2.0	1.3
ISOVALERALDEHYDE	0.2	0.2	0.2	0.1	trace	0.1
VALERALDEHYDE	0.8	0.2	0.5	0.5	0.7	0.6
O-TOLUALDEHYDE	0.0	0.0	0.0	0.1	0.1	0.1
M/P-TOLUALDEHYDE	2.9	5.2	4.1	1.2	2.3	1.8
HEXANALDEHYDE	0.7	0.1	0.4	0.0	0.0	0.0
DIMETHYLBENZALDEHYDE	trace	0.0	trace	0.0	0.0	0.0
SUMMED SPECIATED VALUES	95	87	91.3	103	92	97.2

A - 2,2-Dimethylpentane and methylcyclopentane co-elute. GC peak area split equally between the two compounds.
B - 3-Methyl-3-ethy-pentane co-elutes with reported compound. Not reported separately.
C - Cis-1,4-Dimethylcyclohexane co-elutes with reported compound. Not reported separately.
D - Propylcyclopentane co-elutes with reported compound. Not reported separately.
E - 2,5-Dimethylheptane and 3,5-dimethylheptane co-elute. GC peak area split equally between the two compounds.
F - Decane and isobutylbenzene co-elute. GC peak area split equally between the two compounds.
G - n-Butylbenzene co-elutes with reported compound. Not reported separately.
H - Isobutyraldehyde and methyl ethyl ketone co-elute. LC peak area split equally between the two compounds.

COMPOUND	US06, mg/mi					
	CARB			SWEDISH		
	12/16/99	12/17/99	AVG.	12/10/99	12/14/99	AVG.
METHANE	0.0	0.0	0.0	0.0	0.0	0.0
ETHANE	trace	0.2	0.1	0.0	0.3	0.1
ETHYLENE	5.1	5.4	5.2	5.9	5.9	5.9
PROPANE	0.0	0.0	0.0	0.0	0.4	0.2
PROPYLENE	1.6	1.6	1.6	1.7	1.7	1.7
ACETYLENE	1.2	1.4	1.3	1.3	1.3	1.3
PROPADIENE	0.0	0.0	0.0	0.0	0.0	0.0
BUTANE	0.0	trace	trace	trace	trace	trace
TRANS-2-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
1-BUTENE	0.4	0.6	0.5	0.4	0.4	0.4
2-METHYLPROPENE (ISOBUTYLENE)	0.4	0.4	0.4	0.4	0.4	0.4
2,2-DIMETHYLPROPANE (NEOPENTANE)	0.0	0.0	0.0	0.0	0.0	0.0
PROPYNE	0.0	0.0	0.0	0.0	0.0	0.0
1,3-BUTADIENE	0.4	0.4	0.4	0.6	0.5	0.5
2-METHYLPROPANE (ISOBUTANE)	0.0	0.0	0.0	0.0	0.6	0.3
1-BUTYNE	0.0	0.0	0.0	0.0	0.0	0.0
METHANOL	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
ETHANOL	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLBUTANE (ISOPENTANE)	0.4	0.4	0.4	0.0	0.7	0.4
2-BUTYNE	0.0	0.0	0.0	0.0	0.0	0.0
1-PENTENE	0.3	0.3	0.3	0.2	0.0	0.1
2-METHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
PENTANE	0.2	0.2	0.2	0.0	0.0	0.0
UNIDENTIFIED C5 OLEFINS	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-1,3-BUTADIENE	0.0	0.0	0.0	0.0	0.1	0.1
TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-2-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-BUTANOL	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOPENTADIENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLBUTANE	0.1	0.0	0.1	0.0	0.0	0.0
CYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLBUTANE	0.3	0.0	0.2	0.0	0.0	0.0
MTBE	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLPENTANE	1.6	0.9	1.2	1.0	0.0	0.5
4-METHYL-TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLPENTANE	0.6	0.0	0.3	0.2	0.2	0.2
2-METHYL-1-PENTENE	0.1	0.1	0.1	0.0	0.1	trace
1-HEXENE	0.1	0.1	0.1	0.1	0.1	0.1
HEXANE	0.0	0.0	0.0	0.1	1.1	0.6
UNIDENTIFIED C6 OLEFINS	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
DI-ISOPROPYL ETHER	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLCYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
ETBE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLPENTANE, NOTE A	0.0	0.0	0.0	0.0	0.0	0.0
METHYLCYCLOPENTANE, NOTE A	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,3-TRIMETHYLBUTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0

COMPOUND	US06, mg/mi					
	CARB			SWEDISH		
	12/16/99	12/17/99	AVG.	12/10/99	12/14/99	AVG.
1-METHYLCYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
BENZENE	0.6	0.8	0.7	0.4	0.7	0.6
3-METHYL-1-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-AMYL METHYL ETHER	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOHEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,3-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,2-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,3-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,4-TRIMETHYLPENTANE	0.2	0.3	0.3	0.1	0.3	0.2
2-METHYL-1-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-3-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
HEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C7	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-TRANS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
METHYLCYCLOHEXANE	0.1	0.0	0.1	0.0	0.1	0.1
CIS-1,2-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1,3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,3-TRIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,5-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLHEXANE	0.2	0.2	0.2	0.0	0.3	0.1
1-TRANS-2-CIS-4-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1-TRANS-2-CIS-3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,4-TRIMETHYLPENTANE	0.0	0.2	0.1	0.0	0.0	0.0
2,3,3-TRIMETHYLPENTANE	0.2	0.0	0.1	0.0	0.0	0.0
TOLUENE	0.1	0.1	0.1	0.1	0.0	trace
2,3-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1,2-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYLHEXANE, NOTE B	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-CIS,2-TRANS,3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,3-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,4-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYLHEXANE	0.0	0.0	0.0	0.2	0.2	0.2
2,2,5-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1-METHYL-3-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1-METHYL-3-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1-METHYL-2-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-1-ETHYL-CYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,2-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0

COMPOUND	US06, mg/mi					
	CARB			SWEDISH		
	12/16/99	12/17/99	AVG.	12/10/99	12/14/99	AVG.
1-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-4-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
OCTANE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C8	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,3-DIMETHYLCYCLOHEXANE, NOTE C	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
ISOPROPYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,5-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1-METHYL-2-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLHEPTANE	0.3	0.3	0.3	0.4	0.3	0.4
4,4-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,2-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,6-DIMETHYLHEPTANE, NOTE D	0.0	0.0	0.0	0.2	0.2	0.2
1,1,3-TRIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,5-DIMETHYLHEPTANE, NOTE E	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,5-DIMETHYLHEPTANE, NOTE E	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLBENZENE	0.1	0.0	0.1	0.0	0.0	0.0
2,3,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
m-& p-XYLENE	0.1	0.1	0.1	0.0	0.0	0.0
4-METHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
4-ETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLOCTANE	0.0	0.0	0.0	0.0	0.2	0.1
3-METHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
STYRENE	0.0	0.0	0.0	0.0	0.0	0.0
o-XYLENE	0.1	0.1	0.1	0.0	0.0	0.0
1-NONENE	0.0	0.0	0.0	0.2	0.2	0.2
TRANS-3-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
NONANE	0.0	0.0	0.0	0.1	0.3	0.2
TRANS-2-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
ISOPROPYLBENZENE (CUMENE)	0.0	0.0	0.0	0.2	0.2	0.2
2,2-DIMETHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLOCTANE	0.0	0.0	0.0	0.2	0.2	0.2
n-PROPYLBENZENE	0.1	0.0	0.1	0.2	0.2	0.2
1-METHYL-3-ETHYLBENZENE	0.2	0.0	0.1	0.0	0.0	0.0
1-METHYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,3,5-TRIMETHYLBENZENE	0.0	0.0	0.0	0.6	0.7	0.7
1-METHYL-2-ETHYLBENZENE	0.1	0.0	0.1	0.2	0.2	0.2
1,2,4-TRIMETHYLBENZENE	0.4	0.4	0.4	0.2	0.2	0.2
TERT-BUTYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-DECENE	0.0	0.0	0.0	0.0	0.0	0.0
DECANE, NOTE F	0.8	0.7	0.8	1.2	1.1	1.2
ISOBUTYLBENZENE, NOTE F	0.8	0.7	0.7	1.1	1.1	1.1
1,3,-DIMETHYL-5-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
METHYLPROPYLBENZENE (sec butylbenzene)	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-3-ISOPROPYLBENZENE	0.0	0.6	0.3	0.0	0.0	0.0
1,2,3-TRIMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-4-ISOPROPYLBENZENE	0.3	0.3	0.3	0.0	0.0	0.0
INDAN	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-2-ISOPROPYLBENZENE	0.0	0.0	0.0	0.0	0.4	0.2
1,3-DIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,4-DIETHYLBENZENE	0.7	0.5	0.6	0.0	0.3	0.1
1-METHYL-3-N-PROPYLBENZENE	1.2	0.8	1.0	0.0	0.2	0.1
1-METHYL-4-N-PROPYLBENZENE, NOTE G	0.0	0.0	0.0	0.2	0.0	0.1
1,2 DIETHYLBENZENE	0.6	0.5	0.5	0.0	0.6	0.3
1-METHYL-2-N-PROPYLBENZENE	0.0	0.0	0.0	0.5	0.0	0.3
1,4-DIMETHYL-2-ETHYLBENZENE	1.2	0.8	1.0	0.0	0.2	0.1

COMPOUND	US06, mg/mi					
	CARB			SWEDISH		
	12/16/99	12/17/99	AVG.	12/10/99	12/14/99	AVG.
1,3-DIMETHYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.2	0.0	0.1
1,2-DIMETHYL-4-ETHYLBENZENE	0.9	0.6	0.8	0.0	0.0	0.0
1,3-DIMETHYL-2-ETHYLBENZENE	0.0	0.0	0.0	0.1	0.0	0.1
UNDECANE	0.8	0.8	0.8	1.4	1.5	1.5
1,2-DIMETHYL-3-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,4,5-TETRAMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLBUTYLBENZENE (sec AMYLBENZENE)	0.0	0.0	0.0	0.0	0.0	0.0
3,4 DIMETHYLCUMENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,3,5-TETRAMETHYLBENZENE	1.4	0.0	0.7	1.7	1.6	1.6
TERT-1-BUT-2-METHYLBENZENE	1.7	0.3	1.0	0.0	0.9	0.5
1,2,3,4-TETRAMETHYLBENZENE	0.6	0.0	0.3	0.0	0.0	0.0
N-PENT-BENZENE	0.0	0.3	0.1	0.5	0.5	0.5
TERT-1-BUT-3,5-DIMETHYLBENZENE	0.4	0.0	0.2	0.0	0.0	0.0
TERT-1-BUTYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
NAPHTHALENE	0.0	0.0	0.0	0.5	0.7	0.6
DODECANE	0.4	0.2	0.3	1.6	1.7	1.7
1,3,5-TRIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,4-TRIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
HEXYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C9-C12+	6.6	1.1	3.9	2.7	1.9	2.3
FORMALDEHYDE	7.3	7.0	7.1	8.4	7.3	7.8
ACETALDEHYDE	3.8	3.5	3.6	4.9	4.1	4.5
ACROLEIN	0.1	0.2	0.1	0.1	0.1	0.1
ACETONE	0.0	0.0	0.0	0.0	0.0	0.0
PROPIONALDEHYDE	1.7	1.4	1.5	2.0	2.1	2.1
CROTONALDEHYDE	1.0	0.6	0.8	1.0	1.0	1.0
ISOBUTYRALDEHYDE, NOTE H	0.2	0.3	0.3	0.2	0.3	0.3
METHYL ETHYL KETONE, NOTE H	0.2	0.3	0.3	0.2	0.3	0.3
BENZALDEHYDE	0.0	1.3	0.6	0.9	1.2	1.1
ISOVALERALDEHYDE	0.2	0.2	0.2	0.1	0.2	0.1
VALERALDEHYDE	0.2	0.2	0.2	0.2	0.1	0.1
O-TOLUALDEHYDE	0.0	0.0	0.0	0.2	0.0	0.1
M/P-TOLUALDEHYDE	1.8	1.5	1.6	0.8	1.2	1.0
HEXANALDEHYDE	0.8	0.2	0.5	0.1	0.0	trace
DIMETHYLBENZALDEHYDE	0.2	0.0	0.1	0.0	0.5	0.3
SUMMED SPECIATED VALUES	52	39	45.4	46	50	47.9

A - 2,2-Dimethylpentane and methylcyclopentane co-elute. GC peak area split equally between the two compounds.
B - 3-Methyl-3-ethy-pentane co-elutes with reported compound. Not reported separately.
C - Cis-1,4-Dimethylcyclohexane co-elutes with reported compound. Not reported separately.
D - Propylcyclopentane co-elutes with reported compound. Not reported separately.
E - 2,5-Dimethylheptane and 3,5-dimethylheptane co-elute. GC peak area split equally between the two compounds.
F - Decane and isobutylbenzene co-elute. GC peak area split equally between the two compounds.
G - n-Butylbenzene co-elutes with reported compound. Not reported separately.
H - Isobutyraldehyde and methyl ethyl ketone co-elute. LC peak area split equally between the two compounds.

COMPOUND	HFET, mg/mi					
	CARB			SWEDISH		
	12/16/99	12/17/99	AVG.	12/10/99	12/14/99	AVG.
METHANE	0.0	0.0	0.0	0.0	0.0	0.0
ETHANE	5.0	0.0	2.5	0.1	0.0	trace
ETHYLENE	0.0	4.6	2.3	4.9	5.1	5.0
PROPANE	0.0	0.0	0.0	0.0	0.5	0.2
PROPYLENE	1.2	1.3	1.2	1.2	1.2	1.2
ACETYLENE	1.1	1.2	1.2	1.2	1.2	1.2
PROPADIENE	0.0	0.0	0.0	0.0	0.0	0.0
BUTANE	trace	0.0	trace	0.0	0.0	0.0
TRANS-2-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
1-BUTENE	0.2	0.2	0.2	0.3	0.3	0.3
2-METHYLPROPENE (ISOBUTYLENE)	0.2	0.2	0.2	0.2	0.2	0.2
2,2-DIMETHYLPROPANE (NEOPENTANE)	0.0	0.0	0.0	0.0	0.0	0.0
PROPYNE	0.0	0.0	0.0	0.0	0.0	0.0
1,3-BUTADIENE	0.0	0.2	0.1	0.3	0.3	0.3
2-METHYLPROPANE (ISOBUTANE)	0.0	0.0	0.0	0.0	0.5	0.2
1-BUTYNE	0.0	0.0	0.0	0.0	0.0	0.0
METHANOL	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
ETHANOL	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLBUTANE (ISOPENTANE)	0.3	0.4	0.4	0.0	0.5	0.3
2-BUTYNE	0.0	0.0	0.0	0.0	0.0	0.0
1-PENTENE	0.0	0.3	0.1	0.0	0.0	0.0
2-METHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
PENTANE	0.2	0.2	0.2	0.0	0.0	0.0
UNIDENTIFIED C5 OLEFINS	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-1,3-BUTADIENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-2-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-BUTANOL	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOPENTADIENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLBUTANE	0.3	0.0	0.1	0.0	0.2	0.1
CYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLBUTANE	0.0	0.0	0.0	0.0	0.0	0.0
MTBE	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLPENTANE	1.0	0.6	0.8	0.9	0.0	0.5
4-METHYL-TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLPENTANE	0.5	0.0	0.3	0.2	0.2	0.2
2-METHYL-1-PENTENE	0.1	0.0	trace	0.0	0.0	0.0
1-HEXENE	0.1	0.0	trace	0.0	0.0	0.0
HEXANE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C6 OLEFINS	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
DI-ISOPROPYL ETHER	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLCYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
ETBE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLPENTANE, NOTE A	0.0	0.0	0.0	0.0	0.0	0.0
METHYLCYCLOPENTANE, NOTE A	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,3-TRIMETHYLBUTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0

COMPOUND	HFET, mg/mi					
	CARB			SWEDISH		
	12/16/99	12/17/99	AVG.	12/10/99	12/14/99	AVG.
1-METHYLCYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
BENZENE	0.5	0.6	0.6	0.3	0.5	0.4
3-METHYL-1-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-AMYL METHYL ETHER	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOHEXENE	0.0	0.0	0.0	0.0	0.2	0.1
3-METHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,3-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,2-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,3-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,4-TRIMETHYLPENTANE	0.1	0.3	0.2	0.0	0.2	0.1
2-METHYL-1-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-3-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
HEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C7	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-TRANS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
METHYLCYCLOHEXANE	0.0	0.0	0.0	0.1	0.0	0.1
CIS-1,2-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1,3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,3-TRIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,5-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1-TRANS-2-CIS-4-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1-TRANS-2-CIS-3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,4-TRIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,3-TRIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TOLUENE	0.1	0.1	0.1	trace	0.0	trace
2,3-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1,2-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYLHEXANE, NOTE B	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-CIS,2-TRANS,3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,3-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,4-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYLHEXANE	0.0	0.0	0.0	0.2	0.2	0.2
2,2,5-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1-METHYL-3-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1-METHYL-3-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1-METHYL-2-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-1-ETHYL-CYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,2-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0

COMPOUND	HFET, mg/mi					
	CARB			SWEDISH		
	12/16/99	12/17/99	AVG.	12/10/99	12/14/99	AVG.
1-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-4-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
OCTANE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C8	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,3-DIMETHYLCYCLOHEXANE, NOTE C	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
ISOPROPYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,5-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1-METHYL-2-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLHEPTANE	0.2	0.3	0.2	0.4	0.2	0.3
4,4-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,2-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,6-DIMETHYLHEPTANE, NOTE D	0.0	0.0	0.0	0.2	0.2	0.2
1,1,3-TRIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,5-DIMETHYLHEPTANE, NOTE E	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,5-DIMETHYLHEPTANE, NOTE E	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
m-& p-XYLENE	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
4-ETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLOCTANE	0.0	0.0	0.0	0.0	0.2	0.1
3-METHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
STYRENE	0.0	0.0	0.0	0.0	0.0	0.0
o-XYLENE	0.1	0.1	0.1	0.0	0.0	0.0
1-NONENE	0.0	0.0	0.0	0.2	0.2	0.2
TRANS-3-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
NONANE	0.0	0.0	0.0	0.2	0.3	0.2
TRANS-2-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
ISOPROPYLBENZENE (CUMENE)	0.0	0.0	0.0	0.2	0.2	0.2
2,2-DIMETHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLOCTANE	0.0	0.0	0.0	0.2	0.2	0.2
n-PROPYLBENZENE	0.0	0.0	0.0	0.2	0.2	0.2
1-METHYL-3-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,3,5-TRIMETHYLBENZENE	0.0	0.0	0.0	0.0	0.6	0.3
1-METHYL-2-ETHYLBENZENE	0.0	0.0	0.0	0.2	0.2	0.2
1,2,4-TRIMETHYLBENZENE	0.4	0.4	0.4	0.1	0.2	0.2
TERT-BUTYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-DECENE	0.0	0.0	0.0	0.0	0.0	0.0
DECANE, NOTE F	0.8	0.7	0.7	1.2	1.0	1.1
ISOBUTYLBENZENE, NOTE F	0.7	0.7	0.7	1.1	0.9	1.0
1,3,-DIMETHYL-5-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
METHYLPROPYLBENZENE (sec butylbenzene)	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-3-ISOPROPYLBENZENE	0.0	0.6	0.3	0.0	0.0	0.0
1,2,3-TRIMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-4-ISOPROPYLBENZENE	0.4	0.3	0.3	0.0	0.0	0.0
INDAN	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-2-ISOPROPYLBENZENE	0.0	0.0	0.0	0.4	0.4	0.4
1,3-DIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,4-DIETHYLBENZENE	0.6	0.4	0.5	0.2	0.3	0.3
1-METHYL-3-N-PROPYLBENZENE	1.0	0.8	0.9	0.0	0.2	0.1
1-METHYL-4-N-PROPYLBENZENE, NOTE G	0.0	0.0	0.0	0.2	0.0	0.1
1,2 DIETHYLBENZENE	0.4	0.5	0.5	0.0	0.5	0.3
1-METHYL-2-N-PROPYLBENZENE	0.0	0.0	0.0	0.5	0.0	0.3
1,4-DIMETHYL-2-ETHYLBENZENE	0.8	0.7	0.8	0.0	0.2	0.1

COMPOUND	HFET, mg/mi					
	CARB			SWEDISH		
	12/16/99	12/17/99	AVG.	12/10/99	12/14/99	AVG.
1,3-DIMETHYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.2	0.0	0.1
1,2-DIMETHYL-4-ETHYLBENZENE	0.6	0.6	0.6	0.0	0.0	0.0
1,3-DIMETHYL-2-ETHYLBENZENE	0.0	0.0	0.0	0.1	0.1	0.1
UNDECANE	0.8	0.8	0.8	1.4	1.4	1.4
1,2-DIMETHYL-3-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,4,5-TETRAMETHYLBENZENE	0.0	1.9	1.0	0.0	0.0	0.0
2-METHYLBUTYLBENZENE (sec AMYLBENZENE)	0.0	0.0	0.0	0.0	0.0	0.0
3,4 DIMETHYLCUMENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,3,5-TETRAMETHYLBENZENE	1.9	0.0	1.0	1.1	1.2	1.1
TERT-1-BUT-2-METHYLBENZENE	1.1	0.3	0.7	0.9	0.9	0.9
1,2,3,4-TETRAMETHYLBENZENE	0.6	0.0	0.3	0.0	0.0	0.0
N-PENT-BENZENE	0.0	0.3	0.1	0.4	0.5	0.4
TERT-1-BUT-3,5-DIMETHYLBENZENE	0.5	0.0	0.3	0.0	0.0	0.0
TERT-1-BUTYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
NAPHTHALENE	0.0	0.0	0.0	0.0	0.7	0.4
DODECANE	0.3	0.2	0.2	1.2	1.6	1.4
1,3,5-TRIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,4-TRIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
HEXYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C9-C12+	4.8	1.2	3.0	2.9	1.2	2.0
FORMALDEHYDE	5.6	5.7	5.7	6.1	5.8	6.0
ACETALDEHYDE	2.4	2.5	2.4	2.7	2.7	2.7
ACROLEIN	0.1	0.3	0.2	0.2	0.1	0.2
ACETONE	0.0	0.3	0.2	0.0	0.0	0.0
PROPIONALDEHYDE	1.3	1.7	1.5	1.4	1.5	1.5
CROTONALDEHYDE	0.9	0.8	0.8	0.8	0.9	0.8
ISOBUTYRALDEHYDE, NOTE H	0.1	0.1	0.1	0.1	0.2	0.2
METHYL ETHYL KETONE, NOTE H	0.1	0.1	0.1	0.1	0.2	0.2
BENZALDEHYDE	0.0	0.4	0.2	0.8	0.0	0.4
ISOVALERALDEHYDE	0.0	0.0	0.0	0.1	0.1	0.1
VALERALDEHYDE	0.3	0.0	0.1	0.1	0.1	0.1
O-TOLUALDEHYDE	0.0	0.0	0.0	0.0	0.0	0.0
M/P-TOLUALDEHYDE	0.8	1.4	1.1	0.7	0.7	0.7
HEXANALDEHYDE	0.0	0.4	0.2	0.0	0.0	0.0
DIMETHYLBENZALDEHYDE	0.0	0.0	0.0	0.0	0.0	0.0
SUMMED SPECIATED VALUES	39	35	36.5	37	37	37.0

A - 2,2-Dimethylpentane and methylcyclopentane co-elute. GC peak area split equally between the two compounds.
B - 3-Methyl-3-ethy-pentane co-elutes with reported compound. Not reported separately.
C - Cis-1,4-Dimethylcyclohexane co-elutes with reported compound. Not reported separately.
D - Propylcyclopentane co-elutes with reported compound. Not reported separately.
E - 2,5-Dimethylheptane and 3,5-dimethylheptane co-elute. GC peak area split equally between the two compounds.
F - Decane and isobutylbenzene co-elute. GC peak area split equally between the two compounds.
G - n-Butylbenzene co-elutes with reported compound. Not reported separately.
H - Isobutyraldehyde and methyl ethyl ketone co-elute. LC peak area split equally between the two compounds.

APPENDIX G

APPENDIX A

LIGHT-DUTY EMISSION TEST RESULTS

Page	Test No.	Test Cycle	Fuel
A-1	BASE-3	FTP	Baseline
A-2	BASE-3	US06	Baseline
A-3	BASE-3	HFET	Baseline
A-4	BASE-4	FTP	Baseline
A-5	BASE-4	US06	Baseline
A-6	BASE-4	HFET	Baseline
A-7	FT-1	FTP	S-2 Diesel
A-8	FT-1	US06	S-2 Diesel
A-9	FT-1	HFET	S-2 Diesel
A-10	FT-2	FTP	S-2 Diesel
A-11	FT-2	US06	S-2 Diesel
A-12	FT-2	HFET	S-2 Diesel

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.2-R 3-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER	8	TEST BASE-3		DIESEL	EM-2731-F
VEHICLE MODEL	99 VW GOLF GL TDI	DATE 10/26/1999 RUN		FUEL DENSITY	7.056 LB/GAL
ENGINE	1.9 L (114 CID)-4	DYNO 7	BAG CART 1	H .131 C .869 O .000 X .000	
TRANSMISSION	A4	ACTUAL ROAD LOAD 7.80 HP (5.82 KW)		FTP	
ODOMETER	1063 MILES (1710 KM)	TEST WEIGHT 3250 LBS (1473 KG)			

BAROMETER 29.33 IN HG (745.0 MM HG) DRY BULB TEMPERATURE 72.0°F (22.2°C) NOX HUMIDITY C.F. .912

RELATIVE HUMIDITY 45.7 PCT.

BAG NUMBER	1	2	3
BAG DESCRIPTION	COLD TRANSIENT (0-505 SEC.)	STABILIZED (505-1372 SEC.)	HOT TRANSIENT (0- 505 SEC.)
RUN TIME SECONDS	505.2	869.1	503.2
DRY/WET CORRECTION FACTOR, SAMP/BACK	.983/.988	.985/.988	.984/.988
MEASURED DISTANCE MILES (KM)	3.55 (5.71)	3.82 (6.15)	3.57 (5.75)
BLOWER FLOW RATE SCFM (SCMM)	583.5 (16.53)	585.0 (16.57)	585.6 (16.58)
GAS METER FLOW RATE SCFM (SCMM)	1.09 (.03)	1.06 (.03)	.69 (.02)
TOTAL FLOW SCF (SCM)	4923. (139.4)	8489. (240.4)	4917. (139.2)
HC SAMPLE METER/RANGE/PPM (CONT)	7.0/1071/ 7.04	5.9/1071/ 5.87	6.2/1071/ 6.18
HC BCKGRD METER/RANGE/PPM	4.1/1071/ 4.10	5.7/1071/ 5.70	5.1/1071/ 5.10
CO SAMPLE METER/RANGE/PPM	5.7/ 12/ 5.83	1.5/ 12/ 1.55	1.2/ 12/ 1.24
CO BCKGRD METER/RANGE/PPM	1.5/ 12/ 1.55	1.5/ 12/ 1.55	1.1/ 12/ 1.14
CO2 SAMPLE METER/RANGE/PCT	57.1/ 11/ .4609	39.5/ 11/ .2924	50.2/ 11/ .3908
CO2 BCKGRD METER/RANGE/PCT	7.0/ 11/ .0471	6.5/ 11/ .0437	7.2/ 11/ .0484
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	4.7/1072/ 11.87	2.7/1072/ 6.69	4.3/1072/ 10.77
NOX BCKGRD METER/RANGE/PPM	.1/ 2/ .10	.2/ 2/ .20	.2/ 2/ .20
CH4 SAMPLE PPM (1.200)	2.59	2.57	2.71
CH4 BCKGRD PPM	2.32	2.45	2.64
DILUTION FACTOR	29.46	46.45	34.77
HC CONCENTRATION PPM	3.08	.29	1.23
CO CONCENTRATION PPM	4.21	.02	.12
CO2 CONCENTRATION PCT	.4154	.2496	.3437
NOX CONCENTRATION PPM	11.57	6.39	10.40
CH4 CONCENTRATION PPM	.35	.17	.15
NMHC CONCENTRATION PPM	2.66	.08	1.05
HC MASS GRAMS	.247	.040	.098
CO MASS GRAMS	.684	.007	.020
CO2 MASS GRAMS	1060.27	1098.79	876.29
NOX MASS GRAMS	2.816	2.683	2.527
PM MASS GRAMS	.169	.141	.200
CH4 MASS GRAMS	.032	.027	.014
NMHC MASS GRAMS (FID)	.214	.012	.084
FUEL MASS KG	.334	.345	.275
FUEL ECONOMY MPG (L/100KM)	34.04 (6.91)	35.46 (6.63)	41.52 (5.67)

3-BAG COMPOSITE RESULTS

HC	G/MI	.027	CH4	G/MI	.007
CO	G/MI	.042	NMHC	G/MI	.021
NOX	G/MI	.722			
PM	G/MI	.044			

FUEL ECONOMY MPG (L/100KM) 36.69 (6.41)

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.2-R 1-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER	8	TEST BASE-3		DIESEL	EM-2731-F
VEHICLE MODEL	99 VW GOLF GL TDI	DATE 10/26/1999 RUN		FUEL DENSITY	7.056 LB/GAL
ENGINE	1.9 L (114 CID)-4	DYNO 7	BAG CART 1	H .131 C .869 O .000 X .000	
TRANSMISSION	A4	ACTUAL ROAD LOAD 7.80 HP (5.82 KW)		US06	
ODOMETER	1082 MILES (1740 KM)	TEST WEIGHT 3250 LBS (1473 KG)			

BAROMETER 29.35 IN HG (745.5 MM HG) DRY BULB TEMPERATURE 74.0°F (23.3°C) NOX HUMIDITY C.F. .935

RELATIVE HUMIDITY 47.1 PCT.

BAG NUMBER	1
BAG DESCRIPTION	
RUN TIME SECONDS	600.4
DRY/WET CORRECTION FACTOR, SAMP/BACK	.979/.986
MEASURED DISTANCE MILES (KM)	7.99 (12.85)
BLOWER FLOW RATE SCFM (SCMM)	578.6 (16.39)
GAS METER FLOW RATE SCFM (SCMM)	1.07 (.03)
TOTAL FLOW SCF (SCM)	5801. (164.3)
HC SAMPLE METER/RANGE/PPM (CONT)	5.8/1071/ 5.78
HC BCKGRD METER/RANGE/PPM	5.1/1071/ 5.10
CO SAMPLE METER/RANGE/PPM	1.0/ 12/ 1.04
CO BCKGRD METER/RANGE/PPM	.8/ 12/ .83
CO2 SAMPLE METER/RANGE/PCT	82.4/ 11/ .7712
CO2 BCKGRD METER/RANGE/PCT	6.6/ 11/ .0444
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	19.0/1072/ 47.65
NOX BCKGRD METER/RANGE/PPM	.2/ 2/ .20
CH4 SAMPLE PPM (1.200)	2.24
CH4 BCKGRD PPM	2.31
DILUTION FACTOR	17.64
HC CONCENTRATION PPM	.97
CO CONCENTRATION PPM	.23
CO2 CONCENTRATION PCT	.7293
NOX CONCENTRATION PPM	46.47
CH4 CONCENTRATION PPM	.06
NMHC CONCENTRATION PPM	.89
HC MASS GRAMS	.092
CO MASS GRAMS	.045
CO2 MASS GRAMS	2193.59
NOX MASS GRAMS	13.650
PM MASS GRAMS	3.295
CH4 MASS GRAMS	.007
NMHC MASS GRAMS (FID)	.085
FUEL MASS KG	.689
FUEL ECONOMY MPG (L/100KM)	37.10 (6.34)

1-BAG COMPOSITE RESULTS

HC	G/MI	.011	CH4	G/MI	.001
CO	G/MI	.006	NMHC	G/MI	.011
NOX	G/MI	1.709			
PM	G/MI	.412			

FUEL ECONOMY MPG (L/100KM) 37.10 (6.34)

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.2-R 1-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER	8	TEST BASE-3		DIESEL	EM-2731-F
VEHICLE MODEL	99 VW GOLF GL TDI	DATE 10/26/1999 RUN		FUEL DENSITY	7.056 LB/GAL
ENGINE	1.9 L (114 CID)-4	DYNO 7	BAG CART 1	H .131 C .869 O .000 X .000	
TRANSMISSION	A4	ACTUAL ROAD LOAD 7.80 HP (5.82 KW)		HFET	
ODOMETER	1100 MILES (1769 KM)	TEST WEIGHT 3250 LBS (1473 KG)			

BAROMETER 29.35 IN HG (745.5 MM HG) DRY BULB TEMPERATURE 75.0°F (23.9°C) NOX HUMIDITY C.F. .928

RELATIVE HUMIDITY 44.3 PCT.

BAG NUMBER	1
BAG DESCRIPTION	
RUN TIME SECONDS	765.3
DRY/WET CORRECTION FACTOR, SAMP/BACK	.982/.987
MEASURED DISTANCE MILES (KM)	10.26 (16.51)
BLOWER FLOW RATE SCFM (SCMM)	576.0 (16.31)
GAS METER FLOW RATE SCFM (SCMM)	1.10 (.03)
TOTAL FLOW SCF (SCM)	7361. (208.5)
HC SAMPLE METER/RANGE/PPM (CONT)	5.6/1071/ 5.61
HC BCKGRD METER/RANGE/PPM	5.7/1071/ 5.70
CO SAMPLE METER/RANGE/PPM	1.0/ 12/ 1.04
CO BCKGRD METER/RANGE/PPM	.6/ 12/ .62
CO2 SAMPLE METER/RANGE/PCT	62.3/ 11/ .5176
CO2 BCKGRD METER/RANGE/PCT	6.5/ 11/ .0437
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	5.3/1072/ 13.40
NOX BCKGRD METER/RANGE/PPM	.1/ 2/ .10
CH4 SAMPLE PPM (1.200)	2.21
CH4 BCKGRD PPM	2.11
DILUTION FACTOR	26.27
HC CONCENTRATION PPM	.12
CO CONCENTRATION PPM	.42
CO2 CONCENTRATION PCT	.4756
NOX CONCENTRATION PPM	13.07
CH4 CONCENTRATION PPM	.18
NMHC CONCENTRATION PPM	-.09
HC MASS GRAMS	.015
CO MASS GRAMS	.102
CO2 MASS GRAMS	1814.98
NOX MASS GRAMS	4.835
PM MASS GRAMS	.688
CH4 MASS GRAMS	.025
NMHC MASS GRAMS (FID)	.000
FUEL MASS KG	.570
FUEL ECONOMY MPG (L/100KM)	57.58 (4.09)

1-BAG COMPOSITE RESULTS

HC	G/MI	.001	CH4	G/MI	.002
CO	G/MI	.010	NMHC	G/MI	.000
NOX	G/MI	.471			
PM	G/MI	.067			

FUEL ECONOMY MPG (L/100KM) 57.58 (4.09)

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.2-R 3-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER	8	TEST BASE-4	DIESEL EM-2731-F
VEHICLE MODEL	99 VW GOLF GL TDI	DATE 10/27/1999 RUN	FUEL DENSITY 7.056 LB/GAL
ENGINE	1.9 L (114 CID)-4	DYNO 7 BAG CART 1	H .131 C .869 O .000 X .000
TRANSMISSION	A4	ACTUAL ROAD LOAD 7.80 HP (5.82 KW)	FTP
ODOMETER	1110 MILES (1785 KM)	TEST WEIGHT 3250 LBS (1473 KG)	

BAROMETER 29.30 IN HG (744.2 MM HG) DRY BULB TEMPERATURE 75.0°F (23.9°C) NOX HUMIDITY C.F. .968

RELATIVE HUMIDITY 51.3 PCT.

BAG NUMBER	1	2	3
BAG DESCRIPTION	COLD TRANSIENT (0-505 SEC.)	STABILIZED (505-1372 SEC.)	HOT TRANSIENT (0- 505 SEC.)
RUN TIME SECONDS	505.3	869.1	505.4
DRY/WET CORRECTION FACTOR, SAMP/BACK	.980/.985	.982/.985	.981/.985
MEASURED DISTANCE MILES (KM)	3.56 (5.72)	3.82 (6.14)	3.58 (5.76)
BLOWER FLOW RATE SCFM (SCMM)	577.5 (16.36)	604.8 (17.13)	582.3 (16.49)
GAS METER FLOW RATE SCFM (SCMM)	1.08 (.03)	1.05 (.03)	1.07 (.03)
TOTAL FLOW SCF (SCM)	4873. (138.0)	8775. (248.5)	4914. (139.2)
HC SAMPLE METER/RANGE/PPM (CONT)	8.8/1071/ 8.81	7.6/1071/ 7.58	6.8/1071/ 6.79
HC BCKGRD METER/RANGE/PPM	6.1/1071/ 6.10	6.8/1071/ 6.80	6.2/1071/ 6.20
CO SAMPLE METER/RANGE/PPM	6.0/ 12/ 6.13	1.4/ 12/ 1.45	1.4/ 12/ 1.45
CO BCKGRD METER/RANGE/PPM	1.2/ 12/ 1.24	1.5/ 12/ 1.55	1.4/ 12/ 1.45
CO2 SAMPLE METER/RANGE/PCT	56.1/ 11/ .4504	39.1/ 11/ .2889	50.3/ 11/ .3918
CO2 BCKGRD METER/RANGE/PCT	7.0/ 11/ .0471	6.8/ 11/ .0457	6.6/ 11/ .0444
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	4.1/1072/ 10.29	2.1/1072/ 5.32	4.4/1072/ 11.01
NOX BCKGRD METER/RANGE/PPM	.1/ 2/ .10	.1/ 2/ .10	.1/ 2/ .10
CH4 SAMPLE PPM (1.200)	2.99	2.39	2.34
CH4 BCKGRD PPM	2.24	2.28	2.20
DILUTION FACTOR	30.13	46.97	34.68
HC CONCENTRATION PPM	2.91	.92	.76
CO CONCENTRATION PPM	4.79	-.08	.03
CO2 CONCENTRATION PCT	.4049	.2442	.3487
NOX CONCENTRATION PPM	10.00	5.13	10.70
CH4 CONCENTRATION PPM	.83	.16	.20
NMHC CONCENTRATION PPM	1.92	.73	.52
HC MASS GRAMS	.231	.131	.061
CO MASS GRAMS	.770	.000	.005
CO2 MASS GRAMS	1022.88	1110.93	888.31
NOX MASS GRAMS	2.555	2.359	2.757
PM MASS GRAMS	.160	.135	.123
CH4 MASS GRAMS	.076	.026	.018
NMHC MASS GRAMS (FID)	.153	.104	.042
FUEL MASS KG	.322	.349	.279
FUEL ECONOMY MPG (L/100KM)	35.35 (6.65)	35.00 (6.72)	41.08 (5.73)

3-BAG COMPOSITE RESULTS

HC	G/MI	.036	CH4	G/MI	.009
CO	G/MI	.045	NMHC	G/MI	.026
NOX	G/MI	.681			
PM	G/MI	.037			

FUEL ECONOMY MPG (L/100KM) 36.61 (6.42)

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.2-R 1-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER	8	TEST BASE-4		DIESEL	EM-2731-F
VEHICLE MODEL	99 VW GOLF GL TDI	DATE 10/27/1999 RUN		FUEL DENSITY	7.056 LB/GAL
ENGINE	1.9 L (114 CID)-4	DYNO 7	BAG CART 1	H .131 C .869 O .000 X .000	
TRANSMISSION	A4	ACTUAL ROAD LOAD 7.80 HP (5.82 KW)		US06	
ODOMETER	1128 MILES (1814 KM)	TEST WEIGHT 3250 LBS (1473 KG)			

BAROMETER 29.32 IN HG (744.7 MM HG) DRY BULB TEMPERATURE 79.0°F (26.1°C) NOX HUMIDITY C.F. .960

RELATIVE HUMIDITY 43.7 PCT.

BAG NUMBER	1
BAG DESCRIPTION	
RUN TIME SECONDS	600.5
DRY/WET CORRECTION FACTOR, SAMP/BACK	.978/.985
MEASURED DISTANCE MILES (KM)	7.98 (12.84)
BLOWER FLOW RATE SCFM (SCMM)	576.0 (16.31)
GAS METER FLOW RATE SCFM (SCMM)	1.06 (.03)
TOTAL FLOW SCF (SCM)	5775. (163.6)
HC SAMPLE METER/RANGE/PPM (CONT)	7.1/1071/ 7.10
HC BCKGRD METER/RANGE/PPM	6.2/1071/ 6.20
CO SAMPLE METER/RANGE/PPM	1.4/ 12/ 1.45
CO BCKGRD METER/RANGE/PPM	.8/ 12/ .83
CO2 SAMPLE METER/RANGE/PCT	83.7/ 11/ .7895
CO2 BCKGRD METER/RANGE/PCT	6.8/ 11/ .0457
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	18.8/1072/ 47.16
NOX BCKGRD METER/RANGE/PPM	.3/ 2/ .30
CH4 SAMPLE PPM (1.200)	2.06
CH4 BCKGRD PPM	2.12
DILUTION FACTOR	17.22
HC CONCENTRATION PPM	1.26
CO CONCENTRATION PPM	.64
CO2 CONCENTRATION PCT	.7464
NOX CONCENTRATION PPM	45.83
CH4 CONCENTRATION PPM	.06
NMHC CONCENTRATION PPM	1.19
HC MASS GRAMS	.118
CO MASS GRAMS	.121
CO2 MASS GRAMS	2235.14
NOX MASS GRAMS	13.761
PM MASS GRAMS	3.423
CH4 MASS GRAMS	.007
NMHC MASS GRAMS (FID)	.112
FUEL MASS KG	.702
FUEL ECONOMY MPG (L/100KM)	36.38 (6.47)

1-BAG COMPOSITE RESULTS

HC	G/MI	.015	CH4	G/MI	.001
CO	G/MI	.015	NMHC	G/MI	.014
NOX	G/MI	1.724			
PM	G/MI	.429			

FUEL ECONOMY MPG (L/100KM) 36.38 (6.47)

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.2-R 1-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER	8	TEST BASE-4		DIESEL	EM-2731-F
VEHICLE MODEL	99 VW GOLF GL TDI	DATE 10/27/1999 RUN		FUEL DENSITY	7.056 LB/GAL
ENGINE	1.9 L (114 CID)-4	DYNO 7	BAG CART 1	H .131 C .869 O .000 X .000	
TRANSMISSION	A4	ACTUAL ROAD LOAD 7.80 HP (5.82 KW)		HFET	
ODOMETER	1147 MILES (1845 KM)	TEST WEIGHT 3250 LBS (1473 KG)			

BAROMETER 29.31 IN HG (744.5 MM HG) DRY BULB TEMPERATURE 79.0°F (26.1°C) NOX HUMIDITY C.F. .960

RELATIVE HUMIDITY 43.7 PCT.

BAG NUMBER	1
BAG DESCRIPTION	
RUN TIME SECONDS	765.4
DRY/WET CORRECTION FACTOR. SAMP/BACK	.980/.985
MEASURED DISTANCE MILES (KM)	10.24 (16.47)
BLOWER FLOW RATE SCFM (SCMM)	574.4 (16.27)
GAS METER FLOW RATE SCFM (SCMM)	1.06 (.03)
TOTAL FLOW SCF (SCM)	7341. (207.9)
HC SAMPLE METER/RANGE/PPM (CONT)	7.5/1071/ 7.45
HC BCKGRD METER/RANGE/PPM	6.5/1071/ 6.50
CO SAMPLE METER/RANGE/PPM	1.2/ 12/ 1.24
CO BCKGRD METER/RANGE/PPM	1.0/ 12/ 1.04
CO2 SAMPLE METER/RANGE/PCT	63.6/ 11/ .5323
CO2 BCKGRD METER/RANGE/PCT	7.1/ 11/ .0478
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	5.2/1072/ 13.17
NOX BCKGRD METER/RANGE/PPM	.3/ 2/ .30
CH4 SAMPLE PPM (1.200)	2.17
CH4 BCKGRD PPM	2.04
DILUTION FACTOR	25.53
HC CONCENTRATION PPM	1.21
CO CONCENTRATION PPM	.23
CO2 CONCENTRATION PCT	.4864
NOX CONCENTRATION PPM	12.62
CH4 CONCENTRATION PPM	.21
NMHC CONCENTRATION PPM	.95
HC MASS GRAMS	.144
CO MASS GRAMS	.056
CO2 MASS GRAMS	1851.38
NOX MASS GRAMS	4.816
PM MASS GRAMS	.696
CH4 MASS GRAMS	.029
NMHC MASS GRAMS (FID)	.114
FUEL MASS KG	.582
FUEL ECONOMY MPG (L/100KM)	56.32 (4.18)

1-BAG COMPOSITE RESULTS

HC	G/MI	.014	CH4	G/MI	.003
CO	G/MI	.005	NMHC	G/MI	.011
NOX	G/MI	.470			
PM	G/MI	.068			

FUEL ECONOMY MPG (L/100KM) 56.32 (4.18)

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.2-R 3-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER	8	TEST FT-1	DIESEL EM-2795-F
VEHICLE MODEL	99 VW GOLF GL TDI	DATE 11/ 2/1999 RUN	FUEL DENSITY 6.439 LB/GAL
ENGINE	1.9 L (114 CID)-4	DYNO 7 BAG CART 1	H .151 C .849 O .000 X .000
TRANSMISSION	A4	ACTUAL ROAD LOAD 7.80 HP (5.82 KW)	FTP
ODOMETER	1368 MILES (2201 KM)	TEST WEIGHT 3250 LBS (1473 KG)	

BAROMETER 29.55 IN HG (750.6 MM HG) DRY BULB TEMPERATURE 72.0°F (22.2°C) NOX HUMIDITY C.F. .849

RELATIVE HUMIDITY 31.5 PCT.

BAG NUMBER	1	2	3
BAG DESCRIPTION	COLD TRANSIENT (0-505 SEC.)	STABILIZED (505-1372 SEC.)	HOT TRANSIENT (0- 505 SEC.)
RUN TIME SECONDS	505.4	869.1	505.2
DRY/WET CORRECTION FACTOR, SAMP/BACK	.987/.991	.989/.991	.988/.991
MEASURED DISTANCE MILES (KM)	3.57 (5.74)	3.84 (6.18)	3.57 (5.75)
BLOWER FLOW RATE SCFM (SCMM)	584.1 (16.54)	588.4 (16.66)	589.7 (16.70)
GAS METER FLOW RATE SCFM (SCMM)	.87 (.02)	1.11 (.03)	1.02 (.03)
TOTAL FLOW SCF (SCM)	4927. (139.5)	8539. (241.8)	4974. (140.9)
HC SAMPLE METER/RANGE/PPM (CONT)	5.2/1071/ 5.22	5.1/1071/ 5.06	5.0/1071/ 5.02
HC BCKGRD METER/RANGE/PPM	3.7/1071/ 3.70	4.4/1071/ 4.40	4.1/1071/ 4.10
CO SAMPLE METER/RANGE/PPM	.6/ 12/ .62	.5/ 12/ .52	.5/ 12/ .52
CO BCKGRD METER/RANGE/PPM	.5/ 12/ .52	.3/ 12/ .31	.7/ 12/ .73
CO2 SAMPLE METER/RANGE/PCT	53.8/ 11/ .4267	36.9/ 11/ .2701	47.8/ 11/ .3677
CO2 BCKGRD METER/RANGE/PCT	6.4/ 11/ .0430	5.6/ 11/ .0376	5.7/ 11/ .0383
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	5.4/1072/ 13.51	3.0/1072/ 7.48	4.8/1072/ 12.08
NOX BCKGRD METER/RANGE/PPM	.1/ 2/ .10	.1/ 2/ .10	.2/ 2/ .20
CH4 SAMPLE PPM (1.200)	2.04	2.05	2.00
CH4 BCKGRD PPM	1.90	1.89	1.88
DILUTION FACTOR	29.97	47.30	34.77
HC CONCENTRATION PPM	1.64	.75	1.04
CO CONCENTRATION PPM	.11	.21	-.19
CO2 CONCENTRATION PCT	.3851	.2333	.3305
NOX CONCENTRATION PPM	13.23	7.30	11.74
CH4 CONCENTRATION PPM	.21	.20	.17
NMHC CONCENTRATION PPM	1.39	.51	.83
HC MASS GRAMS	.134	.106	.086
CO MASS GRAMS	.019	.059	.000
CO2 MASS GRAMS	983.83	1033.05	852.34
NOX MASS GRAMS	2.999	2.866	2.685
PM MASS GRAMS	.105	.105	.076
CH4 MASS GRAMS	.019	.032	.016
NMHC MASS GRAMS (FID)	.112	.071	.068
FUEL MASS KG	.316	.332	.274
FUEL ECONOMY MPG (L/100KM)	32.91 (7.15)	33.74 (6.97)	38.07 (6.18)

3-BAG COMPOSITE RESULTS

HC	G/MI	.029	CH4	G/MI	.007
CO	G/MI	.009	NMHC	G/MI	.021
NOX	G/MI	.767			
PM	G/MI	.026			

FUEL ECONOMY MPG (L/100KM) 34.68 (6.78)

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.2-R 1-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER	8	TEST FT-1		DIESEL	EM-2795-F
VEHICLE MODEL	99 VW GOLF GL TDI	DATE 11/ 2/1999 RUN		FUEL DENSITY	6.439 LB/GAL
ENGINE	1.9 L (114 CID)-4	DYNO 7	BAG CART 1	H .151 C .849 O .000 X .000	
TRANSMISSION	A4	ACTUAL ROAD LOAD 7.80 HP (5.82 KW)		US06	
ODOMETER	1368 MILES (2201 KM)	TEST WEIGHT 3250 LBS (1473 KG)			

BAROMETER 29.56 IN HG (750.8 MM HG) DRY BULB TEMPERATURE 76.0°F (24.4°C) NOX HUMIDITY C.F. .855

RELATIVE HUMIDITY 28.7 PCT.

BAG NUMBER	1
BAG DESCRIPTION	
RUN TIME SECONDS	600.3
DRY/WET CORRECTION FACTOR. SAMP/BACK	.983/.991
MEASURED DISTANCE MILES (KM)	7.98 (12.84)
BLOWER FLOW RATE SCFM (SCMM)	582.8 (16.50)
GAS METER FLOW RATE SCFM (SCMM)	1.08 (.03)
TOTAL FLOW SCF (SCM)	5841. (165.4)
HC SAMPLE METER/RANGE/PPM (CONT)	4.9/1071/ 4.90
HC BCKGRD METER/RANGE/PPM	4.1/1071/ 4.10
CO SAMPLE METER/RANGE/PPM	.7/ 12/ .73
CO BCKGRD METER/RANGE/PPM	.5/ 12/ .52
CO2 SAMPLE METER/RANGE/PCT	78.8/ 11/ .7216
CO2 BCKGRD METER/RANGE/PCT	6.0/ 11/ .0403
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	21.1/1072/ 52.95
NOX BCKGRD METER/RANGE/PPM	.1/ 2/ .10
CH4 SAMPLE PPM (1.200)	1.84
CH4 BCKGRD PPM	1.87
DILUTION FACTOR	17.73
HC CONCENTRATION PPM	1.03
CO CONCENTRATION PPM	.22
CO2 CONCENTRATION PCT	.6836
NOX CONCENTRATION PPM	51.98
CH4 CONCENTRATION PPM	.08
NMHC CONCENTRATION PPM	.93
HC MASS GRAMS	.100
CO MASS GRAMS	.043
CO2 MASS GRAMS	2070.36
NOX MASS GRAMS	14.053
PM MASS GRAMS	.412
CH4 MASS GRAMS	.009
NMHC MASS GRAMS (FID)	.089
FUEL MASS KG	.666
FUEL ECONOMY MPG (L/100KM)	35.00 (6.72)

1-BAG COMPOSITE RESULTS

HC	G/MI	.012	CH4	G/MI	.001
CO	G/MI	.005	NMHC	G/MI	.011
NOX	G/MI	1.761			
PM	G/MI	.052			

FUEL ECONOMY MPG (L/100KM) 35.00 (6.72)

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.2-R 1-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER	8	TEST FT-1		DIESEL	EM-2795-F
VEHICLE MODEL	99 VW GOLF GL TDI	DATE 11/ 2/1999 RUN		FUEL DENSITY	6.439 LB/GAL
ENGINE	1.9 L (114 CID)-4	DYNO 7	BAG CART 1	H .151 C .849 O .000 X .000	
TRANSMISSION	A4	ACTUAL ROAD LOAD 7.80 HP (5.82 KW)		HFET	
ODOMETER	1404 MILES (2259 KM)	TEST WEIGHT 3250 LBS (1473 KG)			

BAROMETER 29.56 IN HG (750.8 MM HG) DRY BULB TEMPERATURE 74.0°F (23.3°C) NOX HUMIDITY C.F. .852

RELATIVE HUMIDITY 30.1 PCT.

BAG NUMBER	1
BAG DESCRIPTION	
RUN TIME SECONDS	765.3
DRY/WET CORRECTION FACTOR, SAMP/BACK	.986/.991
MEASURED DISTANCE MILES (KM)	10.25 (16.49)
BLOWER FLOW RATE SCFM (SCMM)	579.4 (16.41)
GAS METER FLOW RATE SCFM (SCMM)	1.08 (.03)
TOTAL FLOW SCF (SCM)	7405. (209.7)
HC SAMPLE METER/RANGE/PPM (CONT)	5.4/1071/ 5.44
HC BCKGRD METER/RANGE/PPM	4.7/1071/ 4.70
CO SAMPLE METER/RANGE/PPM	.7/ 12/ .73
CO BCKGRD METER/RANGE/PPM	.9/ 12/ .93
CO2 SAMPLE METER/RANGE/PCT	60.0/ 11/ .4921
CO2 BCKGRD METER/RANGE/PCT	6.1/ 11/ .0410
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	5.9/1072/ 14.77
NOX BCKGRD METER/RANGE/PPM	.2/ 2/ .20
CH4 SAMPLE PPM (1.200)	2.03
CH4 BCKGRD PPM	1.92
DILUTION FACTOR	25.98
HC CONCENTRATION PPM	.92
CO CONCENTRATION PPM	-.18
CO2 CONCENTRATION PCT	.4527
NOX CONCENTRATION PPM	14.38
CH4 CONCENTRATION PPM	.19
NMHC CONCENTRATION PPM	.69
HC MASS GRAMS	.113
CO MASS GRAMS	.000
CO2 MASS GRAMS	1737.93
NOX MASS GRAMS	4.910
PM MASS GRAMS	.161
CH4 MASS GRAMS	.026
NMHC MASS GRAMS (FID)	.084
FUEL MASS KG	.559
FUEL ECONOMY MPG (L/100KM)	53.56 (4.39)

1-BAG COMPOSITE RESULTS

HC	G/MI	.011	CH4	G/MI	.003
CO	G/MI	.000	NMHC	G/MI	.008
NOX	G/MI	.479			
PM	G/MI	.016			

FUEL ECONOMY MPG (L/100KM) 53.56 (4.39)

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.2-R 3-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER	8	TEST FT-2	DIESEL EM-2795-F
VEHICLE MODEL	99 VW GOLF GL TDI	DATE 11/ 3/1999 RUN	FUEL DENSITY 6.439 LB/GAL
ENGINE	1.9 L (114 CID)-4	DYNO 7 BAG CART 1	H .151 C .849 O .000 X .000
TRANSMISSION	A4	ACTUAL ROAD LOAD 7.80 HP (5.82 KW)	FTP
ODOMETER	1415 MILES (2276 KM)	TEST WEIGHT 3250 LBS (1473 KG)	

BAROMETER 29.48 IN HG (748.8 MM HG) DRY BULB TEMPERATURE 70.0°F (21.1°C) NOX HUMIDITY C.F. .891

RELATIVE HUMIDITY 44.1 PCT.

BAG NUMBER	1	2	3
BAG DESCRIPTION	COLD TRANSIENT (0-505 SEC.)	STABILIZED (505-1372 SEC.)	HOT TRANSIENT (0- 505 SEC.)
RUN TIME SECONDS	505.1	869.5	505.4
DRY/WET CORRECTION FACTOR, SAMP/BACK	.984/.989	.986/.989	.985/.989
MEASURED DISTANCE MILES (KM)	3.59 (5.77)	3.85 (6.20)	3.58 (5.76)
BLOWER FLOW RATE SCFM (SCMM)	581.8 (16.48)	585.9 (16.59)	586.6 (16.61)
GAS METER FLOW RATE SCFM (SCMM)	1.08 (.03)	1.09 (.03)	1.09 (.03)
TOTAL FLOW SCF (SCM)	4907. (139.0)	8507. (240.9)	4950. (140.2)
HC SAMPLE METER/RANGE/PPM (CONT)	5.7/1071/ 5.68	5.9/1071/ 5.92	6.8/1071/ 6.79
HC BCKGRD METER/RANGE/PPM	4.4/1071/ 4.40	5.6/1071/ 5.60	5.5/1071/ 5.50
CO SAMPLE METER/RANGE/PPM	2.3/ 12/ 2.37	1.9/ 12/ 1.96	1.6/ 12/ 1.65
CO BCKGRD METER/RANGE/PPM	.6/ 12/ .62	1.2/ 12/ 1.24	1.0/ 12/ 1.04
CO2 SAMPLE METER/RANGE/PCT	54.4/ 11/ .4328	37.2/ 11/ .2727	47.5/ 11/ .3648
CO2 BCKGRD METER/RANGE/PCT	7.0/ 11/ .0471	5.8/ 11/ .0389	6.5/ 11/ .0437
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	5.3/1072/ 13.30	3.0/1072/ 7.64	4.9/1072/ 12.29
NOX BCKGRD METER/RANGE/PPM	.3/ 2/ .30	.3/ 2/ .30	.2/ 2/ .20
CH4 SAMPLE PPM (1.200)	2.30	2.21	2.13
CH4 BCKGRD PPM	2.14	2.07	2.05
DILUTION FACTOR	29.53	46.82	35.01
HC CONCENTRATION PPM	1.42	.43	1.44
CO CONCENTRATION PPM	1.72	.72	.63
CO2 CONCENTRATION PCT	.3873	.2346	.3224
NOX CONCENTRATION PPM	12.80	7.24	11.91
CH4 CONCENTRATION PPM	.23	.18	.13
NMHC CONCENTRATION PPM	1.14	.21	1.28
HC MASS GRAMS	.116	.061	.119
CO MASS GRAMS	.279	.203	.102
CO2 MASS GRAMS	985.37	1034.55	827.43
NOX MASS GRAMS	3.031	2.972	2.845
PM MASS GRAMS	.078	.097	.067
CH4 MASS GRAMS	.022	.029	.012
NMHC MASS GRAMS (FID)	.092	.030	.103
FUEL MASS KG	.317	.333	.266
FUEL ECONOMY MPG (L/100KM)	33.04 (7.12)	33.80 (6.96)	39.26 (5.99)

3-BAG COMPOSITE RESULTS

HC	G/MI	.024	CH4	G/MI	.006
CO	G/MI	.051	NMHC	G/MI	.017
NOX	G/MI	.793			
PM	G/MI	.023			
FUEL ECONOMY MPG (L/100KM)		35.02 (6.72)			

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.2-R 1-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER	8	TEST FT-2		DIESEL	EM-2795-F
VEHICLE MODEL	99 VW GOLF GL TDI	DATE 11/ 3/1999 RUN		FUEL DENSITY	6.439 LB/GAL
ENGINE	1.9 L (114 CID)-4	DYNO 7	BAG CART 1	H .151 C .849 O .000 X .000	
TRANSMISSION	A4	ACTUAL ROAD LOAD 7.80 HP (5.82 KW)		US06	
ODOMETER	1433 MILES (2305 KM)	TEST WEIGHT 3250 LBS (1473 KG)			

BAROMETER 29.46 IN HG (748.3 MM HG) DRY BULB TEMPERATURE 72.0°F (22.2°C) NOX HUMIDITY C.F. .879

RELATIVE HUMIDITY 38.5 PCT.

BAG NUMBER	1
BAG DESCRIPTION	
RUN TIME SECONDS	600.3
DRY/WET CORRECTION FACTOR, SAMP/BACK	.982/.990
MEASURED DISTANCE MILES (KM)	7.99 (12.85)
BLOWER FLOW RATE SCFM (SCMM)	578.6 (16.39)
GAS METER FLOW RATE SCFM (SCMM)	1.06 (.03)
TOTAL FLOW SCF (SCM)	5800. (164.3)
HC SAMPLE METER/RANGE/PPM (CONT)	6.4/1071/ 6.36
HC BCKGRD METER/RANGE/PPM	6.3/1071/ 6.30
CO SAMPLE METER/RANGE/PPM	2.4/ 12/ 2.47
CO BCKGRD METER/RANGE/PPM	1.2/ 12/ 1.24
CO2 SAMPLE METER/RANGE/PCT	80.2/ 11/ .7407
CO2 BCKGRD METER/RANGE/PCT	6.7/ 11/ .0450
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	20.6/1072/ 51.69
NOX BCKGRD METER/RANGE/PPM	.3/ 2/ .30
CH4 SAMPLE PPM (1.200)	1.94
CH4 BCKGRD PPM	2.01
DILUTION FACTOR	17.26
HC CONCENTRATION PPM	.42
CO CONCENTRATION PPM	1.25
CO2 CONCENTRATION PCT	.6982
NOX CONCENTRATION PPM	50.46
CH4 CONCENTRATION PPM	.04
NMHC CONCENTRATION PPM	.37
HC MASS GRAMS	.041
CO MASS GRAMS	.239
CO2 MASS GRAMS	2099.82
NOX MASS GRAMS	13.929
PM MASS GRAMS	.329
CH4 MASS GRAMS	.005
NMHC MASS GRAMS (FID)	.035
FUEL MASS KG	.675
FUEL ECONOMY MPG (L/100KM)	34.55 (6.81)

1-BAG COMPOSITE RESULTS

HC	G/MI	.005	CH4	G/MI	.001
CO	G/MI	.030	NMHC	G/MI	.004
NOX	G/MI	1.744			
PM	G/MI	.041			

FUEL ECONOMY MPG (L/100KM) 34.55 (6.81)

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.2-R 1-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER	8	TEST FT-2	DIESEL EM-2795-F
VEHICLE MODEL	99 VW GOLF GL TDI	DATE 11/ 3/1999 RUN	FUEL DENSITY 6.439 LB/GAL
ENGINE	1.9 L (114 CID)-4	DYNO 7 BAG CART 1	H .151 C .849 O .000 X .000
TRANSMISSION	A4	ACTUAL ROAD LOAD 7.80 HP (5.82 KW)	HFET
ODOMETER	1451 MILES (2334 KM)	TEST WEIGHT 3250 LBS (1473 KG)	

BAROMETER 29.45 IN HG (748.0 MM HG) DRY BULB TEMPERATURE 74.0°F (23.3°C) NOX HUMIDITY C.F. .867

RELATIVE HUMIDITY 33.4 PCT.

BAG NUMBER	1
BAG DESCRIPTION	
RUN TIME SECONDS	765.3
DRY/WET CORRECTION FACTOR, SAMP/BACK	.985/.990
MEASURED DISTANCE MILES (KM)	10.23 (16.46)
BLOWER FLOW RATE SCFM (SCMM)	576.9 (16.34)
GAS METER FLOW RATE SCFM (SCMM)	1.07 (.03)
TOTAL FLOW SCF (SCM)	7372. (208.8)
HC SAMPLE METER/RANGE/PPM (CONT)	6.6/1071/ 6.57
HC BCKGRD METER/RANGE/PPM	5.9/1071/ 5.90
CO SAMPLE METER/RANGE/PPM	1.9/ 12/ 1.96
CO BCKGRD METER/RANGE/PPM	1.3/ 12/ 1.34
CO2 SAMPLE METER/RANGE/PCT	60.0/ 11/ .4921
CO2 BCKGRD METER/RANGE/PCT	6.6/ 11/ .0444
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	5.9/1072/ 14.87
NOX BCKGRD METER/RANGE/PPM	.3/ 2/ .30
CH4 SAMPLE PPM (1.200)	2.10
CH4 BCKGRD PPM	1.98
DILUTION FACTOR	25.97
HC CONCENTRATION PPM	.89
CO CONCENTRATION PPM	.64
CO2 CONCENTRATION PCT	.4494
NOX CONCENTRATION PPM	14.36
CH4 CONCENTRATION PPM	.20
NMHC CONCENTRATION PPM	.66
HC MASS GRAMS	.110
CO MASS GRAMS	.156
CO2 MASS GRAMS	1717.76
NOX MASS GRAMS	4.970
PM MASS GRAMS	.171
CH4 MASS GRAMS	.027
NMHC MASS GRAMS (FID)	.079
FUEL MASS KG	.553
FUEL ECONOMY MPG (L/100KM)	54.09 (4.35)

1-BAG COMPOSITE RESULTS

HC	G/MI	.011	CH4	G/MI	.003
CO	G/MI	.015	NMHC	G/MI	.008
NOX	G/MI	.486			
PM	G/MI	.017			

FUEL ECONOMY MPG (L/100KM) 54.09 (4.35)

APPENDIX H

APPENDIX B

HYDROCARBON SPECIATION DATA

Page	Table	Title
B-1	B-1	A Comparison of Weighted Composite Results During FTP
B-5	B-2	A Comparison of Weighted Composite Results During US06
B-9	B-3	A Comparison of Weighted Composite Results During HFET

TABLE B-1. A COMPARISON OF WEIGHTED COMPOSITE RESULTS DURING FTP

COMPOUND	FTP COMPOSITE, mg/mi					
	BASELINE (D2)			S-2 Diesel		
	10/26/99	10/27/99	AVG.	11/2/99	11/3/99	AVG.
METHANE	6.9	9.3	8.1	6.5	6.0	6.3
ETHANE	2.6	0.8	1.7	0.9	0.7	0.8
ETHYLENE	1.6	3.4	2.5	0.3	0.3	0.3
PROPANE	1.4	2.1	1.8	0.1	0.0	0.1
PROPYLENE	0.2	0.4	0.3	0.0	0.1	0.0
ACETYLENE	0.3	0.4	0.3	0.0	0.0	0.0
PROPADIENE	0.0	0.0	0.0	0.0	0.0	0.0
BUTANE	1.3	0.0	0.6	0.0	2.5	1.3
TRANS-2-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
1-BUTENE	0.0	0.1	0.1	0.0	0.0	0.0
2-METHYLPROPENE (ISOBUTYLENE)	0.0	0.1	0.0	0.0	0.0	0.0
2,2-DIMETHYLPROPANE (NEOPENTANE)	0.0	0.0	0.0	0.0	0.0	0.0
PROPYNE	0.0	0.0	0.0	0.0	0.0	0.0
1,3-BUTADIENE	0.0	0.1	0.0	0.0	0.0	0.0
2-METHYLPROPANE (ISOBUTANE)	0.0	0.0	0.0	0.2	0.1	0.1
1-BUTYNE	0.0	0.0	0.0	0.0	0.0	0.0
METHANOL	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
ETHANOL	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLBUTANE (ISOPENTANE)	0.1	0.0	0.0	0.0	0.2	0.1
2-BUTYNE	0.0	0.0	0.0	0.0	0.0	0.0
1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
PENTANE	0.6	0.2	0.4	0.6	0.3	0.4
UNIDENTIFIED C5 OLEFINS	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-1,3-BUTADIENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-PENTENE	0.0	0.1	0.0	0.0	0.0	0.0
2-METHYL-2-BUTENE	0.1	0.1	0.1	0.0	0.0	0.0
TERT-BUTANOL	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOPENTADIENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLBUTANE	0.0	0.1	0.1	0.0	0.0	0.0
CYCLOPENTENE	0.1	0.1	0.1	0.0	0.0	0.0
4-METHYL-1-PENTENE	0.0	0.1	0.0	0.0	0.0	0.0
3-METHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLBUTANE	0.0	0.0	0.0	0.0	0.0	0.0
MTBE	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYL-TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
1-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
HEXANE	0.1	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C6 OLEFINS	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
DI-ISOPROPYL ETHER	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLCYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
ETBE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLPENTANE, NOTE A	0.0	0.0	0.0	0.0	0.0	0.0
METHYLCYCLOPENTANE, NOTE A	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,3-TRIMETHYLBUTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0

TABLE B-1 (CONT'D). A COMPARISON OF WEIGHTED COMPOSITE RESULTS DURING FTP

COMPOUND	FTP COMPOSITE, mg/mi					
	BASELINE (D2)			S-2 Diesel		
	10/26/99	10/27/99	AVG.	11/2/99	11/3/99	AVG.
1-METHYLCYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
BENZENE	0.2	0.2	0.2	0.0	0.2	0.1
3-METHYL-1-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLPENTANE	0.2	0.0	0.1	0.0	0.0	0.0
1,1-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-AMYL METHYL ETHER	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOHEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,3-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,2-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,3-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,4-TRIMETHYLPENTANE	0.5	0.0	0.2	0.0	0.0	0.0
2-METHYL-1-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-3-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
HEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C7	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-TRANS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
METHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,2-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1,3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,3-TRIMETHYLPENTANE	0.1	0.0	0.0	0.0	0.0	0.0
2,5-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1-TRANS-2-CIS-4-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1-TRANS-2-CIS-3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,4-TRIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,3-TRIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.1	0.1
TOLUENE	0.8	0.0	0.4	0.0	0.0	0.0
2,3-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1,2-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYLHEXANE, NOTE B	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-CIS,2-TRANS,3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,3-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,4-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,5-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1-METHYL-3-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1-METHYL-3-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1-METHYL-2-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-1-ETHYL-CYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,2-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0

TABLE B-1 (CONT'D). A COMPARISON OF WEIGHTED COMPOSITE RESULTS DURING FTP

COMPOUND	FTP COMPOSITE, mg/mi					
	BASELINE (D2)			S-2 Diesel		
	10/26/99	10/27/99	AVG.	11/2/99	11/3/99	AVG.
1-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-4-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
OCTANE	0.4	0.0	0.2	0.0	0.0	0.0
UNIDENTIFIED C8	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,3-DIMETHYLCYCLOHEXANE, NOTE C	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
ISOPROPYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,5-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1-METHYL-2-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.5	0.2
2,4-DIMETHYLHEPTANE	1.1	2.0	1.5	1.2	0.0	0.6
4,4-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,2-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,6-DIMETHYLHEPTANE, NOTE D	0.0	0.0	0.0	1.1	0.4	0.7
1,1,3-TRIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,5-DIMETHYLHEPTANE, NOTE E	0.9	0.0	0.5	0.0	0.0	0.0
3,3-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,5-DIMETHYLHEPTANE, NOTE E	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
m-& p-XYLENE	0.0	0.1	0.1	0.0	0.0	0.0
4-METHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
4-ETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
STYRENE	0.0	0.0	0.0	0.0	0.0	0.0
o-XYLENE	2.2	0.0	1.1	0.0	0.0	0.0
1-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-3-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
NONANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
ISOPROPYLBENZENE (CUMENE)	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
n-PROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-3-ETHYLBENZENE	0.0	0.0	0.0	0.1	0.1	0.1
1-METHYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,3,5-TRIMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-2-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,4-TRIMETHYLBENZENE	0.0	0.0	0.0	0.0	0.1	0.0
TERT-BUTYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-DECENE	0.0	0.0	0.0	0.0	0.0	0.0
DECANE, NOTE F	1.7	1.2	1.5	4.0	0.8	2.4
ISOBUTYLBENZENE, NOTE F	1.6	1.2	1.4	3.8	0.7	2.3
1,3,-DIMETHYL-5-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
METHYLPROPYLBENZENE (sec butylbenzene)	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-3-ISOPROPYLBENZENE	1.1	0.0	0.5	0.0	0.0	0.0
1,2,3-TRIMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-4-ISOPROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
INDAN	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-2-ISOPROPYLBENZENE	0.3	0.0	0.1	0.0	0.0	0.0
1,3-DIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,4-DIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-3-N-PROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-4-N-PROPYLBENZENE, NOTE G	0.0	0.0	0.0	0.0	0.0	0.0
1,2 DIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-2-N-PROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,4-DIMETHYL-2-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0

TABLE B-1 (CONT'D). A COMPARISON OF WEIGHTED COMPOSITE RESULTS DURING FTP

COMPOUND	FTP COMPOSITE, mg/mi					
	BASELINE (D2)			S-2 Diesel		
	10/26/99	10/27/99	AVG.	11/2/99	11/3/99	AVG.
1,3-DIMETHYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2-DIMETHYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,3-DIMETHYL-2-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
UNDECANE	0.3	0.0	0.1	0.1	0.0	0.0
1,2-DIMETHYL-3-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,4,5-TETRAMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLBUTYLBENZENE (sec AMYLBENZENE)	0.0	0.0	0.0	0.0	0.0	0.0
3,4 DIMETHYLCUMENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,3,5-TETRAMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-1-BUT-2-METHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,3,4-TETRAMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
N-PENT-BENZENE	2.7	0.9	1.8	2.9	0.0	1.4
TERT-1-BUT-3,5-DIMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-1-BUTYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
NAPHTHALENE	0.0	0.0	0.0	0.0	0.0	0.0
DODECANE	0.0	0.0	0.0	0.0	0.0	0.0
1,3,5-TRIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,4-TRIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
HEXYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C9-C12+	0.2	0.3	0.3	0.0	0.9	0.5
FORMALDEHYDE	3.2	2.9	3.0	1.6	1.3	1.5
ACETALDEHYDE	2.3	3.1	2.7	2.0	2.5	2.3
ACROLEIN	0.0	0.1	0.1	0.1	0.0	0.1
ACETONE	0.3	0.4	0.3	0.0	0.0	0.0
PROPIONALDEHYDE	0.0	0.5	0.2	0.1	0.2	0.2
CROTONALDEHYDE	0.0	0.1	0.0	0.1	0.1	0.1
ISOBUTYRALDEHYDE, NOTE H	0.0	0.2	0.1	0.1	0.2	0.1
METHYL ETHYL KETONE, NOTE H	0.0	0.2	0.1	0.1	0.2	0.1
BENZALDEHYDE	0.1	0.1	0.1	0.3	0.0	0.1
ISOVALERALDEHYDE	0.0	0.0	0.0	0.0	0.0	0.0
VALERALDEHYDE	0.2	0.1	0.2	0.2	0.0	0.1
O-TOLUALDEHYDE	0.0	0.0	0.0	0.1	0.1	0.1
M/P-TOLUALDEHYDE	0.4	0.0	0.2	0.1	0.0	0.0
HEXANALDEHYDE	0.1	0.0	0.0	0.0	0.0	0.0
DIMETHYLBENZALDEHYDE	0.0	0.0	0.0	0.1	0.2	0.2
SUMMED SPECIATED VALUES	36	31	33.6	27	19	22.8

A - 2,2-Dimethylpentane and methylcyclopentane co-elute. GC peak area split equally between the two compou
B - 3-Methyl-3-ethy-pentane co-elutes with reported compound. Not reported separately.
C - Cis-1,4-Dimethylcyclohexane co-elutes with reported compound. Not reported separately.
D - Propylcyclopentane co-elutes with reported compound. Not reported separately.
E - 2,5-Dimethylheptane and 3,5-dimethylheptane co-elute. GC peak area split equally between the two compou
F - Decane and isobutylbenzene co-elute. GC peak area split equally between the two compounds.
G - n-Butylbenzene co-elutes with reported compound. Not reported separately.
H - Isobutyraldehyde and methyl ethyl ketone co-elute. LC peak area split equally between the two compounds.

TABLE B-2. A COMPARISON OF WEIGHTED COMPOSITE RESULTS DURING US06

COMPOUND	US06, mg/mi					
	BASELINE (D2)			S-2 Diesel		
	10/26/99	10/27/99	AVG.	11/2/99	11/3/99	AVG.
METHANE	0.9	0.9	0.9	1.1	0.5	0.8
ETHANE	0.3	0.2	0.3	0.0	0.0	0.0
ETHYLENE	0.0	0.0	0.0	0.0	0.0	0.0
PROPANE	0.4	3.7	2.0	0.3	0.4	0.3
PROPYLENE	0.0	0.0	0.0	0.0	0.0	0.0
ACETYLENE	0.0	0.0	0.0	0.0	0.0	0.0
PROPADIENE	0.0	0.0	0.0	0.0	0.0	0.0
BUTANE	0.4	1.3	0.9	0.6	0.0	0.3
TRANS-2-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLPROPENE (ISOBUTYLENE)	0.8	0.0	0.4	0.0	0.0	0.0
2,2-DIMETHYLPROPANE (NEOPENTANE)	0.0	0.0	0.0	0.0	0.0	0.0
PROPYNE	0.0	0.0	0.0	0.0	0.0	0.0
1,3-BUTADIENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLPROPANE (ISOBUTANE)	0.2	0.2	0.2	0.0	0.0	0.0
1-BUTYNE	0.0	0.0	0.0	0.0	0.0	0.0
METHANOL	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
ETHANOL	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLBUTANE (ISOPENTANE)	0.0	0.0	0.0	0.0	2.3	1.1
2-BUTYNE	0.0	0.0	0.0	0.0	0.0	0.0
1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
PENTANE	0.0	0.0	0.0	0.0	0.1	0.0
UNIDENTIFIED C5 OLEFINS	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-1,3-BUTADIENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-2-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-BUTANOL	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOPENTADIENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLBUTANE	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLBUTANE	0.0	0.0	0.0	0.0	0.0	0.0
MTBE	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYL-TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLPENTANE	0.2	0.6	0.4	0.0	0.1	0.1
2-METHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
1-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
HEXANE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C6 OLEFINS	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
DI-ISOPROPYL ETHER	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLCYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
ETBE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLPENTANE, NOTE A	0.0	0.0	0.0	0.0	0.0	0.0
METHYLCYCLOPENTANE, NOTE A	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,3-TRIMETHYLBUTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0

TABLE B-2 (CONT'D). A COMPARISON OF WEIGHTED COMPOSITE RESULTS DURING US06

COMPOUND	US06, mg/mi					
	BASELINE (D2)			S-2 Diesel		
	10/26/99	10/27/99	AVG.	11/2/99	11/3/99	AVG.
1-METHYLCYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
BENZENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-1-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-AMYL METHYL ETHER	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOHEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,3-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,2-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,3-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,4-TRIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-1-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-3-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
HEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C7	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-TRANS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
METHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,2-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1,3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYL-2-PENTENE	0.0	0.5	0.3	0.0	0.0	0.0
2,2,3-TRIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,5-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1-TRANS-2-CIS-4-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1-TRANS-2-CIS-3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,4-TRIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,3-TRIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.2	0.1
TOLUENE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1,2-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYLHEXANE, NOTE B	0.0	1.2	0.6	0.0	0.0	0.0
4-METHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-CIS,2-TRANS,3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,3-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,4-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,5-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1-METHYL-3-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1-METHYL-3-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1-METHYL-2-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-1-ETHYL-CYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,2-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0

TABLE B-2 (CONT'D). A COMPARISON OF WEIGHTED COMPOSITE RESULTS DURING US06

COMPOUND	US06, mg/mi					
	BASELINE (D2)			S-2 Diesel		
	10/26/99	10/27/99	AVG.	11/2/99	11/3/99	AVG.
1-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-4-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
OCTANE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C8	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-OCTENE	0.2	0.0	0.1	0.0	0.0	0.0
TRANS-1,3-DIMETHYLCYCLOHEXANE, NOTE C	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
ISOPROPYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,5-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1-METHYL-2-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
4,4-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,2-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,6-DIMETHYLHEPTANE, NOTE D	0.0	0.0	0.0	0.0	0.0	0.0
1,1,3-TRIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,5-DIMETHYLHEPTANE, NOTE E	0.0	0.0	0.0	0.2	0.0	0.1
3,3-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,5-DIMETHYLHEPTANE, NOTE E	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLBENZENE	1.1	0.0	0.5	0.0	0.0	0.0
2,3,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
m-& p-XYLENE	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
4-ETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
STYRENE	0.0	0.0	0.0	0.0	0.0	0.0
o-XYLENE	0.0	0.0	0.0	0.0	0.0	0.0
1-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-3-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
NONANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
ISOPROPYLBENZENE (CUMENE)	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
n-PROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-3-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,3,5-TRIMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-2-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,4-TRIMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-BUTYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-DECENE	0.0	0.0	0.0	0.0	0.0	0.0
DECANE, NOTE F	0.4	1.0	0.7	0.4	0.4	0.4
ISOBUTYLBENZENE, NOTE F	0.4	1.0	0.7	0.4	0.4	0.4
1,3,-DIMETHYL-5-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
METHYLPROPYLBENZENE (sec butylbenzene)	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-3-ISOPROPYLBENZENE	1.0	0.0	0.5	0.0	0.0	0.0
1,2,3-TRIMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-4-ISOPROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
INDAN	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-2-ISOPROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,3-DIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,4-DIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-3-N-PROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-4-N-PROPYLBENZENE, NOTE G	0.0	0.0	0.0	0.0	0.0	0.0
1,2 DIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-2-N-PROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,4-DIMETHYL-2-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0

TABLE B-2 (CONT'D). A COMPARISON OF WEIGHTED COMPOSITE RESULTS DURING US06

COMPOUND	US06, mg/mi					
	BASELINE (D2)			S-2 Diesel		
	10/26/99	10/27/99	AVG.	11/2/99	11/3/99	AVG.
1,3-DIMETHYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2-DIMETHYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,3-DIMETHYL-2-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
UNDECANE	0.0	0.0	0.0	0.0	0.0	0.0
1,2-DIMETHYL-3-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,4,5-TETRAMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLBUTYLBENZENE (sec AMYLBENZENE)	0.0	0.0	0.0	0.0	0.0	0.0
3,4 DIMETHYLCUMENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,3,5-TETRAMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-1-BUT-2-METHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,3,4-TETRAMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
N-PENT-BENZENE	0.4	0.4	0.4	0.0	0.0	0.0
TERT-1-BUT-3,5-DIMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-1-BUTYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
NAPHTHALENE	0.0	0.0	0.0	0.0	0.0	0.0
DODECANE	0.0	0.0	0.0	0.0	0.0	0.0
1,3,5-TRIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,4-TRIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
HEXYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C9-C12+	0.0	0.0	0.0	0.0	0.3	0.1
FORMALDEHYDE	1.4	1.2	1.3	0.9	0.7	0.8
ACETALDEHYDE	1.5	1.5	1.5	1.4	1.2	1.3
ACROLEIN	0.2	0.0	0.1	0.1	0.1	0.1
ACETONE	0.1	0.0	0.0	0.0	0.0	0.0
PROPIONALDEHYDE	0.1	0.2	0.2	0.1	0.2	0.1
CROTONALDEHYDE	0.1	0.0	0.0	0.1	0.1	0.1
ISOBUTYRALDEHYDE, NOTE H	0.0	0.0	0.0	0.0	0.0	0.0
METHYL ETHYL KETONE, NOTE H	0.0	0.0	0.0	0.0	0.0	0.0
BENZALDEHYDE	0.1	0.0	0.0	0.1	0.0	0.0
ISOVALERALDEHYDE	0.0	0.0	0.0	0.1	0.2	0.1
VALERALDEHYDE	0.1	0.2	0.2	0.0	0.0	0.0
O-TOLUALDEHYDE	0.0	0.0	0.0	0.0	0.0	0.0
M/P-TOLUALDEHYDE	0.3	0.0	0.1	0.0	0.0	0.0
HEXANALDEHYDE	0.0	0.0	0.0	0.0	0.0	0.0
DIMETHYLBENZALDEHYDE	0.2	0.2	0.2	0.0	0.0	0.0
SUMMED SPECIATED VALUES	11	14	12.6	6	7	6.6

A - 2,2-Dimethylpentane and methylcyclopentane co-elute. GC peak area split equally between the two compou
B - 3-Methyl-3-ethy-pentane co-elutes with reported compound. Not reported separately.
C - Cis-1,4-Dimethylcyclohexane co-elutes with reported compound. Not reported separately.
D - Propylcyclopentane co-elutes with reported compound. Not reported separately.
E - 2,5-Dimethylheptane and 3,5-dimethylheptane co-elute. GC peak area split equally between the two compou
F - Decane and isobutylbenzene co-elute. GC peak area split equally between the two compounds.
G - n-Butylbenzene co-elutes with reported compound. Not reported separately.
H - Isobutyraldehyde and methyl ethyl ketone co-elute. LC peak area split equally between the two compounds.

TABLE B-3. A COMPARISON OF WEIGHTED COMPOSITE RESULTS DURING HFET

COMPOUND	HFET, mg/mi					
	BASELINE (D2)			S-2 Diesel		
	10/26/99	10/27/99	AVG.	11/2/99	11/3/99	AVG.
METHANE	2.4	2.8	2.6	2.5	2.6	2.6
ETHANE	0.2	0.3	0.3	0.4	0.0	0.2
ETHYLENE	0.0	0.0	0.0	0.0	0.0	0.0
PROPANE	0.3	2.3	1.3	0.6	0.4	0.5
PROPYLENE	0.0	0.0	0.0	0.0	0.0	0.0
ACETYLENE	0.0	0.0	0.0	0.0	0.0	0.0
PROPADIENE	0.0	0.0	0.0	0.0	0.0	0.0
BUTANE	0.5	1.5	1.0	0.9	0.0	0.4
TRANS-2-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLPROPENE (ISOBUTYLENE)	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLPROPANE (NEOPENTANE)	0.0	0.0	0.0	0.0	0.0	0.0
PROPYNE	0.0	0.0	0.0	0.0	0.0	0.0
1,3-BUTADIENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLPROPANE (ISOBUTANE)	0.2	0.2	0.2	0.2	0.0	0.1
1-BUTYNE	0.0	0.0	0.0	0.0	0.0	0.0
METHANOL	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
ETHANOL	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLBUTANE (ISOPENTANE)	0.1	0.0	0.0	0.0	0.0	0.0
2-BUTYNE	0.0	0.0	0.0	0.0	0.0	0.0
1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
PENTANE	0.0	0.1	0.0	0.1	0.1	0.1
UNIDENTIFIED C5 OLEFINS	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-1,3-BUTADIENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-2-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-BUTANOL	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOPENTADIENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLBUTANE	0.0	0.1	0.1	0.3	0.0	0.2
CYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLBUTANE	0.0	0.0	0.0	0.0	0.0	0.0
MTBE	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLPENTANE	0.2	0.0	0.1	0.0	0.0	0.0
4-METHYL-TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLPENTANE	0.3	0.1	0.2	0.0	0.0	0.0
2-METHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
1-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
HEXANE	0.0	0.0	0.0	0.2	0.0	0.1
UNIDENTIFIED C6 OLEFINS	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
DI-ISOPROPYL ETHER	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLCYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
ETBE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLPENTANE, NOTE A	0.0	0.0	0.0	0.0	0.0	0.0
METHYLCYCLOPENTANE, NOTE A	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,3-TRIMETHYLBUTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0

TABLE B-3 (CONT'D). A COMPARISON OF WEIGHTED COMPOSITE RESULTS DURING HFET

COMPOUND	HFET, mg/mi					
	BASELINE (D2)			S-2 Diesel		
	10/26/99	10/27/99	AVG.	11/2/99	11/3/99	AVG.
1-METHYLCYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
BENZENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-1-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-AMYL METHYL ETHER	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOHEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,3-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,2-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,3-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,4-TRIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-1-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-3-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
HEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C7	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-TRANS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
METHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,2-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1,3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,3-TRIMETHYLPENTANE	0.0	0.0	0.0	0.1	0.0	0.1
2,5-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1-TRANS-2-CIS-4-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1-TRANS-2-CIS-3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,4-TRIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,3-TRIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.2	0.1
TOLUENE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1,2-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYLHEXANE, NOTE B	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-CIS,2-TRANS,3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,3-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,4-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,5-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1-METHYL-3-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1-METHYL-3-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1-METHYL-2-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-1-ETHYL-CYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,2-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0

TABLE B-3 (CONT'D). A COMPARISON OF WEIGHTED COMPOSITE RESULTS DURING HFET

COMPOUND	HFET, mg/mi					
	BASELINE (D2)			S-2 Diesel		
	10/26/99	10/27/99	AVG.	11/2/99	11/3/99	AVG.
1-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-4-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
OCTANE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C8	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,3-DIMETHYLCYCLOHEXANE, NOTE C	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
ISOPROPYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,5-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1-METHYL-2-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLHEPTANE	0.0	0.4	0.2	0.0	0.0	0.0
4,4-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,2-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,6-DIMETHYLHEPTANE, NOTE D	0.0	0.0	0.0	0.3	0.1	0.2
1,1,3-TRIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,5-DIMETHYLHEPTANE, NOTE E	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,5-DIMETHYLHEPTANE, NOTE E	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
m-& p-XYLENE	0.0	0.1	0.1	0.0	0.0	0.0
4-METHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
4-ETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
STYRENE	0.0	0.0	0.0	0.0	0.0	0.0
o-XYLENE	0.0	0.0	0.0	0.0	0.0	0.0
1-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-3-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
NONANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
ISOPROPYLBENZENE (CUMENE)	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
n-PROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-3-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,3,5-TRIMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-2-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,4-TRIMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-BUTYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-DECENE	0.0	0.0	0.0	0.0	0.0	0.0
DECANE, NOTE F	0.5	0.2	0.3	0.0	0.1	0.1
ISOBUTYLBENZENE, NOTE F	0.5	0.2	0.3	0.0	0.1	0.1
1,3,-DIMETHYL-5-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
METHYLPROPYLBENZENE (sec butylbenzene)	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-3-ISOPROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,3-TRIMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-4-ISOPROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
INDAN	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-2-ISOPROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,3-DIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,4-DIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-3-N-PROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-4-N-PROPYLBENZENE, NOTE G	0.0	0.0	0.0	0.0	0.0	0.0
1,2 DIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-2-N-PROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,4-DIMETHYL-2-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0

TABLE B-3 (CONT'D). A COMPARISON OF WEIGHTED COMPOSITE RESULTS DURING HFET

COMPOUND	HFET, mg/mi					
	BASELINE (D2)			S-2 Diesel		
	10/26/99	10/27/99	AVG.	11/2/99	11/3/99	AVG.
1,3-DIMETHYL-4-ETHYLBENZENE	0.0	0.5	0.3	0.0	0.0	0.0
1,2-DIMETHYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,3-DIMETHYL-2-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
UNDECANE	0.0	0.0	0.0	0.0	0.0	0.0
1,2-DIMETHYL-3-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,4,5-TETRAMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLBUTYLBENZENE (sec AMYLBENZENE)	0.0	0.0	0.0	0.0	0.0	0.0
3,4 DIMETHYLCUMENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,3,5-TETRAMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-1-BUT-2-METHYLBENZENE	0.0	1.0	0.5	0.0	0.0	0.0
1,2,3,4-TETRAMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
N-PENT-BENZENE	0.3	0.3	0.3	0.2	0.0	0.1
TERT-1-BUT-3,5-DIMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-1-BUTYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
NAPHTHALENE	0.0	0.0	0.0	0.0	0.0	0.0
DODECANE	0.0	0.0	0.0	0.0	0.0	0.0
1,3,5-TRIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,4-TRIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
HEXYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C9-C12+	0.7	0.0	0.3	0.0	0.1	0.1
FORMALDEHYDE	0.8	0.7	0.8	0.5	0.4	0.5
ACETALDEHYDE	0.8	0.8	0.8	0.7	0.6	0.7
ACROLEIN	0.0	0.0	0.0	0.1	0.0	0.0
ACETONE	0.0	0.0	0.0	0.0	0.0	0.0
PROPIONALDEHYDE	0.1	0.0	0.1	0.1	0.0	0.0
CROTONALDEHYDE	0.1	0.0	0.1	0.0	0.0	0.0
ISOBUTYRALDEHYDE, NOTE H	0.0	0.0	0.0	0.0	0.0	0.0
METHYL ETHYL KETONE, NOTE H	0.0	0.0	0.0	0.0	0.0	0.0
BENZALDEHYDE	0.0	0.2	0.1	0.6	0.0	0.3
ISOVALERALDEHYDE	0.0	0.0	0.0	0.1	0.0	0.0
VALERALDEHYDE	0.1	0.0	0.0	0.0	0.0	0.0
O-TOLUALDEHYDE	0.0	0.0	0.0	0.0	0.0	0.0
M/P-TOLUALDEHYDE	0.2	0.0	0.1	0.0	0.0	0.0
HEXANALDEHYDE	0.0	0.2	0.1	0.0	0.0	0.0
DIMETHYLBENZALDEHYDE	0.1	0.0	0.0	0.0	0.0	0.0
SUMMED SPECIATED VALUES	8	12	10.2	8	5	6.5

A - 2,2-Dimethylpentane and methylcyclopentane co-elute. GC peak area split equally between the two compou
B - 3-Methyl-3-ethy-pentane co-elutes with reported compound. Not reported separately.
C - Cis-1,4-Dimethylcyclohexane co-elutes with reported compound. Not reported separately.
D - Propylcyclopentane co-elutes with reported compound. Not reported separately.
E - 2,5-Dimethylheptane and 3,5-dimethylheptane co-elute. GC peak area split equally between the two compou
F - Decane and isobutylbenzene co-elute. GC peak area split equally between the two compounds.
G - n-Butylbenzene co-elutes with reported compound. Not reported separately.
H - Isobutyraldehyde and methyl ethyl ketone co-elute. LC peak area split equally between the two compounds.

APPENDIX I

APPENDIX A

HEAVY-DUTY EMISSION TEST RESULTS

Page	Test No.	Test Cycle	Fuel
A-1	BASE-C3	EPA Transient	Baseline
A-2	BASE-H3	EPA Transient	Baseline
A-3	BASE-C3/H3 Composite	EPA Transient	Baseline
A-4	BASE-C4	EPA Transient	Baseline
A-5	BASE-H4	EPA Transient	Baseline
A-6	BASE-C4/H4 Composite	EPA Transient	Baseline
A-7	FT-C1	EPA Transient	S-2 Diesel
A-8	FT-H1	EPA Transient	S-2 Diesel
A-9	FT-C1/H1 Composite	EPA Transient	S-2 Diesel
A-10	FT-C2	EPA Transient	S-2 Diesel
A-11	FT-H2	EPA Transient	S-2 Diesel
A-12	FT-C2/H2 Composite	EPA Transient	S-2 Diesel

Southwest Research Institute - Department of Emissions Research
EPA Cold Transient Emission Test Results
Project No. 08-2164-001

Engine Mode:	99 Cummins ISB-215	Test No.: BASE-C3		DIESEL 2D, EM-2731-F	
Engine Desc.:	5.9 L (359 CID) 6	Date: 08/02/1999	Time: 09:25	HCR: 1.796	FID Resp: 1.1
Engine Cycle:	Diesel	Program HDT: 4.04-R		H= 0.131 C= 0.869 O= 0.000 X= 0.000	
Engine S/N:	56541396	Cell: 4	Bag Cart: 1	Oil Code: Mobil Delvac	

Ambient/Test Cell Conditions

Barometer:	29.2	in Hg	98.9 kPa
Engine Inlet Air			
Temperature:	74.0	°F	23.3 °C
Dew Point:	60.8	°F	16.0 °C
Abs. Humidity:	81.8	gr/lb	11.7 g/kg
Rel. Humidity:	63	%	
Dilution Air:			
Temperature:	78.0	°F	25.6 °C
Abs. Humidity	94.2	gr/lb	13.5 g/kg
Rel. Humidity:	64	%	

Sample Flows

	scfm	scmm
Blower 1 Rate:	1,190.6	33.7
Blower 2 Rate:	0.0	0.0
90 mm System:		
Gas Meter 1:	1.7	0.0
Gas Meter 2:	3.2	0.1
Sample Rate:	1.5	0.0
20X20 Sample Rate:	31.9	0.9
Chemistry Sample Rate:	0.136	0.077
Total Flow Rate:	1,224.3	34.7

Measured Gaseous Data

	Meter	Range	Concentration		
HC Sample	n/a		8.4	ppm	
HC Bckgrd	n/a		3.4	ppm	
CO Sample	30.1	2	29.3	ppm	(Dry)
CO Bckgrd	0.6	2	0.6	ppm	
NOx Sample	n/a		44.7	ppm	(Dry)
NOx Bckgrd	0.2	2	0.2	ppm	
CO2 Sample	81.6	1	0.7600	%	(Wet)
CO2 Bckgrd	8.7	1	0.0587	%	
CH4 Sample	n/a	n/a	1.8	ppm	(1.1)
CH4 Bckgrd	n/a	n/a	1.8	ppm	

Particulate Data

Filter Number:	2402.0-74 (pair)	
Weight Gain:	1.855	mg
Sample Multiplier:	0.796	

Correction Factors

NOx Humidity CF:	1.018
Dry-to-Wet CF, Sample:	0.972
Dry-to-Wet CF, Bckgrd:	0.979
Dilution Factor:	17.82

Corrected Concentrations

HC	5.2	ppm	
CO	27.7	ppm	
NOx	43.3	ppm	
CO2	0.7046	%	
CH4	0.1	ppm	(1.1)

Test Cycle Data

Sample Time:	1,207.8	sec		
Work:	13.3	hp-hr	9.9	kW-hr
Reference Work:	13.4	hp-hr	10.0	kW-hr
Total Volume (Vmix):	24,641.6	scf	697.9	scm

Mass Emissions

HC	2.085	grams
CO	22.519	grams
NOx	58.776	grams
Particulate	1.477	grams
CO2	8.995	kg
CH4	0.056	grams
Fuel	6.3 lb	2.8 kg

Brake-Specific Emission Results

BSHC (Cell)	0.157	g/hp-hr	0.211	g/kW-hr
CO	1.698	g/hp-hr	2.277	g/kW-hr
NOx (Cell)	4.433	g/hp-hr	5.944	g/kW-hr
Particulate	0.111	g/hp-hr	0.149	g/kW-hr
CO2	678.4	g/hp-hr	909.7	g/kW-hr
BSFC	0.472	lb/hp-hr	0.287	kg/kW-hr
NMHC	0.137	g/hp-hr	0.183	g/kW-hr
CH4	0.004	g/hp-hr	0.006	g/kW-hr

Southwest Research Institute - Department of Emissions Research
EPA Hot Transient Emission Test Results
Project No. 08-2164-001

Engine Mode:	99 Cummins ISB-215	Test No.:	BASE-H3	DIESEL 2D, EM-2731-F	
Engine Desc.:	5.9 L (359 CID) 6	Date: 08/02/1999	Time: 10:05	HCR: 1.796	FID Resp: 1.1
Engine Cycle:	Diesel	Program HDT:	4.04-R	H= 0.131 C= 0.869 O= 0.000 X= 0.000	
Engine S/N:	56541396	Cell: 4	Bag Cart: 1	Oil Code: Mobil Delvac	

Ambient/Test Cell Conditions

Barometer:	29.2	in Hg	98.9 kPa
Engine Inlet Air			
Temperature:	74.0	°F	23.3 °C
Dew Point:	58.8	°F	14.9 °C
Abs. Humidity:	76.1	gr/lb	10.9 g/kg
Rel. Humidity:	59	%	
Dilution Air:			
Temperature:	78.0	°F	25.6 °C
Abs. Humidity	94.2	gr/lb	13.5 g/kg
Rel. Humidity:	64	%	

Sample Flows

	scfm	scmm
Blower 1 Rate:	1,189.5	33.7
Blower 2 Rate:	0.0	0.0
90 mm System:		
Gas Meter 1:	1.7	0.0
Gas Meter 2:	3.2	0.1
Sample Rate:	1.6	0.0
20X20 Sample Rate:	32.5	0.9
Chemistry Sample Rate:	0.136	0.077
Total Flow Rate:	1,223.6	34.7

Measured Gaseous Data

	Meter	Range	Concentration		
HC Sample	n/a		7.7	ppm	
HC Bckgrd	n/a		3.8	ppm	
CO Sample	21.5	2	20.8	ppm	(Dry)
CO Bckgrd	0.4	2	0.4	ppm	
NOx Sample	n/a		40.5	ppm	(Dry)
NOx Bckgrd	0.4	2	0.4	ppm	
CO2 Sample	80.8	1	0.7489	%	(Wet)
CO2 Bckgrd	9.0	1	0.0607	%	
CH4 Sample	n/a	n/a	1.8	ppm	(1.1)
CH4 Bckgrd	n/a	n/a	1.9	ppm	

Particulate Data

Filter Number:	2401.0-73 (pair)	
Weight Gain:	1.642	mg
Sample Multiplier:	0.788	

Correction Factors

NOx Humidity CF:	1.003
Dry-to-Wet CF, Sample:	0.972
Dry-to-Wet CF, Bckgrd:	0.979
Dilution Factor:	18.11

Corrected Concentrations

HC	4.1	ppm	
CO	19.7	ppm	
NOx	39.0	ppm	
CO2	0.6916	%	
CH4	0.0	ppm	(1.1)

Test Cycle Data

Sample Time:	1,208.2	sec		
Work:	13.2	hp-hr	9.8	kW-hr
Reference Work:	13.4	hp-hr	10.0	kW-hr
Total Volume (Vmix):	24,637.2	scf	697.7	scm

Mass Emissions

HC	1.631	grams		
CO	16.006	grams		
NOx	52.216	grams		
Particulate	1.295	grams		
CO2	8.827	kg		
CH4	0.022	grams		
Fuel	6.1 lb		2.8 kg	

Brake-Specific Emission Results

BSHC (Cell)	0.124	g/hp-hr	0.166	g/kW-hr
CO	1.216	g/hp-hr	1.631	g/kW-hr
NOx (Cell)	3.968	g/hp-hr	5.321	g/kW-hr
Particulate	0.098	g/hp-hr	0.132	g/kW-hr
CO2	670.8	g/hp-hr	899.5	g/kW-hr
BSFC	0.466	lb/hp-hr	0.284	kg/kW-hr
NMHC	0.108	g/hp-hr	0.144	g/kW-hr
CH4	0.002	g/hp-hr	0.002	g/kW-hr

Southwest Research Institute - Department of Emissions Research
Composite Transient Emission Test Results
Project No. 08-2164-001

Engine Mode:	99 Cummins ISB-215	Date: 08/02/1999 Time: 09:25	DIESEL 2D, EM-2731-F	
Engine Desc.:	5.9 L (359 CID) 6	Program HDT: 4.04-R	HCR: 1.796	FID Resp: 1.1
Engine Cycle:	Diesel	Cell: 4 Bag Cart: 1	H= 0.131 C= 0.869 O= 0.000 X= 0.000	
Engine S/N:	56541396		Oil Code: Mobil Delvac	

Test Numbers
Cold: BASE-C3 Hot: BASE-H3

Brake-Specific Emission Results

BSHC (Cell)	0.129	g/hp-hr	0.173	g/kW-hr
CO	1.286	g/hp-hr	1.724	g/kW-hr
NOx (Cell)	4.035	g/hp-hr	5.411	g/kW-hr
Particulate	0.100	g/hp-hr	0.134	g/kW-hr
CO2	671.9	g/hp-hr	901.0	g/kW-hr
BSFC	0.467	lb/hp-hr	0.284	kg/kW-hr
NMHC	0.112	g/hp-hr	0.150	g/kW-hr
CH4	0.002	g/hp-hr	0.003	g/kW-hr
Work:	13.2	hp-hr	9.8	kW-hr
Reference Work:	13.4	hp-hr	10.0	kW-hr

Analyzed: 09/28/1999 13:50

Southwest Research Institute - Department of Emissions Research
EPA Cold Transient Emission Test Results
Project No. 08-2164-001

Engine Mode:	99 Cummins ISB-215	Test No.:	BASE-C4	DIESEL 2D, EM-2731-F	
Engine Desc.:	5.9 L (359 CID) 6	Date: 08/03/1999	Time: 09:22	HCR: 1.796	FID Resp: 1.1
Engine Cycle:	Diesel	Program HDT:	4.04-R	H= 0.131 C= 0.869 O= 0.000 X= 0.000	
Engine S/N:	56541396	Cell: 4	Bag Cart: 2	Oil Code: Mobil Delvac	

Ambient/Test Cell Conditions

Barometer:	29.2	in Hg	98.9 kPa
Engine Inlet Air			
Temperature:	72.0	°F	22.2 °C
Dew Point:	60.2	°F	15.7 °C
Abs. Humidity:	80.1	gr/lb	11.4 g/kg
Rel. Humidity:	66	%	
Dilution Air:			
Temperature:	79.0	°F	26.1 °C
Abs. Humidity	87.0	gr/lb	12.4 g/kg
Rel. Humidity:	57	%	

Sample Flows

	scfm	scmm
Blower 1 Rate:	1,189.6	33.7
Blower 2 Rate:	0.0	0.0
90 mm System:		
Gas Meter 1:	1.7	0.0
Gas Meter 2:	3.2	0.1
Sample Rate:	1.5	0.0
20X20 Sample Rate:	33.9	1.0
Chemistry Sample Rate:	0.133	0.076
Total Flow Rate:	1,225.2	34.8

Measured Gaseous Data

	Meter	Range	Concentration		
HC Sample	n/a		9.7	ppm	
HC Bckgrd	n/a		4.1	ppm	
CO Sample	31.8	2	30.5	ppm	(Dry)
CO Bckgrd	0.3	2	0.3	ppm	
NOx Sample	n/a		47.0	ppm	(Dry)
NOx Bckgrd	0.8	2	0.8	ppm	
CO2 Sample	77.0	1	0.7595	%	(Wet)
CO2 Bckgrd	5.7	1	0.0516	%	
CH4 Sample	n/a	n/a	1.8	ppm	(1.1)
CH4 Bckgrd	n/a	n/a	2.0	ppm	

Particulate Data

Filter Number:	2926.0-95 (pair)	
Weight Gain:	1.980	mg
Sample Multiplier:	0.791	

Correction Factors

NOx Humidity CF:	1.013
Dry-to-Wet CF, Sample:	0.974
Dry-to-Wet CF, Bckgrd:	0.980
Dilution Factor:	17.83

Corrected Concentrations

HC	5.8	ppm	
CO	29.2	ppm	
NOx	45.0	ppm	
CO2	0.7108	%	
CH4	-0.1	ppm	(1.1)

Test Cycle Data

Sample Time:	1,207.9	sec		
Work:	13.3	hp-hr	9.9	kW-hr
Reference Work:	13.4	hp-hr	10.0	kW-hr
Total Volume (Vmix):	24,661.8	scf	698.4	scm

Mass Emissions

HC	2.327	grams
CO	23.774	grams
NOx	60.886	grams
Particulate	1.565	grams
CO2	9.082	kg
CH4	0.000	grams
Fuel	6.3 lb	2.9 kg

Brake-Specific Emission Results

BSHC (Cell)	0.174	g/hp-hr	0.234	g/kW-hr
CO	1.782	g/hp-hr	2.390	g/kW-hr
NOx (Cell)	4.564	g/hp-hr	6.121	g/kW-hr
Particulate	0.117	g/hp-hr	0.157	g/kW-hr
CO2	680.8	g/hp-hr	913.0	g/kW-hr
BSFC	0.474	lb/hp-hr	0.288	kg/kW-hr
NMHC	0.152	g/hp-hr	0.203	g/kW-hr
CH4	0.000	g/hp-hr	0.000	g/kW-hr

Southwest Research Institute - Department of Emissions Research
EPA Hot Transient Emission Test Results
Project No. 08-2164-001

Engine Mode:	99 Cummins ISB-215	Test No.:	BASE-H4	DIESEL 2D, EM-2731-F	
Engine Desc.:	5.9 L (359 CID) 6	Date: 08/03/1999	Time: 10:02	HCR: 1.796	FID Resp: 1.1
Engine Cycle:	Diesel	Program HDT:	4.04-R	H= 0.131 C= 0.869 O= 0.000 X= 0.000	
Engine S/N:	56541396	Cell: 4	Bag Cart: 2	Oil Code: Mobil Delvac	

Ambient/Test Cell Conditions

Barometer:	29.2	in Hg	98.9 kPa
Engine Inlet Air			
Temperature:	73.0	°F	22.8 °C
Dew Point:	57.9	°F	14.4 °C
Abs. Humidity:	73.6	gr/lb	10.5 g/kg
Rel. Humidity:	59	%	
Dilution Air:			
Temperature:	78.0	°F	25.6 °C
Abs. Humidity	88.7	gr/lb	12.7 g/kg
Rel. Humidity:	60	%	

Sample Flows

	scfm	scmm
Blower 1 Rate:	1,189.5	33.7
Blower 2 Rate:	0.0	0.0
90 mm System:		
Gas Meter 1:	1.7	0.0
Gas Meter 2:	3.3	0.1
Sample Rate:	1.6	0.0
20X20 Sample Rate:	33.3	0.9
Chemistry Sample Rate:	0.133	0.076
Total Flow Rate:	1,224.4	34.7

Measured Gaseous Data

	Meter	Range	Concentration		
HC Sample	n/a		7.9	ppm	
HC Bckgrd	n/a		3.8	ppm	
CO Sample	22.3	2	21.2	ppm	(Dry)
CO Bckgrd	0.2	2	0.2	ppm	
NOx Sample	n/a		40.5	ppm	(Dry)
NOx Bckgrd	0.6	2	0.6	ppm	
CO2 Sample	75.2	1	0.7406	%	(Wet)
CO2 Bckgrd	4.6	1	0.0416	%	
CH4 Sample	n/a	n/a	1.7	ppm	(1.1)
CH4 Bckgrd	n/a	n/a	1.8	ppm	

Particulate Data

Filter Number:	2627.0-96 (pair)	
Weight Gain:	1.650	mg
Sample Multiplier:	0.779	

Correction Factors

NOx Humidity CF:	0.996
Dry-to-Wet CF, Sample:	0.973
Dry-to-Wet CF, Bckgrd:	0.980
Dilution Factor:	18.31

Test Cycle Data

Sample Time:	1,208.3	sec		
Work:	13.1	hp-hr	9.8	kW-hr
Reference Work:	13.4	hp-hr	10.0	kW-hr
Total Volume (Vmix):	24,655.3	scf	698.3	scm

Corrected Concentrations

HC	4.3	ppm	
CO	20.3	ppm	
NOx	38.9	ppm	
CO2	0.7013	%	
CH4	-0.1	ppm	(1.1)

Mass Emissions

HC	1.720	grams
CO	16.513	grams
NOx	51.713	grams
Particulate	1.286	grams
CO2	8.958	kg
CH4	0.000	grams
Fuel	6.2 lb	2.8 kg

Brake-Specific Emission Results

BSHC	(Cell)	0.131 g/hp-hr	0.175	g/kW-hr
CO		1.256 g/hp-hr	1.684	g/kW-hr
NOx	(Cell)	3.933 g/hp-hr	5.274	g/kW-hr
Particulate		0.098 g/hp-hr	0.131	g/kW-hr
CO2		681.2 g/hp-hr	913.5	g/kW-hr
BSFC		0.473 lb/hp-hr	0.288	kg/kW-hr
NMHC		0.114 g/hp-hr	0.152	g/kW-hr
CH4		0.000 g/hp-hr	0.000	g/kW-hr

Southwest Research Institute - Department of Emissions Research
Composite Transient Emission Test Results
Project No. 08-2164-001

Engine Mode:	99 Cummins ISB-215	Date: 08/03/1999 Time: 09:22	DIESEL 2D, EM-2731-F	
Engine Desc.:	5.9 L (359 CID) 6	Program HDT: 4.04-R	HCR: 1.796	FID Resp: 1.1
Engine Cycle:	Diesel	Cell: 4 Bag Cart: 2	H= 0.131 C= 0.869 O= 0.000 X= 0.000	
Engine S/N:	56541396		Oil Code: Mobil Delvac	

Test Numbers
Cold: BASE-C4 Hot: BASE-H4

Brake-Specific Emission Results

BSHC (Cell)	0.137	g/hp-hr	0.184	g/kW-hr
CO	1.332	g/hp-hr	1.786	g/kW-hr
NOx (Cell)	4.024	g/hp-hr	5.396	g/kW-hr
Particulate	0.101	g/hp-hr	0.135	g/kW-hr
CO2	681.2	g/hp-hr	913.4	g/kW-hr
BSFC	0.474	lb/hp-hr	0.288	kg/kW-hr
NMHC	0.119	g/hp-hr	0.160	g/kW-hr
CH4	0.000	g/hp-hr	0.000	g/kW-hr
Work:	13.2	hp-hr	9.8	kW-hr
Reference Work:	13.4	hp-hr	10.0	kW-hr

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Southwest Research Institute - Department of Emissions Research
EPA Cold Transient Emission Test Results
Project No. 08-2164-001

Engine Mode:	99 Cummins ISB-215	Test No.: FT-C1		DIESEL FT fuel, EM-2795-F	
Engine Desc.:	5.9 L (359 CID) 6	Date: 08/09/1999	Time: 10:45	HCR: 2.119	FID Resp: 1.1
Engine Cycle:	Diesel	Program HDT:	4.04-R	H= 0.151 C= 0.849 O= 0.000 X= 0.000	
Engine S/N:	56541396	Cell: 4	Bag Cart: 1	Oil Code: Mobil Delvac	

Ambient/Test Cell Conditions

Barometer:	29.1	in Hg	98.5 kPa
Engine Inlet Air			
Temperature:	73.0	°F	22.8 °C
Dew Point:	58.6	°F	14.8 °C
Abs. Humidity:	75.8	gr/lb	10.8 g/kg
Rel. Humidity:	61	%	
Dilution Air:			
Temperature:	79.0	°F	26.1 °C
Abs. Humidity	82.1	gr/lb	11.7 g/kg
Rel. Humidity:	54	%	

Sample Flows

	scfm	scmm
Blower 1 Rate:	1,176.3	33.3
Blower 2 Rate:	0.0	0.0
90 mm System:		
Gas Meter 1:	1.7	0.0
Gas Meter 2:	3.3	0.1
Sample Rate:	1.6	0.0
20X20 Sample Rate:	33.4	0.9
47 mm Sample Rate:	2.1	0.1
Chemistry Sample Rate:	0.135	0.077
Total Flow Rate:	1,213.5	34.4

Measured Gaseous Data

	Meter	Range	Concentration		
HC Sample	n/a		6.1	ppm	
HC Bckgrd	n/a		3.4	ppm	
CO Sample	17.3	2	16.7	ppm	(Dry)
CO Bckgrd	2.9	2	2.8	ppm	
NOx Sample	n/a		34.8	ppm	(Dry)
NOx Bckgrd	0.6	2	0.6	ppm	
CO2 Sample	75.0	1	0.6713	%	(Wet)
CO2 Bckgrd	8.3	1	0.0559	%	
CH4 Sample	n/a	n/a	1.8	ppm	(1.1)
CH4 Bckgrd	n/a	n/a	1.9	ppm	

Particulate Data

Filter Number:	2825.0-125 (pair)	
Weight Gain:	1.045	mg
Sample Multiplier:	0.756	

Correction Factors

NOx Humidity CF:	1.002
Dry-to-Wet CF, Sample:	0.974
Dry-to-Wet CF, Bckgrd:	0.981
Dilution Factor:	19.01

Corrected Concentrations

HC	2.9	ppm	
CO	13.6	ppm	
NOx	33.3	ppm	
CO2	0.6183	%	
CH4	0.0	ppm	(1.1)

Test Cycle Data

Sample Time:	1,207.6	sec		
Work:	11.8	hp-hr	8.8	kW-hr
Reference Work:	12.0	hp-hr	8.9	kW-hr
Total Volume (Vmix):	24,421.2	scf	691.6	scm

Mass Emissions

HC	1.171	grams
CO	10.935	grams
NOx	44.205	grams
Particulate	0.790	grams
CO2	7.824	kg
CH4	0.000	grams
Fuel	5.6 lb	2.5 kg

Brake-Specific Emission Results

BSHC (Cell)	0.099	g/hp-hr	0.133	g/kW-hr
CO	0.925	g/hp-hr	1.241	g/kW-hr
NOx (Cell)	3.740	g/hp-hr	5.015	g/kW-hr
Particulate	0.067	g/hp-hr	0.090	g/kW-hr
CO2	661.9	g/hp-hr	887.6	g/kW-hr
BSFC	0.470	lb/hp-hr	0.286	kg/kW-hr
NMHC	0.084	g/hp-hr	0.113	g/kW-hr
CH4	0.000	g/hp-hr	0.000	g/kW-hr

Southwest Research Institute - Department of Emissions Research
EPA Hot Transient Emission Test Results
Project No. 08-2164-001

Engine Mode:	99 Cummins ISB-215	Test No.: FT-H1		DIESEL FT fuel, EM-2795-F	
Engine Desc.:	5.9 L (359 CID) 6	Date: 08/09/1999	Time: 11:53	HCR: 2.119	FID Resp: 1.1
Engine Cycle:	Diesel	Program HDT:	4.04-R	H= 0.151 C= 0.849 O= 0.000 X= 0.000	
Engine S/N:	56541396	Cell: 4	Bag Cart: 1	Oil Code: Mobil Delvac	

Ambient/Test Cell Conditions

Barometer:	29.1	in Hg	98.5 kPa
Engine Inlet Air			
Temperature:	74.0	°F	23.3 °C
Dew Point:	60.2	°F	15.7 °C
Abs. Humidity:	80.4	gr/lb	11.5 g/kg
Rel. Humidity:	62	%	
Dilution Air:			
Temperature:	80.0	°F	26.7 °C
Abs. Humidity	85.8	gr/lb	12.3 g/kg
Rel. Humidity:	54	%	

Sample Flows

	scfm	scmm
Blower 1 Rate:	1,184.0	33.5
Blower 2 Rate:	0.0	0.0
90 mm System:		
Gas Meter 1:	1.7	0.0
Gas Meter 2:	3.3	0.1
Sample Rate:	1.6	0.0
20X20 Sample Rate:	29.6	0.8
47 mm Sample Rate:	2.1	0.1
Chemistry Sample Rate:	0.135	0.077
Total Flow Rate:	1,217.5	34.6

Measured Gaseous Data

	Meter	Range	Concentration		
HC Sample	n/a		5.8	ppm	
HC Bckgrd	n/a		4.4	ppm	
CO Sample	12.7	2	12.2	ppm	(Dry)
CO Bckgrd	0.7	2	0.7	ppm	
NOx Sample	n/a		27.8	ppm	(Dry)
NOx Bckgrd	0.4	2	0.4	ppm	
CO2 Sample	74.0	1	0.6584	%	(Wet)
CO2 Bckgrd	7.9	1	0.0532	%	
CH4 Sample	n/a	n/a	1.7	ppm	(1.1)
CH4 Bckgrd	n/a	n/a	1.9	ppm	

Particulate Data

Filter Number:	2826.0-126 (pair)	
Weight Gain:	0.965	mg
Sample Multiplier:	0.755	

Correction Factors

NOx Humidity CF:	1.014
Dry-to-Wet CF, Sample:	0.974
Dry-to-Wet CF, Bckgrd:	0.981
Dilution Factor:	19.39

Test Cycle Data

Sample Time:	1,207.8	sec		
Work:	11.8	hp-hr	8.8	kW-hr
Reference Work:	12.0	hp-hr	8.9	kW-hr
Total Volume (Vmix):	24,504.6	scf	694.0	scm

Corrected Concentrations

HC	1.6	ppm	
CO	11.2	ppm	
NOx	26.6	ppm	
CO2	0.6079	%	
CH4	-0.1	ppm	(1.1)

Mass Emissions

HC	0.652	grams
CO	9.030	grams
NOx	35.863	grams
Particulate	0.729	grams
CO2	7.718	kg
CH4	0.000	grams
Fuel	5.5 lb	2.5 kg

Brake-Specific Emission Results

BSHC (Cell)	0.055	g/hp-hr	0.074	g/kW-hr
CO	0.763	g/hp-hr	1.023	g/kW-hr
NOx (Cell)	3.029	g/hp-hr	4.062	g/kW-hr
Particulate	0.062	g/hp-hr	0.083	g/kW-hr
CO2	651.9	g/hp-hr	874.2	g/kW-hr
BSFC	0.463	lb/hp-hr	0.282	kg/kW-hr
NMHC	0.047	g/hp-hr	0.063	g/kW-hr
CH4	0.000	g/hp-hr	0.000	g/kW-hr

Southwest Research Institute - Department of Emissions Research
Composite Transient Emission Test Results
Project No. 08-2164-001

Engine Mode:	99 Cummins ISB-215	Date: 08/09/1999 Time: 10:45	DIESEL FT fuel, EM-2795-F	
Engine Desc.:	5.9 L (359 CID) 6	Program HDT: 4.04-R	HCR: 2.119	FID Resp: 1.1
Engine Cycle:	Diesel	Cell: 4 Bag Cart: 1	H= 0.151 C= 0.849 O= 0.000 X= 0.000	
Engine S/N:	56541396		Oil Code: Mobil Delvac	

Test Numbers
Cold: FT-C1 Hot: FT-H1

Brake-Specific Emission Results

BSHC (Cell)	0.061	g/hp-hr	0.082	g/kW-hr
CO	0.786	g/hp-hr	1.054	g/kW-hr
NOx (Cell)	3.130	g/hp-hr	4.198	g/kW-hr
Particulate	0.062	g/hp-hr	0.084	g/kW-hr
CO2	653.3	g/hp-hr	876.1	g/kW-hr
BSFC	0.464	lb/hp-hr	0.282	kg/kW-hr
NMHC	0.052	g/hp-hr	0.070	g/kW-hr
CH4	0.000	g/hp-hr	0.000	g/kW-hr
Work:	11.8	hp-hr	8.8	kW-hr
Reference Work:	12.0	hp-hr	8.9	kW-hr

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Southwest Research Institute - Department of Emissions Research
EPA Cold Transient Emission Test Results
Project No. 08-2164-001

Engine Mode:	99 Cummins ISB-215	Test No.: FT-C2		DIESEL FT fuel, EM-2795-F	
Engine Desc.:	5.9 L (359 CID) 6	Date: 08/10/1999	Time: 10:00	HCR: 2.119	FID Resp: 1.1
Engine Cycle:	Diesel	Program HDT: 4.04-R		H= 0.151 C= 0.849 O= 0.000 X= 0.000	
Engine S/N:	56541396	Cell: 4	Bag Cart: 1	Oil Code: Mobil Delvac	

Ambient/Test Cell Conditions

Barometer:	29.1	in Hg	98.4 kPa
Engine Inlet Air			
Temperature:	73.0	°F	22.8 °C
Dew Point:	59.3	°F	15.2 °C
Abs. Humidity:	77.9	gr/lb	11.1 g/kg
Rel. Humidity:	62	%	
Dilution Air:			
Temperature:	78.0	°F	25.6 °C
Abs. Humidity	89.3	gr/lb	12.8 g/kg
Rel. Humidity:	60	%	

Sample Flows

	scfm	scmm
Blower 1 Rate:	1,182.1	33.5
Blower 2 Rate:	0.0	0.0
90 mm System:		
Gas Meter 1:	1.7	0.0
Gas Meter 2:	3.2	0.1
Sample Rate:	1.6	0.0
20X20 Sample Rate:	33.8	1.0
47 mm Sample Rate:	2.3	0.1
Chemistry Sample Rate:	0.136	0.078
Total Flow Rate:	1,219.9	34.6

Measured Gaseous Data

	Meter	Range	Concentration		
HC Sample	n/a		6.0	ppm	
HC Bckgrd	n/a		3.4	ppm	
CO Sample	15.3	2	14.7	ppm	(Dry)
CO Bckgrd	1.4	2	1.3	ppm	
NOx Sample	n/a		34.2	ppm	(Dry)
NOx Bckgrd	0.4	2	0.4	ppm	
CO2 Sample	74.2	1	0.6609	%	(Wet)
CO2 Bckgrd	7.7	1	0.0518	%	
CH4 Sample	n/a	n/a	1.8	ppm	(1.1)
CH4 Bckgrd	n/a	n/a	2.0	ppm	

Particulate Data

Filter Number:	2827.0-127 (pair)	
Weight Gain:	1.052	mg
Sample Multiplier:	0.776	

Correction Factors

NOx Humidity CF:	1.008
Dry-to-Wet CF, Sample:	0.973
Dry-to-Wet CF, Bckgrd:	0.980
Dilution Factor:	19.31

Test Cycle Data

Sample Time:	1,207.7	sec		
Work:	11.9	hp-hr	8.9	kW-hr
Reference Work:	12.0	hp-hr	8.9	kW-hr
Total Volume (Vmix):	24,552.5	scf	695.3	scm

Corrected Concentrations

HC	2.7	ppm	
CO	13.0	ppm	
NOx	32.8	ppm	
CO2	0.6118	%	
CH4	-0.1	ppm	(1.1)

Mass Emissions

HC	1.119	grams
CO	10.513	grams
NOx	44.005	grams
Particulate	0.817	grams
CO2	7.782	kg
CH4	0.000	grams
Fuel	5.5 lb	2.5 kg

Brake-Specific Emission Results

BSHC (Cell)	0.094	g/hp-hr	0.126	g/kW-hr
CO	0.883	g/hp-hr	1.185	g/kW-hr
NOx (Cell)	3.698	g/hp-hr	4.959	g/kW-hr
Particulate	0.069	g/hp-hr	0.092	g/kW-hr
CO2	654.0	g/hp-hr	877.0	g/kW-hr
BSFC	0.465	lb/hp-hr	0.283	kg/kW-hr
NMHC	0.080	g/hp-hr	0.107	g/kW-hr
CH4	0.000	g/hp-hr	0.000	g/kW-hr

Southwest Research Institute - Department of Emissions Research
EPA Hot Transient Emission Test Results
Project No. 08-2164-001

Engine Mode:	99 Cummins ISB-215	Test No.: FT-H2		DIESEL FT fuel, EM-2795-F	
Engine Desc.:	5.9 L (359 CID) 6	Date: 08/10/1999	Time: 10:40	HCR: 2.119	FID Resp: 1.1
Engine Cycle:	Diesel	Program HDT:	4.04-R	H= 0.151 C= 0.849 O= 0.000 X= 0.000	
Engine S/N:	56541396	Cell: 4	Bag Cart: 1	Oil Code: Mobil Delvac	

Ambient/Test Cell Conditions

Barometer:	29.1	in Hg	98.4 kPa
Engine Inlet Air			
Temperature:	73.0	°F	22.8 °C
Dew Point:	58.6	°F	14.8 °C
Abs. Humidity:	75.9	gr/lb	10.8 g/kg
Rel. Humidity:	61	%	
Dilution Air:			
Temperature:	80.0	°F	26.7 °C
Abs. Humidity	85.9	gr/lb	12.3 g/kg
Rel. Humidity:	54	%	

Sample Flows

	scfm	scmm
Blower 1 Rate:	1,187.1	33.6
Blower 2 Rate:	0.0	0.0
90 mm System:		
Gas Meter 1:	1.7	0.0
Gas Meter 2:	3.3	0.1
Sample Rate:	1.6	0.0
20X20 Sample Rate:	32.8	0.9
47 mm Sample Rate:	2.2	0.1
Chemistry Sample Rate:	0.136	0.077
Total Flow Rate:	1,223.8	34.7

Measured Gaseous Data

	Meter	Range	Concentration		
HC Sample	n/a		6.4	ppm	
HC Bckgrd	n/a		3.8	ppm	
CO Sample	13.7	2	13.1	ppm	(Dry)
CO Bckgrd	1.9	2	1.8	ppm	
NOx Sample	n/a		29.0	ppm	(Dry)
NOx Bckgrd	0.7	2	0.7	ppm	
CO2 Sample	73.8	1	0.6558	%	(Wet)
CO2 Bckgrd	8.7	1	0.0587	%	
CH4 Sample	n/a	n/a	1.8	ppm	(1.1)
CH4 Bckgrd	n/a	n/a	2.0	ppm	

Particulate Data

Filter Number:	2828.0-128 (pair)	
Weight Gain:	0.947	mg
Sample Multiplier:	0.761	

Correction Factors

NOx Humidity CF:	1.002
Dry-to-Wet CF, Sample:	0.974
Dry-to-Wet CF, Bckgrd:	0.981
Dilution Factor:	19.46

Test Cycle Data

Sample Time:	1,207.9	sec		
Work:	11.9	hp-hr	8.8	kW-hr
Reference Work:	12.0	hp-hr	8.9	kW-hr
Total Volume (Vmix):	24,634.5	scf	697.7	scm

Corrected Concentrations

HC	2.8	ppm	
CO	11.1	ppm	
NOx	27.6	ppm	
CO2	0.6001	%	
CH4	-0.1	ppm	(1.1)

Mass Emissions

HC	1.155	grams		
CO	8.987	grams		
NOx	36.876	grams		
Particulate	0.721	grams		
CO2	7.659	kg		
CH4	0.000	grams		
Fuel	5.4 lb		2.5 kg	

Brake-Specific Emission Results

BSHC	(Cell)	0.097 g/hp-hr	0.131	g/kW-hr
CO		0.758 g/hp-hr	1.016	g/kW-hr
NOx	(Cell)	3.109 g/hp-hr	4.170	g/kW-hr
Particulate		0.061 g/hp-hr	0.082	g/kW-hr
CO2		645.8 g/hp-hr	866.1	g/kW-hr
BSFC		0.459 lb/hp-hr	0.279	kg/kW-hr
NMHC		0.083 g/hp-hr	0.111	g/kW-hr
CH4		0.000 g/hp-hr	0.000	g/kW-hr

Southwest Research Institute - Department of Emissions Research
Composite Transient Emission Test Results
Project No. 08-2164-001

Engine Mode:	99 Cummins ISB-215	Date: 08/10/1999 Time: 10:00	DIESEL FT fuel, EM-2795-F	
Engine Desc.:	5.9 L (359 CID) 6	Program HDT: 4.04-R	HCR: 2.119	FID Resp: 1.1
Engine Cycle:	Diesel	Cell: 4 Bag Cart: 1	H= 0.151 C= 0.849 O= 0.000 X= 0.000	
Engine S/N:	56541396		Oil Code: Mobil Delvac	

Test Numbers
Cold: FT-C2 Hot: FT-H2

Brake-Specific Emission Results

BSHC (Cell)	0.097	g/hp-hr	0.130	g/kW-hr
CO	0.776	g/hp-hr	1.040	g/kW-hr
NOx (Cell)	3.194	g/hp-hr	4.283	g/kW-hr
Particulate	0.062	g/hp-hr	0.083	g/kW-hr
CO2	647.0	g/hp-hr	867.6	g/kW-hr
BSFC	0.460	lb/hp-hr	0.280	kg/kW-hr
NMHC	0.082	g/hp-hr	0.110	g/kW-hr
CH4	0.000	g/hp-hr	0.000	g/kW-hr
Work:	11.9	hp-hr	8.8	kW-hr
Reference Work:	12.0	hp-hr	8.9	kW-hr

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APPENDIX J

APPENDIX B

HYDROCARBON SPECIATION DATA

Page	Table	Title
B-1	B-1	Cold-Start Hydrocarbon Speciation Data (Background Corrected)
B-5	B-2	Hot-Start Hydrocarbon Speciation Data (Background Corrected)
B-9	B-3	Composite Hydrocarbon Speciation Data (Background Corrected)

TABLE B-1. COLD-START HYDROCARBON SPECIATION DATA (BACKGROUND CORRECTED)

COMPOUND	COLD TRANSIENT, mg/hp-hr					
	BASE (SO)			FT		
	8/2/99	8/3/99	AVG.	8/9/99	8/10/99	AVG.
METHANE	4.2	0.0	2.1	0.0	0.0	0.0
ETHANE	0.5	0.8	0.6	1.0	0.9	0.9
ETHYLENE	21.6	22.4	22.0	12.8	11.0	11.9
PROPANE	0.0	0.0	0.0	0.0	0.2	0.1
PROPYLENE	4.6	4.4	4.5	3.0	2.9	2.9
ACETYLENE	4.8	5.0	4.9	2.5	2.1	2.3
PROPADIENE	0.0	0.0	0.0	0.0	0.0	0.0
BUTANE	0.2	0.3	0.3	0.3	0.3	0.3
TRANS-2-BUTENE	0.4	0.5	0.5	0.0	0.0	0.0
1-BUTENE	1.4	1.7	1.5	1.1	1.0	1.0
2-METHYLPROPENE (ISOBUTYLENE)	1.1	1.2	1.2	0.4	0.6	0.5
2,2-DIMETHYLPROPANE (NEOPENTANE)	0.3	0.3	0.3	0.0	0.0	0.0
PROPYNE	0.0	0.0	0.0	0.0	0.0	0.0
1,3-BUTADIENE	2.0	2.6	2.3	1.0	1.4	1.2
2-METHYLPROPANE (ISOBUTANE)	0.4	0.3	0.3	0.0	0.4	0.2
1-BUTYNE	0.0	0.0	0.0	0.0	0.0	0.0
METHANOL	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-BUTENE	0.1	0.0	trace	0.0	0.0	0.0
3-METHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
ETHANOL	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLBUTANE (ISOPENTANE)	0.0	1.5	0.8	0.2	0.2	0.2
2-BUTYNE	0.0	0.0	0.0	0.0	0.0	0.0
1-PENTENE	0.8	0.9	0.9	0.5	0.5	0.5
2-METHYL-1-BUTENE	0.4	0.3	0.3	0.6	0.0	0.3
PENTANE	0.2	0.6	0.4	0.6	0.0	0.3
UNIDENTIFIED C5 OLEFINS	1.4	0.0	0.7	0.0	0.0	0.0
2-METHYL-1,3-BUTADIENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-PENTENE	0.2	1.0	0.6	0.0	0.0	0.0
2-METHYL-2-BUTENE	0.3	0.0	0.2	0.0	0.0	0.0
TERT-BUTANOL	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOPENTADIENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLBUTANE	0.0	0.0	0.0	0.9	0.0	0.5
CYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYL-1-PENTENE	0.5	0.2	0.3	0.0	0.0	0.0
3-METHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLBUTANE	0.0	0.0	0.0	0.0	0.0	0.0
MTBE	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLPENTANE	0.0	0.4	0.2	0.6	0.0	0.3
4-METHYL-TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLPENTANE	0.3	0.2	0.2	0.0	0.0	0.0
2-METHYL-1-PENTENE	0.0	0.8	0.4	0.0	0.5	0.3
1-HEXENE	0.0	0.8	0.4	0.0	0.5	0.3
HEXANE	0.0	0.2	0.1	0.9	0.0	0.5
UNIDENTIFIED C6 OLEFINS	0.0	0.6	0.3	0.0	0.0	0.0
TRANS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
DI-ISOPROPYL ETHER	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLCYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
ETBE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-CIS-2-PENTENE	0.0	0.3	0.1	0.0	0.0	0.0
2,2-DIMETHYLPENTANE, NOTE A	0.0	0.0	0.0	0.0	0.0	0.0
METHYLCYCLOPENTANE, NOTE A	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLPENTANE	0.0	0.4	0.2	0.0	0.0	0.0
2,2,3-TRIMETHYLBUTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYLCYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0

TABLE B-1 (CONT'D). COLD-START HYDROCARBON SPECIATION DATA (BACKGROUND CORRECTED)

COMPOUND	COLD TRANSIENT, mg/hp-hr					
	BASE (SO)			FT		
	8/2/99	8/3/99	AVG.	8/9/99	8/10/99	AVG.
BENZENE	1.4	1.7	1.6	0.8	0.8	0.8
3-METHYL-1-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLPENTANE	0.0	0.0	0.0	0.5	0.0	0.3
1,1-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-AMYL METHYL ETHER	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOHEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLHEXANE	0.3	0.0	0.1	0.5	0.0	0.3
CIS-1,3-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,2-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,3-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,4-TRIMETHYLPENTANE	0.0	0.0	0.0	0.1	0.1	0.1
2-METHYL-1-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-3-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
HEPTANE	0.0	0.2	0.1	0.6	0.0	0.3
CIS-3-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C7	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-TRANS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
METHYLCYCLOHEXANE	0.1	0.3	0.2	0.0	0.0	0.0
CIS-1,2-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1,3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,3-TRIMETHYLPENTANE	0.0	0.0	trace	0.0	0.0	0.0
2,5-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLHEXANE	0.4	0.1	0.2	0.0	0.0	0.0
1-TRANS-2-CIS-4-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1-TRANS-2-CIS-3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,4-TRIMETHYLPENTANE	0.0	0.0	0.0	0.5	0.0	0.2
2,3,3-TRIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TOLUENE	1.0	0.7	0.8	1.1	0.1	0.6
2,3-DIMETHYLHEXANE	0.2	0.2	0.2	0.0	0.0	0.0
1,1,2-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYLHEXANE, NOTE B	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYLHEPTANE	0.0	0.0	0.0	0.6	0.0	0.3
3-METHYLHEPTANE	0.0	0.1	0.1	0.0	0.5	0.3
1-CIS,2-TRANS,3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,3-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,4-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,5-TRIMETHYLHEXANE	0.3	0.1	0.2	0.0	0.4	0.2
TRANS-1-METHYL-3-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1-METHYL-3-ETHYLCYCLOPENTANE	0.3	0.0	0.1	0.0	0.5	0.3
1,1-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1-METHYL-2-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-1-ETHYL-CYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,2-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-4-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0

TABLE B-1 (CONT'D). COLD-START HYDROCARBON SPECIATION DATA (BACKGROUND CORRECTED)

COMPOUND	COLD TRANSIENT, mg/hp-hr					
	BASE (SO)			FT		
	8/2/99	8/3/99	AVG.	8/9/99	8/10/99	AVG.
OCTANE	0.3	0.8	0.5	0.5	0.5	0.5
UNIDENTIFIED C8	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,3-DIMETHYLCYCLOHEXANE, NOTE C	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
ISOPROPYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,5-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1-METHYL-2-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
4,4-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.4	0.2
CIS-1,2-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,6-DIMETHYLHEPTANE, NOTE D	0.4	0.6	0.5	0.0	0.0	0.0
1,1,3-TRIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,5-DIMETHYLHEPTANE, NOTE E	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,5-DIMETHYLHEPTANE, NOTE E	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLBENZENE	0.4	0.5	0.5	0.5	0.5	0.5
2,3,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
m-& p-XYLENE	0.6	1.1	0.9	0.9	0.9	0.9
4-METHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
4-ETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLOCTANE	0.0	0.0	0.0	0.8	0.8	0.8
3-METHYLOCTANE	0.2	0.0	0.1	0.0	0.0	0.0
STYRENE	0.0	0.0	0.0	0.0	0.0	0.0
o-XYLENE	0.8	0.5	0.7	0.0	0.0	0.0
1-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-3-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
NONANE	0.5	1.1	0.8	1.9	1.3	1.6
TRANS-2-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
ISOPROPYLBENZENE (CUMENE)	0.0	0.2	0.1	0.0	0.0	0.0
2,2-DIMETHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLOCTANE	0.2	0.4	0.3	0.0	0.0	0.0
n-PROPYLBENZENE	0.2	0.0	0.1	0.0	0.0	0.0
1-METHYL-3-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,3,5-TRIMETHYLBENZENE	0.3	0.0	0.2	0.0	0.0	0.0
1-METHYL-2-ETHYLBENZENE	0.3	0.0	0.1	0.7	0.0	0.3
1,2,4-TRIMETHYLBENZENE	0.4	0.0	0.2	0.0	0.0	0.0
TERT-BUTYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-DECENE	0.0	0.0	0.0	0.0	0.0	0.0
DECANE, NOTE F	0.4	0.0	0.2	1.6	0.0	0.8
ISOBUTYLBENZENE, NOTE F	0.4	0.0	0.2	1.5	0.0	0.8
1,3,-DIMETHYL-5-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
METHYLPROPYLBENZENE (sec butylbenzene)	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-3-ISOPROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,3-TRIMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-4-ISOPROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
INDAN	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-2-ISOPROPYLBENZENE	0.0	0.0	0.0	0.4	0.0	0.2
1,3-DIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,4-DIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-3-N-PROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-4-N-PROPYLBENZENE, NOTE G	0.0	0.0	0.0	0.6	0.0	0.3
1,2 DIETHYLBENZENE	0.0	0.5	0.2	0.0	0.0	0.0
1-METHYL-2-N-PROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,4-DIMETHYL-2-ETHYLBENZENE	0.0	0.0	0.0	0.8	0.0	0.4
1,3-DIMETHYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.4	0.4	0.4
1,2-DIMETHYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,3-DIMETHYL-2-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0

TABLE B-1 (CONT'D). COLD-START HYDROCARBON SPECIATION DATA (BACKGROUND CORRECTED)

COMPOUND	COLD TRANSIENT, mg/hp-hr					
	BASE (SO)			FT		
	8/2/99	8/3/99	AVG.	8/9/99	8/10/99	AVG.
UNDECANE	1.3	0.0	0.7	2.8	1.6	2.2
1,2-DIMETHYL-3-ETHYLBENZENE	0.0	0.7	0.3	0.0	0.0	0.0
1,2,4,5-TETRAMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLBUTYLBENZENE (sec AMYLBENZENE)	0.0	0.0	0.0	0.0	0.0	0.0
3,4 DIMETHYLCUMENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,3,5-TETRAMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-1-BUT-2-METHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,3,4-TETRAMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
N-PENT-BENZENE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-1-BUT-3,5-DIMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-1-BUTYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.4	0.0	0.2
NAPHTHALENE	0.0	0.0	0.0	0.0	0.0	0.0
DODECANE	0.8	0.5	0.6	0.9	0.0	0.4
1,3,5-TRIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,4-TRIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
HEXYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C9-C12+	0.4	0.9	0.6	1.8	2.3	2.0
FORMALDEHYDE	24.1	23.4	23.7	9.8	10.5	10.2
ACETALDEHYDE	9.1	9.2	9.1	4.2	4.1	4.2
ACROLEIN	3.9	4.4	4.1	1.4	1.6	1.5
ACETONE	1.8	2.0	1.9	0.8	0.8	0.8
PROPIONALDEHYDE	1.7	1.6	1.6	0.9	1.2	1.1
CROTONALDEHYDE	3.1	2.6	2.8	1.4	1.4	1.4
ISOBUTYRALDEHYDE, NOTE H	0.7	0.7	0.7	0.4	0.4	0.4
METHYL ETHYL KETONE, NOTE H	0.7	0.7	0.7	0.4	0.4	0.4
BENZALDEHYDE	1.4	1.0	1.2	0.5	0.7	0.6
ISOVALERALDEHYDE	1.2	0.4	0.8	0.2	0.1	0.2
VALERALDEHYDE	1.1	1.1	1.1	0.7	0.7	0.7
O-TOLUALDEHYDE	0.0	0.1	trace	0.0	0.0	0.0
M/P-TOLUALDEHYDE	2.4	2.5	2.4	1.5	0.8	1.2
HEXANALDEHYDE	0.8	0.6	0.7	0.5	0.4	0.5
DIMETHYLBENZALDEHYDE	0.5	0.6	0.5	0.1	1.4	0.8
SUMMED SPECIATED VALUES	109.9	109.7	109.8	70.6	58.1	64.3

A - 2,2-Dimethylpentane and methylcyclopentane co-elute. GC peak area split equally between the two compounds.
B - 3-Methyl-3-ethy-pentane co-elutes with reported compound. Not reported separately.
C - Cis-1,4-Dimethylcyclohexane co-elutes with reported compound. Not reported separately.
D - Propylcyclopentane co-elutes with reported compound. Not reported separately.
E - 2,5-Dimethylheptane and 3,5-dimethylheptane co-elute. GC peak area split equally between the two compounds.
F - Decane and isobutylbenzene co-elute. GC peak area split equally between the two compounds.
G - n-Butylbenzene co-elutes with reported compound. Not reported separately.
H - Isobutyraldehyde and methyl ethyl ketone co-elute. LC peak area split equally between the two compounds.

TABLE B-2. HOT-START HYDROCARBON SPECIATION DATA (BACKGROUND CORRECTED)

COMPOUND	HOT TRANSIENT, mg/hp-hr					
	BASE (SO)			FT		
	8/2/99	8/3/99	AVG.	8/9/99	8/10/99	AVG.
METHANE	1.7	0.0	0.8	0.0	0.0	0.0
ETHANE	0.9	0.6	0.7	0.0	0.0	0.0
ETHYLENE	15.5	16.1	15.8	11.3	10.9	11.1
PROPANE	0.2	0.1	0.2	0.7	0.0	0.4
PROPYLENE	3.5	3.5	3.5	2.9	2.8	2.9
ACETYLENE	3.5	4.1	3.8	2.5	2.6	2.6
PROPADIENE	0.0	0.0	0.0	0.0	0.0	0.0
BUTANE	0.0	0.0	0.0	0.4	0.0	0.2
TRANS-2-BUTENE	0.2	0.2	0.2	0.0	0.0	0.0
1-BUTENE	1.5	1.2	1.4	1.0	1.0	1.0
2-METHYLPROPENE (ISOBUTYLENE)	0.9	0.9	0.9	0.5	0.8	0.7
2,2-DIMETHYLPROPANE (NEOPENTANE)	1.9	0.1	1.0	0.0	0.0	0.0
PROPYNE	0.1	0.4	0.3	0.4	0.0	0.2
1,3-BUTADIENE	1.4	1.3	1.3	1.2	1.2	1.2
2-METHYLPROPANE (ISOBUTANE)	0.1	0.2	0.1	0.0	0.5	0.2
1-BUTYNE	0.0	0.0	0.0	0.0	0.0	0.0
METHANOL	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
ETHANOL	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLBUTANE (ISOPENTANE)	0.0	0.0	0.0	0.0	0.4	0.2
2-BUTYNE	0.0	0.0	0.0	0.0	0.0	0.0
1-PENTENE	0.0	0.8	0.4	0.0	0.0	0.0
2-METHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
PENTANE	0.0	0.4	0.2	0.3	0.0	0.1
UNIDENTIFIED C5 OLEFINS	1.4	0.0	0.7	0.8	0.9	0.9
2-METHYL-1,3-BUTADIENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-PENTENE	0.0	0.4	0.2	0.0	0.0	0.0
2-METHYL-2-BUTENE	0.4	0.0	0.2	0.0	0.0	0.0
TERT-BUTANOL	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOPENTADIENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLBUTANE	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYL-1-PENTENE	0.0	0.4	0.2	0.0	0.0	0.0
3-METHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLBUTANE	0.0	0.3	0.2	0.0	0.0	0.0
MTBE	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLPENTANE	0.2	0.0	0.1	0.0	0.0	0.0
4-METHYL-TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-1-PENTENE	0.0	0.6	0.3	0.2	0.0	0.1
1-HEXENE	0.0	0.6	0.3	0.4	0.0	0.2
HEXANE	0.8	0.0	0.4	0.7	0.4	0.6
UNIDENTIFIED C6 OLEFINS	0.0	0.2	0.1	0.0	0.0	0.0
TRANS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
DI-ISOPROPYL ETHER	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLCYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
ETBE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-CIS-2-PENTENE	0.0	0.4	0.2	0.0	0.0	0.0
2,2-DIMETHYLPENTANE, NOTE A	0.0	0.0	0.0	0.0	0.0	0.0
METHYLCYCLOPENTANE, NOTE A	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,3-TRIMETHYLBUTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYLCYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0

TABLE B-2 (CONT'D). HOT-START HYDROCARBON SPECIATION DATA (BACKGROUND CORRECTED)

COMPOUND	HOT TRANSIENT, mg/hp-hr					
	BASE (SO)			FT		
	8/2/99	8/3/99	AVG.	8/9/99	8/10/99	AVG.
BENZENE	1.0	1.2	1.1	0.9	0.8	0.8
3-METHYL-1-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLHEXANE	0.0	0.0	0.0	0.5	0.0	0.2
2,3-DIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-AMYL METHYL ETHER	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOHEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,3-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,2-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,3-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,4-TRIMETHYLPENTANE	0.0	0.0	0.0	0.5	0.0	0.2
2-METHYL-1-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-3-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
HEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C7	0.2	0.0	0.1	0.0	0.0	0.0
2-METHYL-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-TRANS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
METHYLCYCLOHEXANE	0.2	0.0	0.1	0.0	0.0	0.0
CIS-1,2-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1,3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,3-TRIMETHYLPENTANE	0.0	0.0	trace	0.4	0.0	0.2
2,5-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLHEXANE	0.4	0.0	0.2	0.0	0.0	0.0
1-TRANS-2-CIS-4-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1-TRANS-2-CIS-3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,4-TRIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,3-TRIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TOLUENE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLHEXANE	0.3	0.0	0.2	0.0	0.0	0.0
1,1,2-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYLHEXANE, NOTE B	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYLHEPTANE	0.0	0.1	0.1	0.6	0.5	0.6
3-METHYLHEPTANE	0.0	0.3	0.2	0.6	0.6	0.6
1-CIS,2-TRANS,3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,3-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,4-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,5-TRIMETHYLHEXANE	0.3	0.0	0.1	0.0	0.0	0.0
TRANS-1-METHYL-3-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1-METHYL-3-ETHYLCYCLOPENTANE	0.3	0.6	0.4	0.0	0.0	0.0
1,1-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1-METHYL-2-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-1-ETHYL-CYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,2-DIMETHYLCYCLOHEXANE	0.0	0.3	0.1	0.0	0.0	0.0
1-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-4-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0

TABLE B-2 (CONT'D). HOT-START HYDROCARBON SPECIATION DATA (BACKGROUND CORRECTED)

COMPOUND	HOT TRANSIENT, mg/hp-hr					
	BASE (SO)			FT		
	8/2/99	8/3/99	AVG.	8/9/99	8/10/99	AVG.
OCTANE	0.4	0.0	0.2	0.8	0.8	0.8
UNIDENTIFIED C8	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,3-DIMETHYLCYCLOHEXANE, NOTE C	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
ISOPROPYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,5-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1-METHYL-2-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
4,4-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,2-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,6-DIMETHYLHEPTANE, NOTE D	0.2	0.3	0.3	0.2	0.4	0.3
1,1,3-TRIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,5-DIMETHYLHEPTANE, NOTE E	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,5-DIMETHYLHEPTANE, NOTE E	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLBENZENE	0.5	0.7	0.6	0.0	0.5	0.2
2,3,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
m-& p-XYLENE	0.9	0.8	0.8	1.1	1.1	1.1
4-METHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
4-ETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLOCTANE	0.0	0.0	0.0	0.8	0.7	0.8
3-METHYLOCTANE	0.3	0.4	0.3	0.0	0.0	0.0
STYRENE	0.0	0.0	0.0	0.0	0.0	0.0
o-XYLENE	0.5	0.4	0.5	0.0	0.0	0.0
1-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-3-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
NONANE	0.6	0.5	0.6	2.1	2.0	2.1
TRANS-2-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
ISOPROPYLBENZENE (CUMENE)	0.0	0.4	0.2	0.0	0.0	0.0
2,2-DIMETHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLOCTANE	0.0	0.5	0.3	0.0	0.0	0.0
n-PROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-3-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,3,5-TRIMETHYLBENZENE	0.0	0.2	0.1	0.4	0.0	0.2
1-METHYL-2-ETHYLBENZENE	0.0	0.0	0.0	2.1	0.0	1.1
1,2,4-TRIMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-BUTYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-DECENE	0.0	0.0	0.0	0.0	0.0	0.0
DECANE, NOTE F	0.8	0.4	0.6	2.4	1.7	2.1
ISOBUTYLBENZENE, NOTE F	0.0	0.4	0.2	2.3	1.6	2.0
1,3,-DIMETHYL-5-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
METHYLPROPYLBENZENE (sec butylbenzene)	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-3-ISOPROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,3-TRIMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-4-ISOPROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
INDAN	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-2-ISOPROPYLBENZENE	0.0	0.0	0.0	0.3	0.0	0.2
1,3-DIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,4-DIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-3-N-PROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-4-N-PROPYLBENZENE, NOTE G	0.0	0.0	0.0	0.0	0.0	0.0
1,2 DIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-2-N-PROPYLBENZENE	0.0	0.0	0.0	0.8	0.0	0.4
1,4-DIMETHYL-2-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.4	0.2
1,3-DIMETHYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.9	0.6	0.8
1,2-DIMETHYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,3-DIMETHYL-2-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0

TABLE B-2 (CONT'D). HOT-START HYDROCARBON SPECIATION DATA (BACKGROUND CORRECTED)

COMPOUND	HOT TRANSIENT, mg/hp-hr					
	BASE (SO)			FT		
	8/2/99	8/3/99	AVG.	8/9/99	8/10/99	AVG.
UNDECANE	1.5	1.3	1.4	3.8	3.4	3.6
1,2-DIMETHYL-3-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,4,5-TETRAMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLBUTYLBENZENE (sec AMYLBENZENE)	0.0	0.0	0.0	0.0	0.0	0.0
3,4 DIMETHYLCUMENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,3,5-TETRAMETHYLBENZENE	0.0	0.4	0.2	0.0	0.0	0.0
TERT-1-BUT-2-METHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,3,4-TETRAMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
N-PENT-BENZENE	0.0	0.0	0.0	0.8	0.4	0.6
TERT-1-BUT-3,5-DIMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-1-BUTYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.4	0.0	0.2
NAPHTHALENE	0.0	0.0	0.0	0.0	0.0	0.0
DODECANE	0.0	0.9	0.5	1.0	2.7	1.9
1,3,5-TRIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,4-TRIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
HEXYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C9-C12+	1.4	0.4	0.9	1.1	1.0	1.0
FORMALDEHYDE	15.1	12.4	13.8	9.2	10.1	9.6
ACETALDEHYDE	5.7	5.0	5.4	3.8	4.0	3.9
ACROLEIN	2.7	2.6	2.7	1.3	1.2	1.3
ACETONE	0.9	0.8	0.9	0.4	0.8	0.6
PROPIONALDEHYDE	1.1	0.8	1.0	0.9	1.1	1.0
CROTONALDEHYDE	1.9	1.2	1.6	1.3	1.1	1.2
ISOBUTYRALDEHYDE, NOTE H	0.5	0.3	0.4	0.4	0.4	0.4
METHYL ETHYL KETONE, NOTE H	0.5	0.3	0.4	0.4	0.4	0.4
BENZALDEHYDE	1.6	0.0	0.8	0.8	0.8	0.8
ISOVALERALDEHYDE	0.7	0.2	0.4	0.4	0.2	0.3
VALERALDEHYDE	0.5	0.5	0.5	1.2	0.7	0.9
O-TOLUALDEHYDE	0.0	0.2	0.1	0.0	0.0	0.0
M/P-TOLUALDEHYDE	1.3	1.0	1.2	1.1	0.8	1.0
HEXANALDEHYDE	0.5	0.4	0.4	0.5	0.8	0.7
DIMETHYLBENZALDEHYDE	0.1	0.3	0.2	0.0	0.9	0.5
SUMMED SPECIATED VALUES	77	70	73.4	70	64	67.0

A - 2,2-Dimethylpentane and methylcyclopentane co-elute. GC peak area split equally between the two compounds.
B - 3-Methyl-3-ethy-pentane co-elutes with reported compound. Not reported separately.
C - Cis-1,4-Dimethylcyclohexane co-elutes with reported compound. Not reported separately.
D - Propylcyclopentane co-elutes with reported compound. Not reported separately.
E - 2,5-Dimethylheptane and 3,5-dimethylheptane co-elute. GC peak area split equally between the two compounds.
F - Decane and isobutylbenzene co-elute. GC peak area split equally between the two compounds.
G - n-Butylbenzene co-elutes with reported compound. Not reported separately.
H - Isobutyraldehyde and methyl ethyl ketone co-elute. LC peak area split equally between the two compounds.

TABLE B-3. COMPOSITE HYDROCARBON SPECIATION DATA (BACKGROUND CORRECTED)

COMPOUND	COMPOSITE, mg/hp-hr					
	BASE (SO)			FT		
	8/2/99	8/3/99	AVG.	8/9/99	8/10/99	AVG.
METHANE	2.0	0.0	1.0	0.0	0.0	0.0
ETHANE	0.8	0.6	0.7	0.1	0.1	0.1
ETHYLENE	16.3	17.0	16.6	11.5	10.9	11.2
PROPANE	0.2	0.1	0.1	0.6	0.0	0.3
PROPYLENE	3.7	3.6	3.6	2.9	2.8	2.9
ACETYLENE	3.7	4.3	4.0	2.5	2.6	2.5
PROPADIENE	0.0	0.0	0.0	0.0	0.0	0.0
BUTANE	0.0	0.0	trace	0.4	0.0	0.2
TRANS-2-BUTENE	0.3	0.2	0.3	0.0	0.0	0.0
1-BUTENE	1.5	1.3	1.4	1.0	1.0	1.0
2-METHYLPROPENE (ISOBUTYLENE)	0.9	0.9	0.9	0.5	0.8	0.6
2,2-DIMETHYLPROPANE (NEOPENTANE)	1.7	0.1	0.9	0.0	0.0	0.0
PROPYNE	0.1	0.3	0.2	0.4	0.0	0.2
1,3-BUTADIENE	1.5	1.5	1.5	1.2	1.2	1.2
2-METHYLPROPANE (ISOBUTANE)	0.1	0.2	0.1	0.0	0.5	0.2
1-BUTYNE	0.0	0.0	0.0	0.0	0.0	0.0
METHANOL	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-BUTENE	0.0	0.0	trace	0.0	0.0	0.0
3-METHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
ETHANOL	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLBUTANE (ISOPENTANE)	0.0	0.2	0.1	0.0	0.4	0.2
2-BUTYNE	0.0	0.0	0.0	0.0	0.0	0.0
1-PENTENE	0.1	0.8	0.5	0.1	0.1	0.1
2-METHYL-1-BUTENE	0.1	0.0	trace	0.1	0.0	trace
PENTANE	0.0	0.4	0.2	0.3	0.0	0.2
UNIDENTIFIED C5 OLEFINS	1.4	0.0	0.7	0.7	0.8	0.7
2-METHYL-1,3-BUTADIENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-PENTENE	0.0	0.4	0.2	0.0	0.0	0.0
2-METHYL-2-BUTENE	0.4	0.0	0.2	0.0	0.0	0.0
TERT-BUTANOL	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOPENTADIENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLBUTANE	0.0	0.0	0.0	0.1	0.0	0.1
CYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYL-1-PENTENE	0.1	0.4	0.2	0.0	0.0	0.0
3-METHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLBUTANE	0.0	0.3	0.1	0.0	0.0	0.0
MTBE	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLPENTANE	0.2	0.1	0.1	0.1	0.0	trace
4-METHYL-TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLPENTANE	0.0	0.0	trace	0.0	0.0	0.0
2-METHYL-1-PENTENE	0.0	0.7	0.3	0.1	0.1	0.1
1-HEXENE	0.0	0.7	0.3	0.3	0.1	0.2
HEXANE	0.7	0.0	0.4	0.8	0.3	0.6
UNIDENTIFIED C6 OLEFINS	0.0	0.3	0.1	0.0	0.0	0.0
TRANS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
DI-ISOPROPYL ETHER	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLCYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
ETBE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-CIS-2-PENTENE	0.0	0.4	0.2	0.0	0.0	0.0
2,2-DIMETHYLPENTANE, NOTE A	0.0	0.0	0.0	0.0	0.0	0.0
METHYLCYCLOPENTANE, NOTE A	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLPENTANE	0.0	0.1	trace	0.0	0.0	0.0
2,2,3-TRIMETHYLBUTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYLCYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0

TABLE B-3 (CONT'D). COMPOSITE HYDROCARBON SPECIATION DATA (BACKGROUND CORRECTED)

COMPOUND	COMPOSITE, mg/hp-hr					
	BASE (SO)			FT		
	8/2/99	8/3/99	AVG.	8/9/99	8/10/99	AVG.
BENZENE	1.1	1.3	1.2	0.9	0.8	0.8
3-METHYL-1-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLHEXANE	0.0	0.0	0.0	0.4	0.0	0.2
2,3-DIMETHYLPENTANE	0.0	0.0	0.0	0.1	0.0	trace
1,1-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-AMYL METHYL ETHER	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOHEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLHEXANE	0.0	0.0	trace	0.1	0.0	trace
CIS-1,3-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,2-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,3-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,4-TRIMETHYLPENTANE	0.0	0.0	0.0	0.4	0.0	0.2
2-METHYL-1-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-3-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
HEPTANE	0.0	0.0	trace	0.1	0.0	trace
CIS-3-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C7	0.2	0.0	0.1	0.0	0.0	0.0
2-METHYL-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-TRANS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
METHYLCYCLOHEXANE	0.2	0.1	0.1	0.0	0.0	0.0
CIS-1,2-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1,3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,3-TRIMETHYLPENTANE	0.0	0.0	trace	0.3	0.0	0.2
2,5-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLHEXANE	0.4	0.0	0.2	0.0	0.0	0.0
1-TRANS-2-CIS-4-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1-TRANS-2-CIS-3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,4-TRIMETHYLPENTANE	0.0	0.0	0.0	0.1	0.0	trace
2,3,3-TRIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TOLUENE	0.1	0.1	0.1	0.2	0.0	0.1
2,3-DIMETHYLHEXANE	0.3	0.0	0.2	0.0	0.0	0.0
1,1,2-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYLHEXANE, NOTE B	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYLHEPTANE	0.0	0.1	trace	0.6	0.5	0.5
3-METHYLHEPTANE	0.0	0.3	0.2	0.5	0.6	0.6
1-CIS,2-TRANS,3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,3-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,4-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,5-TRIMETHYLHEXANE	0.3	0.0	0.2	0.0	0.1	trace
TRANS-1-METHYL-3-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1-METHYL-3-ETHYLCYCLOPENTANE	0.3	0.5	0.4	0.0	0.1	trace
1,1-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1-METHYL-2-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-1-ETHYL-CYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,2-DIMETHYLCYCLOHEXANE	0.0	0.2	0.1	0.0	0.0	0.0
1-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-4-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0

TABLE B-3 (CONT'D). COMPOSITE HYDROCARBON SPECIATION DATA (BACKGROUND CORRECTED)

COMPOUND	COMPOSITE, mg/hp-hr					
	BASE (SO)			FT		
	8/2/99	8/3/99	AVG.	8/9/99	8/10/99	AVG.
OCTANE	0.4	0.1	0.2	0.7	0.8	0.8
UNIDENTIFIED C8	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,3-DIMETHYLCYCLOHEXANE, NOTE C	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
ISOPROPYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,5-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1-METHYL-2-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
4,4-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,2-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,6-DIMETHYLHEPTANE, NOTE D	0.3	0.4	0.3	0.2	0.4	0.3
1,1,3-TRIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,5-DIMETHYLHEPTANE, NOTE E	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,5-DIMETHYLHEPTANE, NOTE E	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLBENZENE	0.5	0.7	0.6	0.1	0.5	0.3
2,3,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
m-& p-XYLENE	0.9	0.8	0.8	1.1	1.1	1.1
4-METHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
4-ETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLOCTANE	0.0	0.0	0.0	0.8	0.7	0.8
3-METHYLOCTANE	0.3	0.3	0.3	0.0	0.0	0.0
STYRENE	0.0	0.0	0.0	0.0	0.0	0.0
o-XYLENE	0.5	0.5	0.5	0.0	0.0	0.0
1-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-3-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
NONANE	0.6	0.6	0.6	2.1	1.9	2.0
TRANS-2-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
ISOPROPYLBENZENE (CUMENE)	0.0	0.4	0.2	0.0	0.0	0.0
2,2-DIMETHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLOCTANE	0.0	0.5	0.3	0.0	0.0	0.0
n-PROPYLBENZENE	0.0	0.0	trace	0.0	0.0	0.0
1-METHYL-3-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,3,5-TRIMETHYLBENZENE	0.0	0.2	0.1	0.3	0.0	0.2
1-METHYL-2-ETHYLBENZENE	0.0	0.0	trace	1.9	0.0	1.0
1,2,4-TRIMETHYLBENZENE	0.1	0.0	trace	0.0	0.0	0.0
TERT-BUTYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-DECENE	0.0	0.0	0.0	0.0	0.0	0.0
DECANE, NOTE F	0.7	0.4	0.5	2.3	1.5	1.9
ISOBUTYLBENZENE, NOTE F	0.1	0.3	0.2	2.2	1.4	1.8
1,3,-DIMETHYL-5-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
METHYLPROPYLBENZENE (sec butylbenzene)	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-3-ISOPROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,3-TRIMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-4-ISOPROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
INDAN	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-2-ISOPROPYLBENZENE	0.0	0.0	0.0	0.3	0.0	0.2
1,3-DIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,4-DIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-3-N-PROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-4-N-PROPYLBENZENE, NOTE G	0.0	0.0	0.0	0.1	0.0	trace
1,2 DIETHYLBENZENE	0.0	0.1	trace	0.0	0.0	0.0
1-METHYL-2-N-PROPYLBENZENE	0.0	0.0	0.0	0.7	0.0	0.3
1,4-DIMETHYL-2-ETHYLBENZENE	0.0	0.0	0.0	0.1	0.4	0.2
1,3-DIMETHYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.8	0.6	0.7
1,2-DIMETHYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,3-DIMETHYL-2-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0

TABLE B-3 (CONT'D). COMPOSITE HYDROCARBON SPECIATION DATA (BACKGROUND CORRECTED)

COMPOUND	COMPOSITE, mg/hp-hr					
	BASE (SO)			FT		
	8/2/99	8/3/99	AVG.	8/9/99	8/10/99	AVG.
UNDECANE	1.4	1.1	1.3	3.7	3.1	3.4
1,2-DIMETHYL-3-ETHYLBENZENE	0.0	0.1	trace	0.0	0.0	0.0
1,2,4,5-TETRAMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLBUTYLBENZENE (sec AMYLBENZENE)	0.0	0.0	0.0	0.0	0.0	0.0
3,4 DIMETHYLCUMENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,3,5-TETRAMETHYLBENZENE	0.0	0.4	0.2	0.0	0.0	0.0
TERT-1-BUT-2-METHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,3,4-TETRAMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
N-PENT-BENZENE	0.0	0.0	0.0	0.6	0.3	0.5
TERT-1-BUT-3,5-DIMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-1-BUTYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.4	0.0	0.2
NAPHTHALENE	0.0	0.0	0.0	0.0	0.0	0.0
DODECANE	0.1	0.9	0.5	1.0	2.3	1.7
1,3,5-TRIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,4-TRIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
HEXYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C9-C12+	1.3	0.5	0.9	1.2	1.1	1.2
FORMALDEHYDE	16.4	14.0	15.2	9.3	10.1	9.7
ACETALDEHYDE	6.2	5.6	5.9	3.9	4.0	3.9
ACROLEIN	2.9	2.9	2.9	1.3	1.3	1.3
ACETONE	1.0	1.0	1.0	0.5	0.8	0.6
PROPIONALDEHYDE	1.2	1.0	1.1	0.9	1.1	1.0
CROTONALDEHYDE	2.1	1.4	1.8	1.3	1.1	1.2
ISOBUTYRALDEHYDE, NOTE H	0.5	0.3	0.4	0.4	0.4	0.4
METHYL ETHYL KETONE, NOTE H	0.5	0.3	0.4	0.4	0.4	0.4
BENZALDEHYDE	1.6	0.1	0.9	0.8	0.8	0.8
ISOVALERALDEHYDE	0.7	0.2	0.5	0.4	0.2	0.3
VALERALDEHYDE	0.6	0.6	0.6	1.1	0.7	0.9
O-TOLUALDEHYDE	0.0	0.2	0.1	0.0	0.0	0.0
M/P-TOLUALDEHYDE	1.4	1.2	1.3	1.2	0.8	1.0
HEXANALDEHYDE	0.5	0.4	0.5	0.5	0.8	0.6
DIMETHYLBENZALDEHYDE	0.1	0.3	0.2	0.0	1.0	0.5
SUMMED SPECIATED VALUES	82	75	78.6	70	63	66.6

A - 2,2-Dimethylpentane and methylcyclopentane co-elute. GC peak area split equally between the two compounds.
B - 3-Methyl-3-ethy-pentane co-elutes with reported compound. Not reported separately.
C - Cis-1,4-Dimethylcyclohexane co-elutes with reported compound. Not reported separately.
D - Propylcyclopentane co-elutes with reported compound. Not reported separately.
E - 2,5-Dimethylheptane and 3,5-dimethylheptane co-elute. GC peak area split equally between the two compounds.
F - Decane and isobutylbenzene co-elute. GC peak area split equally between the two compounds.
G - n-Butylbenzene co-elutes with reported compound. Not reported separately.
H - Isobutyraldehyde and methyl ethyl ketone co-elute. LC peak area split equally between the two compounds.

APPENDIX K

APPENDIX A

HEAVY LIGHT-DUTY EMISSION TEST RESULTS

Page	Test No.	Test Cycle	Fuel
A-1	BASE-1	FTP	Baseline
A-2	BASE-1	US06	Baseline
A-3	BASE-1	HFET	Baseline
A-4	BASE-2	FTP	Baseline
A-5	BASE-2	US06	Baseline
A-6	BASE-2	HFET	Baseline
A-7	FT-1	FTP	S-2 Diesel
A-8	FT-1	US06	S-2 Diesel
A-9	FT-1	HFET	S-2 Diesel
A-10	FT-2	FTP	S-2 Diesel
A-11	FT-2	US06	S-2 Diesel
A-12	FT-2	HFET	S-2 Diesel

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.3-R 3-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER 100
VEHICLE MODEL 0 DODGE RAM 2500
ENGINE 5.9 L (359 CID)-6
TRANSMISSION A4
ODOMETER 249 MILES (400 KM)

TEST BASE-1
DATE 11/22/1999 RUN
DYNO 7 BAG CART 2
ACTUAL ROAD LOAD 12.44 HP (9.28 KW)
TEST WEIGHT 6250 LBS (2834 KG)

DIESEL EM-2731-F
FUEL DENSITY 7.056 LB/GAL
H .131 C .869 O .000 X .000
FTP

BAROMETER 28.96 IN HG (735.6 MM HG) DRY BULB TEMPERATURE 74.0°F (23.3°C) NOX HUMIDITY C.F. 1.028
RELATIVE HUMIDITY 62.0 PCT.

BAG NUMBER	1	2	3
BAG DESCRIPTION	COLD TRANSIENT (0-505 SEC.)	STABILIZED (505-1372 SEC.)	HOT TRANSIENT (0- 505 SEC.)
RUN TIME SECONDS	506.4	868.6	505.7
DRY/WET CORRECTION FACTOR, SAMP/BACK	.974/.982	.976/.982	.974/.982
MEASURED DISTANCE MILES (KM)	3.59 (5.78)	3.85 (6.20)	3.59 (5.78)
BLOWER FLOW RATE SCFM (SCMM)	566.2 (16.03)	559.4 (15.84)	561.8 (15.91)
GAS METER FLOW RATE SCFM (SCMM)	1.07 (.03)	1.08 (.03)	1.06 (.03)
TOTAL FLOW SCF (SCM)	4788. (135.6)	8114. (229.8)	4744. (134.3)
HC SAMPLE METER/RANGE/PPM (CONT)	19.2/1071/ 19.23	17.5/1071/ 17.50	17.5/1071/ 17.49
HC BCKGRD METER/RANGE/PPM	4.5/1071/ 4.50	4.5/1071/ 4.50	4.6/1071/ 4.60
CO SAMPLE METER/RANGE/PPM	55.3/ 12/ 53.64	20.8/ 12/ 19.73	23.3/ 12/ 22.17
CO BCKGRD METER/RANGE/PPM	.0/ 12/ .00	.0/ 12/ .00	.0/ 12/ .00
CO2 SAMPLE METER/RANGE/PCT	89.6/ 11/ .8931	63.6/ 11/ .6198	81.9/ 11/ .8112
CO2 BCKGRD METER/RANGE/PCT	4.8/ 11/ .0434	4.8/ 11/ .0434	4.9/ 11/ .0443
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	54.5/1072/ 136.66	35.0/1072/ 87.70	44.6/1072/ 111.85
NOX BCKGRD METER/RANGE/PPM	.6/ 1/ .16	.6/ 1/ .16	1.0/ 1/ .26
CH4 SAMPLE PPM (1.150)	1.93	1.77	1.91
CH4 BCKGRD PPM	1.95	1.93	1.94
DILUTION FACTOR	15.12	21.83	16.70
HC CONCENTRATION PPM	15.03	13.20	13.17
CO CONCENTRATION PPM	51.66	19.10	21.38
CO2 CONCENTRATION PCT	.8526	.5784	.7695
NOX CONCENTRATION PPM	132.91	85.46	108.74
CH4 CONCENTRATION PPM	.11	-.07	.09
NMHC CONCENTRATION PPM	14.90	13.20	13.07
HC MASS GRAMS	1.171	1.743	1.016
CO MASS GRAMS	8.154	5.111	3.344
CO2 MASS GRAMS	2116.53	2433.63	1892.75
NOX MASS GRAMS	35.414	38.590	28.708
PM MASS GRAMS	.213	.194	.193
CH4 MASS GRAMS	.010	.000	.008
NMHC MASS GRAMS (FID)	1.165	1.750	1.012
FUEL MASS KG	.670	.769	.597
FUEL ECONOMY MPG (L/100KM)	17.16 (13.71)	16.05 (14.66)	19.24 (12.22)

3-BAG COMPOSITE RESULTS

HC	G/MI	.379	CH4	G/MI	.001
CO	G/MI	1.413	NMHC	G/MI	.380
NOX	G/MI	9.424			
PM	G/MI	.053			

FUEL ECONOMY MPG (L/100KM) 17.07 (13.78)

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.3-R 1-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER 100	TEST BASE-1	DIESEL EM-2731-F
VEHICLE MODEL 0 DODGE RAM 2500	DATE 11/22/1999 RUN	FUEL DENSITY 7.056 LB/GAL
ENGINE 5.9 L (359 CID)-6	DYNO 7 BAG CART 2	H .131 C .869 O .000 X .000
TRANSMISSION A4	ACTUAL ROAD LOAD 12.44 HP (9.28 KW)	US06
ODOMETER 268 MILES (431 KM)	TEST WEIGHT 6250 LBS (2834 KG)	

BAROMETER 28.96 IN HG (735.6 MM HG) DRY BULB TEMPERATURE 77.0°F (25.0°C) NOX HUMIDITY C.F. 1.003

RELATIVE HUMIDITY 52.7 PCT.

BAG NUMBER	1
BAG DESCRIPTION	
RUN TIME SECONDS	600.2
DRY/WET CORRECTION FACTOR, SAMP/BACK	.969/.983
MEASURED DISTANCE MILES (KM)	8.01 (12.89)
BLOWER FLOW RATE SCFM (SCMM)	561.3 (15.90)
GAS METER FLOW RATE SCFM (SCMM)	1.03 (.03)
TOTAL FLOW SCF (SCM)	5625. (159.3)
HC SAMPLE METER/RANGE/PPM (CONT)	20.7/1071/ 20.74
HC BCKGRD METER/RANGE/PPM	4.6/1071/ 4.60
CO SAMPLE METER/RANGE/PPM	32.6/ 12/ 31.28
CO BCKGRD METER/RANGE/PPM	.1/ 12/ .09
CO2 SAMPLE METER/RANGE/PCT	76.7/ 1/ 1.5184
CO2 BCKGRD METER/RANGE/PCT	2.2/ 1/ .0441
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	61.6/1072/ 154.48
NOX BCKGRD METER/RANGE/PPM	1.5/ 1/ .39
CH4 SAMPLE PPM (1.150)	1.58
CH4 BCKGRD PPM	1.90
DILUTION FACTOR	8.93
HC CONCENTRATION PPM	16.65
CO CONCENTRATION PPM	29.76
CO2 CONCENTRATION PCT	1.4793
NOX CONCENTRATION PPM	149.37
CH4 CONCENTRATION PPM	-.11
NMHC CONCENTRATION PPM	16.65
HC MASS GRAMS	1.524
CO MASS GRAMS	5.520
CO2 MASS GRAMS	4314.57
NOX MASS GRAMS	45.645
PM MASS GRAMS	1.041
CH4 MASS GRAMS	.000
NMHC MASS GRAMS (FID)	1.530
FUEL MASS KG	1.360
FUEL ECONOMY MPG (L/100KM)	18.86 (12.47)

1-BAG COMPOSITE RESULTS

HC	G/MI	.190	CH4	G/MI	.000
CO	G/MI	.689	NMHC	G/MI	.191
NOX	G/MI	5.697			
PM	G/MI	.130			
FUEL ECONOMY MPG (L/100KM)		18.86 (12.47)			

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.3-R 1-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER 100	TEST BASE-1	DIESEL EM-2731-F
VEHICLE MODEL 0 DODGE RAM 2500	DATE 11/22/1999 RUN	FUEL DENSITY 7.056 LB/GAL
ENGINE 5.9 L (359 CID)-6	DYNO 7 BAG CART 2	H .131 C .869 O .000 X .000
TRANSMISSION A4	ACTUAL ROAD LOAD 12.44 HP (9.28 KW)	H-FET
ODOMETER 287 MILES (461 KM)	TEST WEIGHT 6250 LBS (2834 KG)	

BAROMETER 28.96 IN HG (735.6 MM HG) DRY BULB TEMPERATURE 77.0°F (25.0°C) NOX HUMIDITY C.F. 1.003

RELATIVE HUMIDITY 52.7 PCT.

BAG NUMBER	1
BAG DESCRIPTION	
RUN TIME SECONDS	765.3
DRY/WET CORRECTION FACTOR, SAMP/BACK	.974/.983
MEASURED DISTANCE MILES (KM)	10.27 (16.52)
BLOWER FLOW RATE SCFM (SCMM)	562.2 (15.92)
GAS METER FLOW RATE SCFM (SCMM)	1.07 (.03)
TOTAL FLOW SCF (SCM)	7184. (203.5)
HC SAMPLE METER/RANGE/PPM (CONT)	20.6/1071/ 20.63
HC BCKGRD METER/RANGE/PPM	4.6/1071/ 4.60
CO SAMPLE METER/RANGE/PPM	23.6/ 12/ 22.46
CO BCKGRD METER/RANGE/PPM	.0/ 12/ .00
CO2 SAMPLE METER/RANGE/PCT	48.9/ 1/ .9806
CO2 BCKGRD METER/RANGE/PCT	2.4/ 1/ .0481
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	56.9/1072/ 142.82
NOX BCKGRD METER/RANGE/PPM	2.1/ 1/ .54
CH4 SAMPLE PPM (1.150)	1.62
CH4 BCKGRD PPM	1.90
DILUTION FACTOR	13.82
HC CONCENTRATION PPM	16.37
CO CONCENTRATION PPM	21.66
CO2 CONCENTRATION PCT	.9360
NOX CONCENTRATION PPM	138.60
CH4 CONCENTRATION PPM	-.14
NMHC CONCENTRATION PPM	16.37
HC MASS GRAMS	1.913
CO MASS GRAMS	5.130
CO2 MASS GRAMS	3486.74
NOX MASS GRAMS	54.092
PM MASS GRAMS	.324
CH4 MASS GRAMS	.000
NMHC MASS GRAMS (FID)	1.920
FUEL MASS KG	1.100
FUEL ECONOMY MPG (L/100KM)	29.88 (7.87)

1-BAG COMPOSITE RESULTS

HC	G/MI	.186	CH4	G/MI	.000
CO	G/MI	.500	NMHC	G/MI	.187
NOX	G/MI	5.267			
PM	G/MI	.032			
FUEL ECONOMY MPG (L/100KM)		29.88 (7.87)			

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.3-R 3-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER 100
VEHICLE MODEL 0 DODGE RAM 2500
ENGINE 5.9 L (359 CID)-6
TRANSMISSION A4
ODOMETER 298 MILES (479 KM)

TEST BASE-2
DATE 11/23/1999 RUN
DYNO 7 BAG CART 2
ACTUAL ROAD LOAD 12.44 HP (9.28 KW)
TEST WEIGHT 6250 LBS (2834 KG)

DIESEL EM-2731-F
FUEL DENSITY 7.056 LB/GAL
H .131 C .869 O .000 X .000
FTP

BAROMETER 29.19 IN HG (741.4 MM HG) DRY BULB TEMPERATURE 74.0°F (23.3°C) NOX HUMIDITY C.F. .901
RELATIVE HUMIDITY 40.2 PCT.

BAG NUMBER	1	2	3
BAG DESCRIPTION	COLD TRANSIENT (0-505 SEC.)	STABILIZED (505-1372 SEC.)	HOT TRANSIENT (0- 505 SEC.)
RUN TIME SECONDS	505.3	869.3	505.4
DRY/WET CORRECTION FACTOR, SAMP/BACK	.980/.988	.983/.988	.981/.988
MEASURED DISTANCE MILES (KM)	3.59 (5.78)	3.87 (6.22)	3.58 (5.77)
BLOWER FLOW RATE SCFM (SCMM)	575.2 (16.29)	568.2 (16.09)	568.7 (16.11)
GAS METER FLOW RATE SCFM (SCMM)	1.10 (.03)	1.09 (.03)	1.07 (.03)
TOTAL FLOW SCF (SCM)	4854. (137.5)	8248. (233.6)	4800. (135.9)
HC SAMPLE METER/RANGE/PPM (CONT)	18.6/1071/ 18.59	17.3/1071/ 17.34	16.9/1071/ 16.88
HC BCKGRD METER/RANGE/PPM	4.2/1071/ 4.20	4.2/1071/ 4.20	4.3/1071/ 4.30
CO SAMPLE METER/RANGE/PPM	53.4/ 12/ 51.77	19.7/ 12/ 18.66	20.9/ 12/ 19.83
CO BCKGRD METER/RANGE/PPM	.0/ 12/ .00	.0/ 12/ .00	.0/ 12/ .00
CO2 SAMPLE METER/RANGE/PCT	93.8/ 11/ .9382	63.3/ 11/ .6167	81.8/ 11/ .8101
CO2 BCKGRD METER/RANGE/PCT	4.8/ 11/ .0434	4.7/ 11/ .0425	4.7/ 11/ .0425
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	58.5/1072/ 146.82	36.7/1072/ 92.03	46.2/1072/ 115.92
NOX BCKGRD METER/RANGE/PPM	1.9/ 1/ .49	2.3/ 1/ .59	2.1/ 1/ .54
CH4 SAMPLE PPM (1.150)	2.13	1.86	1.83
CH4 BCKGRD PPM	2.02	1.99	1.96
DILUTION FACTOR	14.40	21.94	16.73
HC CONCENTRATION PPM	14.68	13.33	12.83
CO CONCENTRATION PPM	50.17	18.20	19.27
CO2 CONCENTRATION PCT	.8979	.5762	.7702
NOX CONCENTRATION PPM	143.40	89.87	113.20
CH4 CONCENTRATION PPM	.24	-.04	-.01
NMHC CONCENTRATION PPM	14.40	13.33	12.83
HC MASS GRAMS	1.159	1.788	1.002
CO MASS GRAMS	8.028	4.950	3.049
CO2 MASS GRAMS	2259.54	2464.24	1916.67
NOX MASS GRAMS	33.963	36.173	26.513
PM MASS GRAMS	.247	.248	.203
CH4 MASS GRAMS	.022	.000	.000
NMHC MASS GRAMS (FID)	1.141	1.795	1.006
FUEL MASS KG	.715	.778	.605
FUEL ECONOMY MPG (L/100KM)	16.08 (14.63)	15.90 (14.80)	18.97 (12.40)

3-BAG COMPOSITE RESULTS

HC	G/MI	.383	CH4	G/MI	.001
CO	G/MI	1.360	NMHC	G/MI	.384
NOX	G/MI	8.839			
PM	G/MI	.063			

FUEL ECONOMY MPG (L/100KM) 16.70 (14.09)

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.3-R 1-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER 100	TEST BASE-2	DIESEL EM-2731-F
VEHICLE MODEL 0 DODGE RAM 2500	DATE 11/23/1999 RUN	FUEL DENSITY 7.056 LB/GAL
ENGINE 5.9 L (359 CID)-6	DYNO 7 BAG CART 2	H .131 C .869 O .000 X .000
TRANSMISSION A4	ACTUAL ROAD LOAD 12.44 HP (9.28 KW)	US06
ODOMETER 316 MILES (508 KM)	TEST WEIGHT 6250 LBS (2834 KG)	

BAROMETER 29.23 IN HG (742.4 MM HG) DRY BULB TEMPERATURE 76.0°F (24.4°C) NOX HUMIDITY C.F. .905

RELATIVE HUMIDITY 38.4 PCT.

BAG NUMBER	1
BAG DESCRIPTION	
RUN TIME SECONDS	600.2
DRY/WET CORRECTION FACTOR, SAMP/BACK	.974/.988
MEASURED DISTANCE MILES (KM)	8.01 (12.88)
BLOWER FLOW RATE SCFM (SCMM)	565.1 (16.00)
GAS METER FLOW RATE SCFM (SCMM)	1.07 (.03)
TOTAL FLOW SCF (SCM)	5663. (160.4)
HC SAMPLE METER/RANGE/PPM (CONT)	19.7/1071/ 19.73
HC BCKGRD METER/RANGE/PPM	4.9/1071/ 4.90
CO SAMPLE METER/RANGE/PPM	30.1/ 12/ 28.82
CO BCKGRD METER/RANGE/PPM	.0/ 12/ .00
CO2 SAMPLE METER/RANGE/PCT	76.5/ 1/ 1.5145
CO2 BCKGRD METER/RANGE/PCT	2.3/ 1/ .0461
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	56.6/1072/ 142.02
NOX BCKGRD METER/RANGE/PPM	1.9/ 1/ .49
CH4 SAMPLE PPM (1.150)	1.69
CH4 BCKGRD PPM	1.89
DILUTION FACTOR	8.96
HC CONCENTRATION PPM	15.38
CO CONCENTRATION PPM	27.64
CO2 CONCENTRATION PCT	1.4736
NOX CONCENTRATION PPM	137.95
CH4 CONCENTRATION PPM	.01
NMHC CONCENTRATION PPM	15.37
HC MASS GRAMS	1.417
CO MASS GRAMS	5.160
CO2 MASS GRAMS	4327.12
NOX MASS GRAMS	38.288
PM MASS GRAMS	.639
CH4 MASS GRAMS	.001
NMHC MASS GRAMS (FID)	1.421
FUEL MASS KG	1.363
FUEL ECONOMY MPG (L/100KM)	18.79 (12.52)

1-BAG COMPOSITE RESULTS

HC	G/MI	.177	CH4	G/MI	.000
CO	G/MI	.645	NMHC	G/MI	.178
NOX	G/MI	4.783			
PM	G/MI	.080			
FUEL ECONOMY MPG (L/100KM)		18.79 (12.52)			

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.3-R 1-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER 100
VEHICLE MODEL 0 DODGE RAM 2500
ENGINE 5.9 L (359 CID)-6
TRANSMISSION A4
ODOMETER 335 MILES (539 KM)

TEST BASE-2
DATE 11/23/1999 RUN
DYNO 7 BAG CART 2
ACTUAL ROAD LOAD 12.44 HP (9.28 KW)
TEST WEIGHT 6250 LBS (2834 KG)

DIESEL EM-2731-F
FUEL DENSITY 7.056 LB/GAL
H .131 C .869 O .000 X .000
H-FET

BAROMETER 29.23 IN HG (742.4 MM HG) DRY BULB TEMPERATURE 77.0°F (25.0°C) NOX HUMIDITY C.F. .899
RELATIVE HUMIDITY 36.0 PCT.

BAG NUMBER	1
BAG DESCRIPTION	
RUN TIME SECONDS	765.3
DRY/WET CORRECTION FACTOR, SAMP/BACK	.980/.988
MEASURED DISTANCE MILES (KM)	10.28 (16.54)
BLOWER FLOW RATE SCFM (SCMM)	566.7 (16.05)
GAS METER FLOW RATE SCFM (SCMM)	1.06 (.03)
TOTAL FLOW SCF (SCM)	7241. (205.1)
HC SAMPLE METER/RANGE/PPM (CONT)	20.0/1071/ 20.01
HC BCKGRD METER/RANGE/PPM	4.9/1071/ 4.90
CO SAMPLE METER/RANGE/PPM	23.5/ 12/ 22.36
CO BCKGRD METER/RANGE/PPM	.0/ 12/ .00
CO2 SAMPLE METER/RANGE/PCT	49.0/ 1/ .9826
CO2 BCKGRD METER/RANGE/PCT	2.2/ 1/ .0441
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	58.8/1072/ 147.49
NOX BCKGRD METER/RANGE/PPM	2.4/ 1/ .62
CH4 SAMPLE PPM (1.150)	1.77
CH4 BCKGRD PPM	1.99
DILUTION FACTOR	13.79
HC CONCENTRATION PPM	15.47
CO CONCENTRATION PPM	21.68
CO2 CONCENTRATION PCT	.9417
NOX CONCENTRATION PPM	143.90
CH4 CONCENTRATION PPM	-.07
NMHC CONCENTRATION PPM	15.47
HC MASS GRAMS	1.822
CO MASS GRAMS	5.177
CO2 MASS GRAMS	3535.75
NOX MASS GRAMS	50.709
PM MASS GRAMS	.359
CH4 MASS GRAMS	.000
NMHC MASS GRAMS (FID)	1.829
FUEL MASS KG	1.115
FUEL ECONOMY MPG (L/100KM)	29.50 (7.97)

1-BAG COMPOSITE RESULTS

HC	G/MI	.177	CH4	G/MI	.000
CO	G/MI	.504	NMHC	G/MI	.178
NOX	G/MI	4.933			
PM	G/MI	.035			

FUEL ECONOMY MPG (L/100KM) 29.50 (7.97)

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.2-R 3-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER 100	TEST FT-1	DIESEL EM-2795-F
VEHICLE MODEL 0 DODGE RAM 2500	DATE 11/18/1999 RUN	FUEL DENSITY 6.439 LB/GAL
ENGINE 5.9 L (359 CID)-6	DYNO 7 BAG CART 2	H .151 C .849 O .000 X .000
TRANSMISSION A4	ACTUAL ROAD LOAD 12.44 HP (9.28 KW)	FTP
ODOMETER 131 MILES (210 KM)	TEST WEIGHT 6250 LBS (2834 KG)	

BAROMETER 29.18 IN HG (741.2 MM HG) DRY BULB TEMPERATURE 74.0°F (23.3°C) NOX HUMIDITY C.F. 1.024

RELATIVE HUMIDITY 61.9 PCT.

BAG NUMBER	1	2	3
BAG DESCRIPTION	COLD TRANSIENT (0-505 SEC.)	STABILIZED (505-1372 SEC.)	HOT TRANSIENT (0- 505 SEC.)
RUN TIME SECONDS	505.3	864.8	505.2
DRY/WET CORRECTION FACTOR, SAMP/BACK	.972/.982	.975/.982	.974/.982
MEASURED DISTANCE MILES (KM)	3.59 (5.77)	3.85 (6.20)	3.59 (5.78)
BLOWER FLOW RATE SCFM (SCMM)	570.8 (16.16)	565.9 (16.03)	569.9 (16.14)
GAS METER FLOW RATE SCFM (SCMM)	1.08 (.03)	1.07 (.03)	1.08 (.03)
TOTAL FLOW SCF (SCM)	4816. (136.4)	8171. (231.4)	4808. (136.2)
HC SAMPLE METER/RANGE/PPM (CONT)	10.6/1071/ 10.61	13.3/1071/ 13.28	14.1/1071/ 14.12
HC BCKGRD METER/RANGE/PPM	4.1/1071/ 4.10	4.1/1071/ 4.10	4.4/1071/ 4.40
CO SAMPLE METER/RANGE/PPM	22.2/ 12/ 21.09	12.6/ 12/ 11.81	14.3/ 12/ 13.44
CO BCKGRD METER/RANGE/PPM	.3/ 12/ .27	.3/ 12/ .27	.2/ 12/ .18
CO2 SAMPLE METER/RANGE/PCT	90.7/ 11/ .9049	61.5/ 11/ .5982	79.2/ 11/ .7826
CO2 BCKGRD METER/RANGE/PCT	5.1/ 11/ .0461	5.0/ 11/ .0452	5.1/ 11/ .0461
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	40.2/1072/ 100.93	26.1/1072/ 65.57	33.4/1072/ 83.86
NOX BCKGRD METER/RANGE/PPM	.4/ 2/ .40	.3/ 2/ .30	.3/ 2/ .30
CH4 SAMPLE PPM (1.150)	1.86	1.85	1.80
CH4 BCKGRD PPM	2.04	2.00	1.98
DILUTION FACTOR	14.10	21.31	16.30
HC CONCENTRATION PPM	6.80	9.37	9.99
CO CONCENTRATION PPM	20.03	11.18	12.79
CO2 CONCENTRATION PCT	.8621	.5551	.7394
NOX CONCENTRATION PPM	97.76	63.68	81.36
CH4 CONCENTRATION PPM	-.03	-.06	-.05
NMHC CONCENTRATION PPM	6.83	9.43	10.05
HC MASS GRAMS	.545	1.275	.799
CO MASS GRAMS	3.180	3.011	2.027
CO2 MASS GRAMS	2152.64	2351.87	1843.01
NOX MASS GRAMS	26.108	28.856	21.692
PM MASS GRAMS	.123	.145	.121
CH4 MASS GRAMS	.000	.000	.000
NMHC MASS GRAMS (FID)	.537	1.259	.789
FUEL MASS KG	.694	.759	.594
FUEL ECONOMY MPG (L/100KM)	15.08 (15.60)	14.82 (15.87)	17.66 (13.32)

3-BAG COMPOSITE RESULTS

HC	G/MI	.264	CH4	G/MI	.000
CO	G/MI	.744	NMHC	G/MI	.261
NOX	G/MI	7.048			
PM	G/MI	.036			

FUEL ECONOMY MPG (L/100KM) 15.58 (15.10)

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.2-R 1-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER 100
VEHICLE MODEL 0 DODGE RAM 2500
ENGINE 5.9 L (359 CID)-6
TRANSMISSION A4
ODOMETER 150 MILES (241 KM)

TEST FT-1
DATE 11/18/1999 RUN
DYNO 7 BAG CART 2
ACTUAL ROAD LOAD 12.44 HP (9.28 KW)
TEST WEIGHT 6250 LBS (2834 KG)

DIESEL EM-2795-F
FUEL DENSITY 6.439 LB/GAL
H .151 C .849 O .000 X .000
US06

BAROMETER 29.18 IN HG (741.2 MM HG) DRY BULB TEMPERATURE 76.0°F (24.4°C) NOX HUMIDITY C.F. 1.008
RELATIVE HUMIDITY 55.5 PCT.

BAG NUMBER	1
BAG DESCRIPTION	
RUN TIME SECONDS	600.3
DRY/WET CORRECTION FACTOR, SAMP/BACK	.967/.983
MEASURED DISTANCE MILES (KM)	8.02 (12.90)
BLOWER FLOW RATE SCFM (SCMM)	567.2 (16.06)
GAS METER FLOW RATE SCFM (SCMM)	1.04 (.03)
TOTAL FLOW SCF (SCM)	5686. (161.0)
HC SAMPLE METER/RANGE/PPM (CONT)	17.4/1071/ 17.38
HC BCKGRD METER/RANGE/PPM	4.7/1071/ 4.70
CO SAMPLE METER/RANGE/PPM	22.1/ 12/ 21.00
CO BCKGRD METER/RANGE/PPM	.0/ 12/ .00
CO2 SAMPLE METER/RANGE/PCT	74.9/ 1/ 1.4836
CO2 BCKGRD METER/RANGE/PCT	2.4/ 1/ .0481
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	47.7/1072/ 119.68
NOX BCKGRD METER/RANGE/PPM	.4/ 2/ .40
CH4 SAMPLE PPM (1.150)	1.60
CH4 BCKGRD PPM	1.99
DILUTION FACTOR	8.61
HC CONCENTRATION PPM	13.22
CO CONCENTRATION PPM	19.98
CO2 CONCENTRATION PCT	1.4411
NOX CONCENTRATION PPM	115.36
CH4 CONCENTRATION PPM	-.16
NMHC CONCENTRATION PPM	13.40
HC MASS GRAMS	1.252
CO MASS GRAMS	3.745
CO2 MASS GRAMS	4248.44
NOX MASS GRAMS	35.791
PM MASS GRAMS	.551
CH4 MASS GRAMS	.000
NMHC MASS GRAMS (FID)	1.244
FUEL MASS KG	1.369
FUEL ECONOMY MPG (L/100KM)	17.10 (13.75)

1-BAG COMPOSITE RESULTS

HC	G/MI	.156	CH4	G/MI	.000
CO	G/MI	.467	NMHC	G/MI	.155
NOX	G/MI	4.464			
PM	G/MI	.069			
FUEL ECONOMY MPG (L/100KM)		17.10 (13.75)			

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.2-R 1-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER 100	TEST FT-1	DIESEL EM-2795-F
VEHICLE MODEL 0 DODGE RAM 2500	DATE 11/18/1999 RUN	FUEL DENSITY 6.439 LB/GAL
ENGINE 5.9 L (359 CID)-6	DYNO 7 BAG CART 2	H .151 C .849 O .000 X .000
TRANSMISSION A4	ACTUAL ROAD LOAD 12.44 HP (9.28 KW)	H-FET
ODOMETER 168 MILES (270 KM)	TEST WEIGHT 6250 LBS (2834 KG)	

BAROMETER 29.17 IN HG (740.9 MM HG) DRY BULB TEMPERATURE 78.0°F (25.6°C) NOX HUMIDITY C.F. 1.016

RELATIVE HUMIDITY 53.1 PCT.

BAG NUMBER	1
BAG DESCRIPTION	
RUN TIME SECONDS	765.3
DRY/WET CORRECTION FACTOR, SAMP/BACK	.972/.982
MEASURED DISTANCE MILES (KM)	10.29 (16.56)
BLOWER FLOW RATE SCFM (SCMM)	565.3 (16.01)
GAS METER FLOW RATE SCFM (SCMM)	1.10 (.03)
TOTAL FLOW SCF (SCM)	7225. (204.6)
HC SAMPLE METER/RANGE/PPM (CONT)	16.7/1071/ 16.66
HC BCKGRD METER/RANGE/PPM	4.7/1071/ 4.70
CO SAMPLE METER/RANGE/PPM	15.2/ 12/ 14.31
CO BCKGRD METER/RANGE/PPM	.2/ 12/ .18
CO2 SAMPLE METER/RANGE/PCT	92.3/ 11/ .9221
CO2 BCKGRD METER/RANGE/PCT	5.2/ 11/ .0470
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	43.3/1072/ 108.69
NOX BCKGRD METER/RANGE/PPM	.4/ 2/ .40
CH4 SAMPLE PPM (1.150)	1.73
CH4 BCKGRD PPM	1.98
DILUTION FACTOR	13.84
HC CONCENTRATION PPM	12.30
CO CONCENTRATION PPM	13.63
CO2 CONCENTRATION PCT	.8785
NOX CONCENTRATION PPM	105.33
CH4 CONCENTRATION PPM	-.11
NMHC CONCENTRATION PPM	12.42
HC MASS GRAMS	1.480
CO MASS GRAMS	3.246
CO2 MASS GRAMS	3290.66
NOX MASS GRAMS	41.870
PM MASS GRAMS	.220
CH4 MASS GRAMS	.000
NMHC MASS GRAMS (FID)	1.465
FUEL MASS KG	1.061
FUEL ECONOMY MPG (L/100KM)	28.32 (8.31)

1-BAG COMPOSITE RESULTS

HC	G/MI	.144	CH4	G/MI	.000
CO	G/MI	.315	NMHC	G/MI	.142
NOX	G/MI	4.069			
PM	G/MI	.021			
FUEL ECONOMY MPG (L/100KM)		28.32 (8.31)			

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.2-R 3-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER 100
VEHICLE MODEL 0 DODGE RAM 2500
ENGINE 5.9 L (359 CID)-6
TRANSMISSION A4
ODOMETER 179 MILES (288 KM)

TEST FT-2
DATE 11/19/1999 RUN
DYNO 7 BAG CART 2
ACTUAL ROAD LOAD 12.44 HP (9.28 KW)
TEST WEIGHT 6250 LBS (2834 KG)

DIESEL EM-2795-F
FUEL DENSITY 6.439 LB/GAL
H .151 C .849 O .000 X .000
FTP

BAROMETER 29.18 IN HG (741.2 MM HG) DRY BULB TEMPERATURE 76.0°F (24.4°C) NOX HUMIDITY C.F. 1.008
RELATIVE HUMIDITY 55.5 PCT.

BAG NUMBER	1	2	3
BAG DESCRIPTION	COLD TRANSIENT (0-505 SEC.)	STABILIZED (505-1372 SEC.)	HOT TRANSIENT (0- 505 SEC.)
RUN TIME SECONDS	505.1	870.2	505.2
DRY/WET CORRECTION FACTOR, SAMP/BACK	.973/.983	.976/.983	.974/.983
MEASURED DISTANCE MILES (KM)	3.60 (5.80)	3.86 (6.21)	3.59 (5.77)
BLOWER FLOW RATE SCFM (SCMM)	569.6 (16.13)	566.1 (16.03)	567.5 (16.07)
GAS METER FLOW RATE SCFM (SCMM)	1.07 (.03)	1.08 (.03)	1.08 (.03)
TOTAL FLOW SCF (SCM)	4804. (136.1)	8226. (233.0)	4787. (135.6)
HC SAMPLE METER/RANGE/PPM (CONT)	10.8/1071/ 10.78	13.4/1071/ 13.44	13.9/1071/ 13.92
HC BCKGRD METER/RANGE/PPM	4.4/1071/ 4.40	4.4/1071/ 4.40	4.6/1071/ 4.60
CO SAMPLE METER/RANGE/PPM	23.0/ 12/ 21.87	11.0/ 12/ 10.29	13.3/ 12/ 12.49
CO BCKGRD METER/RANGE/PPM	.0/ 12/ .00	.0/ 12/ .00	.1/ 12/ .09
CO2 SAMPLE METER/RANGE/PCT	89.1/ 11/ .8878	60.4/ 11/ .5869	77.9/ 11/ .7689
CO2 BCKGRD METER/RANGE/PCT	4.8/ 11/ .0434	4.8/ 11/ .0434	4.9/ 11/ .0443
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	41.4/1072/ 103.83	26.5/1072/ 66.49	33.3/1072/ 83.44
NOX BCKGRD METER/RANGE/PPM	.3/ 1/ .08	.8/ 1/ .21	.8/ 1/ .21
CH4 SAMPLE PPM (1.150)	1.91	1.81	1.75
CH4 BCKGRD PPM	1.96	1.99	1.97
DILUTION FACTOR	14.37	21.73	16.59
HC CONCENTRATION PPM	6.69	9.24	9.59
CO CONCENTRATION PPM	21.08	9.98	11.98
CO2 CONCENTRATION PCT	.8474	.5455	.7273
NOX CONCENTRATION PPM	100.98	64.73	81.11
CH4 CONCENTRATION PPM	.08	-.09	-.10
NMHC CONCENTRATION PPM	6.59	9.35	9.71
HC MASS GRAMS	.535	1.266	.765
CO MASS GRAMS	3.339	2.706	1.891
CO2 MASS GRAMS	2110.87	2326.47	1805.41
NOX MASS GRAMS	26.471	29.053	21.189
PM MASS GRAMS	.118	.134	.117
CH4 MASS GRAMS	.007	.000	.000
NMHC MASS GRAMS (FID)	.517	1.256	.759
FUEL MASS KG	.681	.751	.582
FUEL ECONOMY MPG (L/100KM)	15.45 (15.23)	15.01 (15.67)	18.00 (13.07)

3-BAG COMPOSITE RESULTS

HC	G/MI	.259	CH4	G/MI	.000
CO	G/MI	.700	NMHC	G/MI	.256
NOX	G/MI	7.047			
PM	G/MI	.034			

FUEL ECONOMY MPG (L/100KM) 15.84 (14.85)

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.2-R 1-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER 100	TEST FT-2	DIESEL EM-2795-F
VEHICLE MODEL 0 DODGE RAM 2500	DATE 11/19/1999 RUN	FUEL DENSITY 6.439 LB/GAL
ENGINE 5.9 L (359 CID)-6	DYNO 7 BAG CART 2	H .151 C .849 O .000 X .000
TRANSMISSION A4	ACTUAL ROAD LOAD 12.44 HP (9.28 KW)	US06
ODOMETER 198 MILES (318 KM)	TEST WEIGHT 6250 LBS (2834 KG)	

BAROMETER 29.23 IN HG (742.4 MM HG) DRY BULB TEMPERATURE 77.0°F (25.0°C) NOX HUMIDITY C.F. 1.023

RELATIVE HUMIDITY 56.0 PCT.

BAG NUMBER	1
BAG DESCRIPTION	
RUN TIME SECONDS	600.4
DRY/WET CORRECTION FACTOR, SAMP/BACK	.967/.982
MEASURED DISTANCE MILES (KM)	8.00 (12.87)
BLOWER FLOW RATE SCFM (SCMM)	564.9 (16.00)
GAS METER FLOW RATE SCFM (SCMM)	1.06 (.03)
TOTAL FLOW SCF (SCM)	5664. (160.4)
HC SAMPLE METER/RANGE/PPM (CONT)	16.8/1071/ 16.77
HC BCKGRD METER/RANGE/PPM	5.0/1071/ 5.00
CO SAMPLE METER/RANGE/PPM	22.5/ 12/ 21.39
CO BCKGRD METER/RANGE/PPM	.1/ 12/ .09
CO2 SAMPLE METER/RANGE/PCT	72.5/ 1/ 1.4373
CO2 BCKGRD METER/RANGE/PCT	2.2/ 1/ .0441
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	47.8/1072/ 119.90
NOX BCKGRD METER/RANGE/PPM	.6/ 1/ .16
CH4 SAMPLE PPM (1.150)	1.58
CH4 BCKGRD PPM	1.93
DILUTION FACTOR	8.88
HC CONCENTRATION PPM	12.33
CO CONCENTRATION PPM	20.29
CO2 CONCENTRATION PCT	1.3982
NOX CONCENTRATION PPM	115.76
CH4 CONCENTRATION PPM	-.14
NMHC CONCENTRATION PPM	12.49
HC MASS GRAMS	1.163
CO MASS GRAMS	3.788
CO2 MASS GRAMS	4105.98
NOX MASS GRAMS	36.334
PM MASS GRAMS	.393
CH4 MASS GRAMS	.000
NMHC MASS GRAMS (FID)	1.155
FUEL MASS KG	1.323
FUEL ECONOMY MPG (L/100KM)	17.65 (13.33)

1-BAG COMPOSITE RESULTS

HC	G/MI	.145	CH4	G/MI	.000
CO	G/MI	.474	NMHC	G/MI	.144
NOX	G/MI	4.543			
PM	G/MI	.049			
FUEL ECONOMY MPG (L/100KM)		17.65 (13.33)			

SOUTHWEST RESEARCH INSTITUTE - DEPARTMENT OF EMISSIONS RESEARCH

COMPUTER PROGRAM LDT 2.2-R 1-BAG EPA FTP VEHICLE EMISSION RESULTS PROJECT NO. 08-2164-001

VEHICLE NUMBER 100
VEHICLE MODEL 0 DODGE RAM 2500
ENGINE 5.9 L (359 CID)-6
TRANSMISSION A4
ODOMETER 217 MILES (349 KM)

TEST FT-2
DATE 11/18/1999 RUN
DYNO 7 BAG CART 2
ACTUAL ROAD LOAD 12.44 HP (9.28 KW)
TEST WEIGHT 6250 LBS (2834 KG)

DIESEL EM-2795-F
FUEL DENSITY 6.439 LB/GAL
H .151 C .849 O .000 X .000
H-FET

BAROMETER 29.22 IN HG (742.2 MM HG) DRY BULB TEMPERATURE 78.0°F (25.6°C) NOX HUMIDITY C.F. 1.015
RELATIVE HUMIDITY 53.1 PCT.

BAG NUMBER	1
BAG DESCRIPTION	
RUN TIME SECONDS	765.4
DRY/WET CORRECTION FACTOR, SAMP/BACK	.973/.982
MEASURED DISTANCE MILES (KM)	10.28 (16.53)
BLOWER FLOW RATE SCFM (SCMM)	564.7 (15.99)
GAS METER FLOW RATE SCFM (SCMM)	1.08 (.03)
TOTAL FLOW SCF (SCM)	7217. (204.4)
HC SAMPLE METER/RANGE/PPM (CONT)	16.3/1071/ 16.26
HC BCKGRD METER/RANGE/PPM	5.0/1071/ 5.00
CO SAMPLE METER/RANGE/PPM	14.3/ 12/ 13.44
CO BCKGRD METER/RANGE/PPM	.0/ 12/ .00
CO2 SAMPLE METER/RANGE/PCT	91.4/ 11/ .9124
CO2 BCKGRD METER/RANGE/PCT	4.8/ 11/ .0434
NOX SAMPLE METER/RANGE/PPM (CONT)(D)	43.2/1072/ 108.35
NOX BCKGRD METER/RANGE/PPM	.6/ 1/ .16
CH4 SAMPLE PPM (1.150)	1.85
CH4 BCKGRD PPM	1.98
DILUTION FACTOR	13.99
HC CONCENTRATION PPM	11.62
CO CONCENTRATION PPM	12.96
CO2 CONCENTRATION PCT	.8721
NOX CONCENTRATION PPM	105.23
CH4 CONCENTRATION PPM	.02
NMHC CONCENTRATION PPM	11.60
HC MASS GRAMS	1.396
CO MASS GRAMS	3.084
CO2 MASS GRAMS	3263.82
NOX MASS GRAMS	41.758
PM MASS GRAMS	.195
CH4 MASS GRAMS	.002
NMHC MASS GRAMS (FID)	1.367
FUEL MASS KG	1.052
FUEL ECONOMY MPG (L/100KM)	28.52 (8.25)

1-BAG COMPOSITE RESULTS

HC	G/MI	.136	CH4	G/MI	.000
CO	G/MI	.300	NMHC	G/MI	.133
NOX	G/MI	4.064			
PM	G/MI	.019			

FUEL ECONOMY MPG (L/100KM) 28.52 (8.25)

APPENDIX L

APPENDIX B

HYDROCARBON SPECIATION DATA

Page	Table	Title
B-1	B-1	A Comparison of Weighted Composite Results During FTP
B-5	B-2	A Comparison of Weighted Composite Results During US06
B-9	B-3	A Comparison of Weighted Composite Results During HFET

TABLE B-1. A COMPARISON OF WEIGHTED COMPOSITE RESULTS DURING FTP

COMPOUND	FTP COMPOSITE, mg/mi					
	BASELINE			S-2 Diesel		
	11/22/99	11/23/99	AVG.	11/18/99	11/19/99	AVG.
METHANE	1.2	1.3	1.2	0.0	0.4	0.2
ETHANE	0.4	0.8	0.6	0.7	0.7	0.7
ETHYLENE	15.8	16.0	15.9	10.8	10.9	10.9
PROPANE	0.0	0.3	0.2	0.1	0.0	trace
PROPYLENE	3.4	3.5	3.5	2.6	2.7	2.6
ACETYLENE	4.1	4.1	4.1	2.6	1.9	2.2
PROPADIENE	0.0	0.0	0.0	0.0	0.0	0.0
BUTANE	0.2	0.1	0.2	0.0	0.1	0.1
TRANS-2-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
1-BUTENE	0.9	0.9	0.9	0.8	0.9	0.9
2-METHYLPROPENE (ISOBUTYLENE)	0.6	0.5	0.5	0.7	0.2	0.4
2,2-DIMETHYLPROPANE (NEOPENTANE)	0.0	0.0	0.0	0.0	0.0	0.0
PROPYNE	0.0	0.0	0.0	0.0	0.0	0.0
1,3-BUTADIENE	0.8	0.9	0.8	0.6	0.7	0.6
2-METHYLPROPANE (ISOBUTANE)	0.0	0.0	0.0	0.0	0.7	0.4
1-BUTYNE	0.0	0.0	0.0	0.0	0.0	0.0
METHANOL	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
ETHANOL	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLBUTANE (ISOPENTANE)	0.0	0.2	0.1	0.0	4.1	2.1
2-BUTYNE	0.0	0.0	0.0	0.0	0.0	0.0
1-PENTENE	1.0	0.5	0.7	0.6	0.3	0.5
2-METHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
PENTANE	0.7	0.4	0.5	0.4	0.5	0.4
UNIDENTIFIED C5 OLEFINS	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-1,3-BUTADIENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-2-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-BUTANOL	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOPENTADIENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLBUTANE	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLBUTANE	0.1	0.1	0.1	2.0	3.0	2.5
MTBE	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLPENTANE	4.1	2.5	3.3	0.7	0.0	0.4
4-METHYL-TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLPENTANE	0.0	0.0	0.0	0.1	0.0	0.1
2-METHYL-1-PENTENE	0.1	0.0	0.1	0.0	0.0	0.0
1-HEXENE	0.1	0.0	0.1	0.0	0.0	0.0
HEXANE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C6 OLEFINS	0.0	0.0	0.0	0.1	0.0	0.1
TRANS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
DI-ISOPROPYL ETHER	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLCYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
ETBE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLPENTANE, NOTE A	0.0	0.0	0.0	0.0	0.0	0.0
METHYLCYCLOPENTANE, NOTE A	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,3-TRIMETHYLBUTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0

TABLE B-1 (CONT'D). A COMPARISON OF WEIGHTED COMPOSITE RESULTS DURING FTP

COMPOUND	FTP COMPOSITE, mg/mi					
	BASELINE			S-2 Diesel		
	11/22/99	11/23/99	AVG.	11/18/99	11/19/99	AVG.
1-METHYLCYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
BENZENE	1.3	1.4	1.4	0.9	0.9	0.9
3-METHYL-1-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLPENTANE	0.0	0.0	0.0	0.4	0.1	0.3
1,1-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-AMYL METHYL ETHER	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOHEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLHEXANE	0.1	0.0	trace	0.5	0.4	0.5
CIS-1,3-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,2-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,3-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,4-TRIMETHYLPENTANE	0.3	0.1	0.2	0.6	0.7	0.7
2-METHYL-1-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-3-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
HEPTANE	0.0	0.0	0.0	0.5	0.0	0.3
CIS-3-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C7	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-TRANS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
METHYLCYCLOHEXANE	0.0	8.4	4.2	0.0	0.0	0.0
CIS-1,2-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1,3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,3-TRIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,5-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLHEXANE	0.0	0.1	0.1	0.0	0.4	0.2
1-TRANS-2-CIS-4-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1-TRANS-2-CIS-3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,4-TRIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,3-TRIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TOLUENE	0.1	0.4	0.3	0.3	0.1	0.2
2,3-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1,2-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYLHEXANE, NOTE B	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYLHEPTANE	0.1	1.0	0.6	1.1	1.3	1.2
3-METHYLHEPTANE	0.0	0.0	0.0	0.8	0.9	0.8
1-CIS,2-TRANS,3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,3-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,4-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYLHEXANE	0.1	1.0	0.6	0.0	0.0	0.0
2,2,5-TRIMETHYLHEXANE	0.1	0.0	0.1	0.0	0.0	0.0
TRANS-1-METHYL-3-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1-METHYL-3-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1-METHYL-2-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-1-ETHYL-CYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,2-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0

TABLE B-1 (CONT'D). A COMPARISON OF WEIGHTED COMPOSITE RESULTS DURING FTP

COMPOUND	FTP COMPOSITE, mg/mi					
	BASELINE			S-2 Diesel		
	11/22/99	11/23/99	AVG.	11/18/99	11/19/99	AVG.
1-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-4-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
OCTANE	0.0	0.1	0.1	1.3	1.5	1.4
UNIDENTIFIED C8	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,3-DIMETHYLCYCLOHEXANE, NOTE C	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
ISOPROPYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,5-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1-METHYL-2-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLHEPTANE	1.9	1.4	1.6	1.3	2.0	1.6
4,4-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,2-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,6-DIMETHYLHEPTANE, NOTE D	1.3	1.2	1.3	0.0	0.0	0.0
1,1,3-TRIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,5-DIMETHYLHEPTANE, NOTE E	0.1	0.0	0.1	1.4	0.4	0.9
3,3-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,5-DIMETHYLHEPTANE, NOTE E	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLBENZENE	0.7	0.7	0.7	0.0	0.1	0.1
2,3,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
m-& p-XYLENE	0.9	1.0	0.9	0.4	2.4	1.4
4-METHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
4-ETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLOCTANE	0.9	0.0	0.4	2.2	1.7	2.0
3-METHYLOCTANE	0.6	0.0	0.3	0.0	0.0	0.0
STYRENE	0.0	0.0	0.0	0.0	0.0	0.0
o-XYLENE	0.5	0.8	0.6	0.0	0.1	0.1
1-NONENE	0.1	0.7	0.4	0.0	0.0	0.0
TRANS-3-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
NONANE	1.9	2.0	1.9	1.9	5.6	3.8
TRANS-2-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
ISOPROPYLBENZENE (CUMENE)	0.9	0.7	0.8	0.0	0.0	0.0
2,2-DIMETHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLOCTANE	0.9	0.6	0.8	0.5	0.0	0.2
n-PROPYLBENZENE	1.3	0.8	1.1	0.0	0.0	0.0
1-METHYL-3-ETHYLBENZENE	1.0	0.4	0.7	0.0	0.0	0.0
1-METHYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.6	1.0	0.8
1,3,5-TRIMETHYLBENZENE	2.0	0.9	1.4	1.8	2.8	2.3
1-METHYL-2-ETHYLBENZENE	1.2	0.0	0.6	2.2	2.6	2.4
1,2,4-TRIMETHYLBENZENE	3.0	2.6	2.8	0.0	0.1	trace
TERT-BUTYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-DECENE	0.0	0.0	0.0	0.0	0.0	0.0
DECANE, NOTE F	4.7	4.1	4.4	8.9	10.3	9.6
ISOBUTYLBENZENE, NOTE F	4.5	3.9	4.2	8.4	9.7	9.0
1,3,-DIMETHYL-5-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
METHYLPROPYLBENZENE (sec butylbenzene)	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-3-ISOPROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,3-TRIMETHYLBENZENE	1.1	0.8	0.9	0.8	0.6	0.7
1-METHYL-4-ISOPROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
INDAN	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-2-ISOPROPYLBENZENE	0.0	0.0	0.0	0.5	0.5	0.5
1,3-DIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,4-DIETHYLBENZENE	0.0	0.1	0.1	0.0	0.0	0.0
1-METHYL-3-N-PROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-4-N-PROPYLBENZENE, NOTE G	1.6	1.1	1.3	0.0	0.0	0.0
1,2 DIETHYLBENZENE	0.0	0.0	0.0	1.2	1.6	1.4
1-METHYL-2-N-PROPYLBENZENE	0.0	0.1	0.1	3.6	3.8	3.7
1,4-DIMETHYL-2-ETHYLBENZENE	1.0	0.0	0.5	2.5	2.8	2.7

TABLE B-1 (CONT'D). A COMPARISON OF WEIGHTED COMPOSITE RESULTS DURING FTP

COMPOUND	FTP COMPOSITE, mg/mi					
	BASELINE			S-2 Diesel		
	11/22/99	11/23/99	AVG.	11/18/99	11/19/99	AVG.
1,3-DIMETHYL-4-ETHYLBENZENE	0.5	0.8	0.6	0.0	0.0	0.0
1,2-DIMETHYL-4-ETHYLBENZENE	0.0	0.1	0.1	0.4	0.0	0.2
1,3-DIMETHYL-2-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
UNDECANE	6.4	4.9	5.7	13.5	16.4	15.0
1,2-DIMETHYL-3-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,4,5-TETRAMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLBUTYLBENZENE (sec AMYLBENZENE)	0.0	0.0	0.0	0.0	0.0	0.0
3,4 DIMETHYLCUMENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,3,5-TETRAMETHYLBENZENE	0.5	2.3	1.4	3.5	3.1	3.3
TERT-1-BUT-2-METHYLBENZENE	0.0	0.8	0.4	1.1	0.0	0.6
1,2,3,4-TETRAMETHYLBENZENE	0.0	0.0	0.0	0.4	0.0	0.2
N-PENT-BENZENE	1.1	0.8	0.9	2.5	1.5	2.0
TERT-1-BUT-3,5-DIMETHYLBENZENE	0.0	0.0	0.0	2.7	2.6	2.6
TERT-1-BUTYL-4-ETHYLBENZENE	0.6	0.0	0.3	0.0	0.0	0.0
NAPHTHALENE	0.0	0.0	0.0	0.5	0.5	0.5
DODECANE	5.2	2.9	4.0	11.3	11.8	11.5
1,3,5-TRIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,4-TRIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
HEXYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C9-C12+	9.4	5.5	7.5	15.8	13.7	14.7
FORMALDEHYDE	18.8	17.7	18.3	13.7	12.2	12.9
ACETALDEHYDE	8.9	9.0	8.9	4.1	6.8	5.5
ACROLEIN	0.2	2.3	1.2	0.4	0.5	0.4
ACETONE	1.2	0.0	0.6	0.6	0.4	0.5
PROPIONALDEHYDE	4.4	4.4	4.4	3.1	2.4	2.7
CROTONALDEHYDE	2.0	2.5	2.3	1.4	1.4	1.4
ISOBUTYRALDEHYDE, NOTE H	0.7	0.3	0.5	0.7	0.3	0.5
METHYL ETHYL KETONE, NOTE H	0.7	0.3	0.5	0.7	0.3	0.5
BENZALDEHYDE	3.4	0.1	1.7	0.4	0.0	0.2
ISOVALERALDEHYDE	0.0	0.4	0.2	0.2	0.1	0.1
VALERALDEHYDE	0.2	0.5	0.4	0.4	0.1	0.2
O-TOLUALDEHYDE	0.0	0.3	0.1	0.3	0.0	0.2
M/P-TOLUALDEHYDE	3.2	3.4	3.3	2.7	0.2	1.4
HEXANALDEHYDE	0.6	0.2	0.4	0.0	0.0	0.0
DIMETHYLBENZALDEHYDE	0.2	0.2	0.2	0.6	0.0	0.3
SUMMED SPECIATED VALUES	136	128	132.2	148	156	151.8

A - 2,2-Dimethylpentane and methylcyclopentane co-elute. GC peak area split equally between the two compounds.
B - 3-Methyl-3-ethy-pentane co-elutes with reported compound. Not reported separately.
C - Cis-1,4-Dimethylcyclohexane co-elutes with reported compound. Not reported separately.
D - Propylcyclopentane co-elutes with reported compound. Not reported separately.
E - 2,5-Dimethylheptane and 3,5-dimethylheptane co-elute. GC peak area split equally between the two compounds.
F - Decane and isobutylbenzene co-elute. GC peak area split equally between the two compounds.
G - n-Butylbenzene co-elutes with reported compound. Not reported separately.
H - Isobutyraldehyde and methyl ethyl ketone co-elute. LC peak area split equally between the two compounds.

TABLE B-2. A COMPARISON OF WEIGHTED COMPOSITE RESULTS DURING US06

COMPOUND	US06, mg/mi					
	BASELINE			S-2 Diesel		
	11/22/99	11/23/99	AVG.	11/18/99	11/19/99	AVG.
METHANE	0.0	0.1	0.1	0.0	0.0	0.0
ETHANE	0.0	0.1	trace	0.2	0.2	0.2
ETHYLENE	6.1	5.7	5.9	5.5	5.7	5.6
PROPANE	0.0	0.0	0.0	0.4	0.0	0.2
PROPYLENE	1.6	1.5	1.6	1.6	1.6	1.6
ACETYLENE	1.6	1.6	1.6	0.9	1.1	1.0
PROPADIENE	0.0	0.0	0.0	0.0	0.0	0.0
BUTANE	0.0	0.0	0.0	1.1	0.0	0.6
TRANS-2-BUTENE	0.0	0.1	0.1	0.0	0.0	0.0
1-BUTENE	0.4	0.7	0.6	0.8	0.5	0.6
2-METHYLPROPENE (ISOBUTYLENE)	0.3	0.5	0.4	0.3	0.3	0.3
2,2-DIMETHYLPROPANE (NEOPENTANE)	0.0	0.0	0.0	0.0	0.0	0.0
PROPYNE	0.0	0.0	0.0	0.0	0.0	0.0
1,3-BUTADIENE	0.3	0.3	0.3	0.4	0.5	0.5
2-METHYLPROPANE (ISOBUTANE)	0.0	0.0	0.0	0.2	0.3	0.2
1-BUTYNE	0.0	0.0	0.0	0.0	0.0	0.0
METHANOL	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
ETHANOL	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLBUTANE (ISOPENTANE)	0.0	0.0	0.0	0.0	0.0	0.0
2-BUTYNE	0.0	0.0	0.0	0.0	0.0	0.0
1-PENTENE	0.5	0.3	0.4	0.5	0.5	0.5
2-METHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
PENTANE	0.1	0.2	0.2	0.1	0.1	0.1
UNIDENTIFIED C5 OLEFINS	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-1,3-BUTADIENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-PENTENE	0.0	0.2	0.1	0.0	0.0	0.0
3,3-DIMETHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-2-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-BUTANOL	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOPENTADIENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLBUTANE	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOPENTANE	0.0	0.3	0.1	0.0	0.0	0.0
2,3-DIMETHYLBUTANE	0.0	0.0	0.0	0.9	1.2	1.1
MTBE	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLPENTANE	1.9	2.1	2.0	0.6	0.6	0.6
4-METHYL-TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLPENTANE	0.0	0.0	0.0	0.3	0.3	0.3
2-METHYL-1-PENTENE	0.1	0.0	0.1	0.0	0.0	0.0
1-HEXENE	0.1	0.0	0.1	0.0	0.0	0.0
HEXANE	0.0	0.4	0.2	0.0	0.0	0.0
UNIDENTIFIED C6 OLEFINS	0.0	0.0	0.0	0.3	0.3	0.3
TRANS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
DI-ISOPROPYL ETHER	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-TRANS-2-PENTENE	0.0	0.0	0.0	0.4	0.0	0.2
2-METHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLCYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
ETBE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLPENTANE, NOTE A	0.0	0.0	0.0	0.0	0.0	0.0
METHYLCYCLOPENTANE, NOTE A	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,3-TRIMETHYLBUTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0

TABLE B-2 (CONT'D). A COMPARISON OF WEIGHTED COMPOSITE RESULTS DURING US06

COMPOUND	US06, mg/mi					
	BASELINE			S-2 Diesel		
	11/22/99	11/23/99	AVG.	11/18/99	11/19/99	AVG.
1-METHYLCYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
BENZENE	0.6	0.6	0.6	0.2	0.3	0.2
3-METHYL-1-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-AMYL METHYL ETHER	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOHEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLHEXANE	0.0	0.0	0.0	0.3	0.3	0.3
CIS-1,3-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,2-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,3-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,4-TRIMETHYLPENTANE	0.1	0.0	trace	0.0	0.1	0.1
2-METHYL-1-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-3-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
HEPTANE	0.0	0.0	0.0	0.3	0.3	0.3
CIS-3-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C7	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-TRANS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
METHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,2-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1,3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,3-TRIMETHYLPENTANE	0.5	0.5	0.5	0.3	0.5	0.4
2,5-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1-TRANS-2-CIS-4-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1-TRANS-2-CIS-3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,4-TRIMETHYLPENTANE	0.0	0.0	0.0	0.5	0.0	0.2
2,3,3-TRIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TOLUENE	0.2	0.0	0.1	0.0	0.2	0.1
2,3-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.7	0.3
1,1,2-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYLHEXANE, NOTE B	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYLHEPTANE	0.0	0.0	0.0	0.5	0.7	0.6
3-METHYLHEPTANE	0.0	0.0	0.0	0.4	0.5	0.5
1-CIS,2-TRANS,3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,3-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,4-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,5-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1-METHYL-3-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1-METHYL-3-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1-METHYL-2-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-1-ETHYL-CYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,2-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0

TABLE B-2 (CONT'D). A COMPARISON OF WEIGHTED COMPOSITE RESULTS DURING US06

COMPOUND	US06, mg/mi					
	BASELINE			S-2 Diesel		
	11/22/99	11/23/99	AVG.	11/18/99	11/19/99	AVG.
1-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-4-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
OCTANE	0.3	0.3	0.3	0.7	0.8	0.8
UNIDENTIFIED C8	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,3-DIMETHYLCYCLOHEXANE, NOTE C	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
ISOPROPYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,5-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1-METHYL-2-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLHEPTANE	0.9	0.7	0.8	0.8	0.6	0.7
4,4-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,2-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,6-DIMETHYLHEPTANE, NOTE D	0.6	0.5	0.5	0.0	0.0	0.0
1,1,3-TRIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,5-DIMETHYLHEPTANE, NOTE E	0.2	0.3	0.2	0.3	0.3	0.3
3,3-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,5-DIMETHYLHEPTANE, NOTE E	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLBENZENE	0.3	0.3	0.3	0.0	0.7	0.4
2,3,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
m-& p-XYLENE	0.6	0.7	0.7	0.3	1.3	0.8
4-METHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
4-ETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLOCTANE	0.0	0.3	0.1	1.0	1.0	1.0
3-METHYLOCTANE	0.3	0.3	0.3	1.1	0.0	0.5
STYRENE	0.0	0.0	0.0	0.0	0.0	0.0
o-XYLENE	0.3	0.4	0.3	0.0	0.5	0.3
1-NONENE	0.3	0.3	0.3	0.0	0.3	0.2
TRANS-3-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
NONANE	0.9	1.0	0.9	2.6	2.8	2.7
TRANS-2-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
ISOPROPYLBENZENE (CUMENE)	0.5	0.3	0.4	0.3	0.2	0.3
2,2-DIMETHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLOCTANE	0.5	0.4	0.4	0.3	0.0	0.2
n-PROPYLBENZENE	0.7	0.0	0.4	0.3	0.0	0.1
1-METHYL-3-ETHYLBENZENE	0.7	0.0	0.3	0.2	0.0	0.1
1-METHYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.3	0.3	0.3
1,3,5-TRIMETHYLBENZENE	1.0	0.6	0.8	1.1	1.2	1.1
1-METHYL-2-ETHYLBENZENE	0.3	0.9	0.6	1.1	1.1	1.1
1,2,4-TRIMETHYLBENZENE	1.3	1.2	1.3	0.0	0.0	0.0
TERT-BUTYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-DECENE	0.0	0.0	0.0	0.0	0.0	0.0
DECANE, NOTE F	2.0	1.7	1.9	4.8	4.5	4.7
ISOBUTYLBENZENE, NOTE F	1.9	1.6	1.8	4.5	4.3	4.4
1,3,-DIMETHYL-5-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
METHYLPROPYLBENZENE (sec butylbenzene)	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-3-ISOPROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,3-TRIMETHYLBENZENE	0.6	0.5	0.6	0.6	0.4	0.5
1-METHYL-4-ISOPROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
INDAN	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-2-ISOPROPYLBENZENE	0.0	0.0	0.0	0.3	0.3	0.3
1,3-DIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,4-DIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-3-N-PROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-4-N-PROPYLBENZENE, NOTE G	0.8	1.1	0.9	0.0	0.0	0.0
1,2 DIETHYLBENZENE	0.0	0.0	0.0	0.3	0.9	0.6
1-METHYL-2-N-PROPYLBENZENE	0.0	0.0	0.0	0.3	2.1	1.2
1,4-DIMETHYL-2-ETHYLBENZENE	0.3	0.0	0.2	1.4	1.6	1.5

TABLE B-2 (CONT'D). A COMPARISON OF WEIGHTED COMPOSITE RESULTS DURING US06

COMPOUND	US06, mg/mi					
	BASELINE			S-2 Diesel		
	11/22/99	11/23/99	AVG.	11/18/99	11/19/99	AVG.
1,3-DIMETHYL-4-ETHYLBENZENE	0.6	0.5	0.8	0.0	0.0	0.0
1,2-DIMETHYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,3-DIMETHYL-2-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
UNDECANE	3.4	2.8	3.1	8.7	8.4	8.6
1,2-DIMETHYL-3-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,4,5-TETRAMETHYLBENZENE	0.0	0.0	0.0	3.2	0.0	1.6
2-METHYLBUTYLBENZENE (sec AMYLBENZENE)	0.0	0.0	0.0	0.0	0.0	0.0
3,4 DIMETHYLCUMENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,3,5-TETRAMETHYLBENZENE	0.0	0.0	0.0	2.8	4.8	3.8
TERT-1-BUT-2-METHYLBENZENE	0.0	0.0	0.0	0.5	0.5	0.5
1,2,3,4-TETRAMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
N-PENT-BENZENE	0.6	0.7	0.7	0.8	1.3	1.0
TERT-1-BUT-3,5-DIMETHYLBENZENE	0.0	0.0	0.0	1.2	1.1	1.1
TERT-1-BUTYL-4-ETHYLBENZENE	0.0	0.8	0.4	0.0	0.0	0.0
NAPHTHALENE	0.0	0.3	0.2	0.0	0.4	0.2
DODECANE	0.4	2.5	1.4	6.9	6.3	6.6
1,3,5-TRIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,4-TRIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
HEXYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C9-C12+	4.9	6.0	5.5	10.1	7.1	8.6
FORMALDEHYDE	7.9	6.7	7.3	7.4	6.7	7.1
ACETALDEHYDE	4.2	2.9	3.6	4.2	3.8	4.0
ACROLEIN	0.1	0.3	0.2	0.1	0.3	0.2
ACETONE	0.3	0.0	0.2	0.9	0.3	0.6
PROPIONALDEHYDE	1.7	1.6	1.6	1.8	1.6	1.7
CROTONALDEHYDE	0.7	0.7	0.7	0.7	0.8	0.7
ISOBUTYRALDEHYDE, NOTE H	0.3	0.7	0.5	0.3	0.3	0.3
METHYL ETHYL KETONE, NOTE H	0.3	0.7	0.5	0.3	0.3	0.3
BENZALDEHYDE	0.8	2.2	1.5	0.0	0.1	trace
ISOVALERALDEHYDE	0.0	0.0	0.0	0.0	0.0	0.0
VALERALDEHYDE	0.0	0.1	trace	0.5	0.2	0.4
O-TOLUALDEHYDE	0.0	0.0	0.0	0.0	0.0	0.0
M/P-TOLUALDEHYDE	0.7	0.4	0.5	1.4	0.4	0.9
HEXANALDEHYDE	0.0	0.1	trace	0.0	0.5	0.2
DIMETHYLBENZALDEHYDE	0.0	0.3	0.1	0.0	0.0	0.0
SUMMED SPECIATED VALUES	57	59	57.7	92	87	89.4

A - 2,2-Dimethylpentane and methylcyclopentane co-elute. GC peak area split equally between the two compounds.
B - 3-Methyl-3-ethy-pentane co-elutes with reported compound. Not reported separately.
C - Cis-1,4-Dimethylcyclohexane co-elutes with reported compound. Not reported separately.
D - Propylcyclopentane co-elutes with reported compound. Not reported separately.
E - 2,5-Dimethylheptane and 3,5-dimethylheptane co-elute. GC peak area split equally between the two compounds.
F - Decane and isobutylbenzene co-elute. GC peak area split equally between the two compounds.
G - n-Butylbenzene co-elutes with reported compound. Not reported separately.
H - Isobutyraldehyde and methyl ethyl ketone co-elute. LC peak area split equally between the two compounds.

TABLE B-3. A COMPARISON OF WEIGHTED COMPOSITE RESULTS DURING HFET

COMPOUND	HFET, mg/mi					
	BASELINE			S-2 Diesel		
	11/22/99	11/23/99	AVG.	11/18/99	11/19/99	AVG.
METHANE	0.0	0.0	0.0	0.0	0.0	0.0
ETHANE	0.0	0.8	0.4	0.2	0.2	0.2
ETHYLENE	5.8	5.7	5.7	4.8	4.7	4.7
PROPANE	0.0	0.0	0.0	0.3	0.0	0.2
PROPYLENE	1.3	1.3	1.3	1.3	1.2	1.2
ACETYLENE	1.5	1.5	1.5	0.8	1.0	0.9
PROPADIENE	0.0	0.0	0.0	0.0	0.0	0.0
BUTANE	0.0	0.1	trace	1.2	0.1	0.6
TRANS-2-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
1-BUTENE	0.3	0.3	0.3	0.4	0.4	0.4
2-METHYLPROPENE (ISOBUTYLENE)	0.2	0.2	0.2	0.2	0.2	0.2
2,2-DIMETHYLPROPANE (NEOPENTANE)	0.0	0.0	0.0	0.0	0.0	0.0
PROPYNE	0.0	0.0	0.0	0.0	0.0	0.0
1,3-BUTADIENE	0.2	0.0	0.1	0.3	0.5	0.4
2-METHYLPROPANE (ISOBUTANE)	0.0	0.0	0.0	0.3	0.2	0.3
1-BUTYNE	0.0	0.0	0.0	0.0	0.0	0.0
METHANOL	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
ETHANOL	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLBUTANE (ISOPENTANE)	0.0	0.0	0.0	0.0	0.0	0.0
2-BUTYNE	0.0	0.0	0.0	0.0	0.0	0.0
1-PENTENE	0.4	0.3	0.3	0.4	0.4	0.4
2-METHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
PENTANE	0.1	0.1	0.1	0.1	0.1	0.1
UNIDENTIFIED C5 OLEFINS	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-1,3-BUTADIENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYL-1-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-2-BUTENE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-BUTANOL	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOPENTADIENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLBUTANE	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLBUTANE	0.0	0.0	0.0	1.3	1.6	1.5
MTBE	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLPENTANE	2.4	1.5	1.9	0.5	0.6	0.6
4-METHYL-TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLPENTANE	0.0	0.0	0.0	0.2	0.0	0.1
2-METHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
1-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
HEXANE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C6 OLEFINS	0.0	0.0	0.0	0.3	0.0	0.2
TRANS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
DI-ISOPROPYL ETHER	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-TRANS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLCYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
ETBE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLPENTANE, NOTE A	0.0	0.0	0.0	0.0	0.0	0.0
METHYLCYCLOPENTANE, NOTE A	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,3-TRIMETHYLBUTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0

TABLE B-3 (CONT'D). A COMPARISON OF WEIGHTED COMPOSITE RESULTS DURING HFET

COMPOUND	HFET, mg/ml					
	BASELINE			S-2 Diesel		
	11/22/99	11/23/99	AVG.	11/18/99	11/19/99	AVG.
1-METHYLCYCLOPENTENE	0.0	0.0	0.0	0.0	0.0	0.0
BENZENE	0.5	0.4	0.4	0.1	0.5	0.3
3-METHYL-1-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLPENTANE	0.0	0.0	0.0	0.4	0.0	0.2
1,1-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TERT-AMYL METHYL ETHER	0.0	0.0	0.0	0.0	0.0	0.0
CYCLOHEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYLHEXANE	0.0	0.0	0.0	0.2	0.2	0.2
CIS-1,3-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,2-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,3-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,4-TRIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-1-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-3-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
HEPTANE	0.0	0.0	0.0	0.2	0.3	0.3
CIS-3-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C7	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYL-2-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
3-METHYL-TRANS-3-HEXENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYL-CIS-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYL-1-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-HEPTENE	0.0	0.0	0.0	0.0	0.0	0.0
METHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,2-DIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1,3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYL-2-PENTENE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,3-TRIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,5-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1-TRANS-2-CIS-4-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,3-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1-TRANS-2-CIS-3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,4-TRIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,3-TRIMETHYLPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
TOLUENE	0.1	0.1	0.1	0.0	0.1	0.1
2,3-DIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1,2-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,4-DIMETHYLHEXANE, NOTE B	0.0	0.0	0.0	0.0	0.0	0.0
4-METHYLHEPTANE	0.0	0.0	0.0	0.7	0.7	0.7
3-METHYLHEPTANE	0.0	0.0	0.0	0.5	0.5	0.5
1-CIS,2-TRANS,3-TRIMETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,3-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,4-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
3-ETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,5-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1-METHYL-3-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1-METHYL-3-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1,1-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1-METHYL-2-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-1-ETHYL-CYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,2-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0

TABLE B-3 (CONT'D). A COMPARISON OF WEIGHTED COMPOSITE RESULTS DURING HFET

COMPOUND	HFET, mg/mi					
	BASELINE			S-2 Diesel		
	11/22/99	11/23/99	AVG.	11/18/99	11/19/99	AVG.
1-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-4-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
OCTANE	0.3	0.0	0.1	0.7	0.9	0.8
UNIDENTIFIED C8	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-2-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
TRANS-1,3-DIMETHYLCYCLOHEXANE, NOTE C	0.0	0.0	0.0	0.0	0.0	0.0
CIS-2-OCTENE	0.0	0.0	0.0	0.0	0.0	0.0
ISOPROPYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,2-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3,5-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1-METHYL-2-ETHYLCYCLOPENTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLHEPTANE	0.7	0.3	0.5	0.5	0.5	0.5
4,4-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-1,2-DIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,6-DIMETHYLHEPTANE, NOTE D	0.4	0.6	0.5	0.0	0.0	0.0
1,1,3-TRIMETHYLCYCLOHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,5-DIMETHYLHEPTANE, NOTE E	0.2	0.0	0.1	0.3	0.3	0.3
3,3-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
3,5-DIMETHYLHEPTANE, NOTE E	0.0	0.0	0.0	0.0	0.0	0.0
ETHYLBENZENE	0.3	0.6	0.4	0.0	0.0	0.0
2,3,4-TRIMETHYLHEXANE	0.0	0.0	0.0	0.0	0.0	0.0
2,3-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
m-& p-XYLENE	0.5	0.7	0.6	0.3	1.2	0.7
4-METHYLOCTANE	0.0	0.0	0.0	0.0	1.0	0.5
3,4-DIMETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
4-ETHYLHEPTANE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLOCTANE	0.0	0.0	0.0	1.0	0.0	0.5
3-METHYLOCTANE	0.2	0.2	0.2	0.0	0.0	0.0
STYRENE	0.0	0.0	0.0	0.0	0.0	0.0
o-XYLENE	0.2	0.3	0.2	0.0	0.0	0.0
1-NONENE	0.0	0.2	0.1	0.0	0.0	0.0
TRANS-3-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
CIS-3-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
NONANE	0.9	0.9	0.9	2.8	2.8	2.8
TRANS-2-NONENE	0.0	0.0	0.0	0.0	0.0	0.0
ISOPROPYLBENZENE (CUMENE)	0.4	0.3	0.3	0.0	0.3	0.1
2,2-DIMETHYLOCTANE	0.0	0.0	0.0	0.0	0.0	0.0
2,4-DIMETHYLOCTANE	0.2	0.4	0.3	0.0	0.3	0.1
n-PROPYLBENZENE	0.6	0.8	0.7	0.0	0.0	0.0
1-METHYL-3-ETHYLBENZENE	0.5	0.6	0.5	0.0	0.0	0.0
1-METHYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.2	0.1
1,3,5-TRIMETHYLBENZENE	1.0	1.8	1.4	1.6	1.4	1.5
1-METHYL-2-ETHYLBENZENE	0.3	1.2	0.7	1.1	1.1	1.1
1,2,4-TRIMETHYLBENZENE	1.3	1.2	1.2	0.0	0.0	0.0
TERT-BUTYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-DECENE	0.0	0.0	0.0	0.0	0.0	0.0
DECANE, NOTE F	1.9	1.7	1.8	4.9	4.6	4.8
ISOBUTYLBENZENE, NOTE F	1.8	1.6	1.7	4.6	4.4	4.5
1,3,-DIMETHYL-5-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
METHYLPROPYLBENZENE (sec butylbenzene)	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-3-ISOPROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,3-TRIMETHYLBENZENE	0.5	0.7	0.6	0.6	0.5	0.6
1-METHYL-4-ISOPROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
INDAN	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-2-ISOPROPYLBENZENE	0.0	0.0	0.0	0.3	0.3	0.3
1,3-DIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,4-DIETHYLBENZENE	0.0	0.6	0.3	0.0	0.0	0.0
1-METHYL-3-N-PROPYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1-METHYL-4-N-PROPYLBENZENE, NOTE G	0.5	7.7	4.1	0.0	0.0	0.0
1,2 DIETHYLBENZENE	0.0	0.0	0.0	1.0	1.0	1.0
1-METHYL-2-N-PROPYLBENZENE	0.0	0.0	0.0	2.3	2.3	2.3
1,4-DIMETHYL-2-ETHYLBENZENE	0.0	1.4	0.7	1.7	2.2	1.9

TABLE B-3 (CONT'D). A COMPARISON OF WEIGHTED COMPOSITE RESULTS DURING HFET

COMPOUND	HFET, mg/mi					
	BASELINE			S-2 Diesel		
	11/22/99	11/23/99	AVG.	11/18/99	11/19/99	AVG.
1,3-DIMETHYL-4-ETHYLBENZENE	0.5	1.1	0.8	0.0	0.0	0.0
1,2-DIMETHYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,3-DIMETHYL-2-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
UNDECANE	2.8	3.0	2.9	9.2	8.3	8.7
1,2-DIMETHYL-3-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,4,5-TETRAMETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
2-METHYLBUTYLBENZENE (sec AMYLBENZENE)	0.0	0.0	0.0	0.0	0.0	0.0
3,4 DIMETHYLCUMENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,3,5-TETRAMETHYLBENZENE	0.6	0.0	0.3	0.9	0.6	0.8
TERT-1-BUT-2-METHYLBENZENE	0.0	0.0	0.0	0.2	0.2	0.2
1,2,3,4-TETRAMETHYLBENZENE	0.0	0.0	0.0	0.0	0.3	0.1
N-PENT-BENZENE	0.5	0.7	0.6	0.9	1.4	1.1
TERT-1-BUT-3,5-DIMETHYLBENZENE	0.0	0.0	0.0	1.4	1.3	1.4
TERT-1-BUTYL-4-ETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
NAPHTHALENE	0.0	0.0	0.0	0.0	0.0	0.0
DODECANE	2.2	2.1	2.2	6.9	6.3	6.6
1,3,5-TRIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
1,2,4-TRIETHYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
HEXYLBENZENE	0.0	0.0	0.0	0.0	0.0	0.0
UNIDENTIFIED C9-C12+	3.7	4.9	4.3	7.8	6.4	7.1
FORMALDEHYDE	6.5	6.0	6.3	5.9	5.3	5.6
ACETALDEHYDE	3.1	2.3	2.7	3.0	2.6	2.8
ACROLEIN	0.3	0.1	0.2	0.3	0.2	0.2
ACETONE	0.3	0.0	0.1	0.4	0.1	0.3
PROPIONALDEHYDE	1.4	0.0	0.7	1.3	1.3	1.3
CROTONALDEHYDE	0.6	0.6	0.6	0.7	0.6	0.6
ISOBUTYRALDEHYDE, NOTE H	0.3	0.0	0.2	0.3	0.3	0.3
METHYL ETHYL KETONE, NOTE H	0.3	0.0	0.2	0.3	0.3	0.3
BENZALDEHYDE	1.1	0.0	0.5	0.0	0.1	trace
ISOVALERALDEHYDE	0.2	0.0	0.1	0.1	0.1	0.1
VALERALDEHYDE	0.1	0.0	trace	0.2	0.2	0.2
O-TOLUALDEHYDE	0.0	0.0	0.0	0.1	0.0	trace
M/P-TOLUALDEHYDE	0.7	0.9	0.8	1.0	0.2	0.6
HEXANALDEHYDE	0.2	0.0	0.1	0.0	0.2	0.1
DIMETHYLBENZALDEHYDE	0.0	0.8	0.4	0.0	0.0	0.0
SUMMED SPECIATED VALUES	51	59	54.7	79	75	77.1

A - 2,2-Dimethylpentane and methylcyclopentane co-elute. GC peak area split equally between the two compounds.
B - 3-Methyl-3-ethy-pentane co-elutes with reported compound. Not reported separately.
C - Cis-1,4-Dimethylcyclohexane co-elutes with reported compound. Not reported separately.
D - Propylcyclopentane co-elutes with reported compound. Not reported separately.
E - 2,5-Dimethylheptane and 3,5-dimethylheptane co-elute. GC peak area split equally between the two compounds.
F - Decane and isobutylbenzene co-elute. GC peak area split equally between the two compounds.
G - n-Butylbenzene co-elutes with reported compound. Not reported separately.
H - Isobutyraldehyde and methyl ethyl ketone co-elute. LC peak area split equally between the two compounds.