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Title:	Source Test: Stationary Source Sampling Report Michelin North America, Inc Tire Carcass Grinder Exhaust Duncan, SC Performed by Trigon Engineering January 1999

Stationary Source Sampling Report

Michelin North America, Inc.
Tire Carcass Grinder Exhaust
Duncan, South Carolina

Trigon Project # 046-98-181
January 1999

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STATIONARY SOURCE SAMPLING REPORT

FOR

MICHELIN NORTH AMERICA, INC.

DUNCAN, SOUTH CAROLINA

Tire Carcass Grinder Exhaust

Performed by:

Trigon Engineering Consultants, Inc.
Environmental, Health & Safety Division
6200 Harris Technology Blvd.
Charlotte, North Carolina 28269
704/598-1049

Trigon Project # 046-98-181
January 1999

REPORT CERTIFICATION

This report, all testing details, and the final results have been performed under the supervision and reviewed by the persons named below.

Date March 2, 1999 Signature _____

James A. Lewis
Project Manager
Environmental, Health & Safety Division
Trigon Engineering Consultants, Inc.

Date March 2, 1999 Signature _____

Paul R. Jenkins, Jr.
Quality Assurance Manager
Environmental, Health & Safety Division
Trigon Engineering Consultants, Inc.

Date February 26, 1999 Signature _____

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Stack Testing Department Manager
Environmental, Health & Safety Division
Trigon Engineering Consultants, Inc.

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TRIGON

1.0 INTRODUCTION

This section describes the purpose, a brief outline including the sampling and analytical strategy, and the personnel involved in the test program.

1.1 Purpose

The purpose of this sampling project was to determine concentrations and emission rates of total gaseous organic(s), toluene and methylene chloride from the Tire Carcass Grinder Exhaust located at the Michelin North America, Inc. (Michelin) tire retread facility in Duncan, South Carolina. The results of the sampling and the documentation provided in this report will be used to update draft AP-42 emission factors for the tire retread process which were developed by the Rubber Manufacturers Association for submission to the United States Environmental Protection Agency (US EPA).

1.2 Outline of Test Program

Stationary source sampling was performed January 28, 1999 by the Environmental, Health & Safety Division of Trigon Engineering Consultants, Inc. at the Michelin Tire Retread facility in Duncan, South Carolina. Three 1-hour sampling runs were performed for total gaseous organic(s) and 40 minutes for toluene and methylene chloride at the Tire Carcass Grinder Exhaust. US EPA Methods 1 through 4 and Method 25A were used for the determination of total gaseous organic(s) concentrations and emission rates expressed as carbon. Method 0030 was used for the determination of toluene and methylene chloride. All sampling and analytical procedures used were those established by the US EPA in standard reference test methods and appropriate state-of-the-art analytical procedures. The test runs were conducted during normal operating conditions.

1.3 Test Participants

A list of the project participants, titles, affiliation and telephone numbers can be found below.

Participant	Title	Affiliation	Contact
James A. Lewis	Project Manager	Trigon Engineering Consultants, Inc.	Telephone: (704) 598-1049 Facsimile: (704) 598-1050
Paul R. Jenkins	Quality Assurance Manager	Trigon Engineering Consultants, Inc.	
Kevin Howlett	Environmental Scientist	Trigon Engineering Consultants, Inc.	
Dave E. Clark	Environmental Engineer	Michelin	Telephone: (864) 458-1353 Facsimile: (864) 458-0782

2.0 PROCESS DESCRIPTION

This section contains a brief description of a tire carcass grinding process, the type and amount of materials handled, and a typical process air flow schematic.

2.1 Discussion

The Michelin facility in Duncan, South Carolina utilizes a tire carcass grinder in the truck tire retread process. This operation is performed to prepare the truck tire for future retreading operations by removing the remaining original tread rubber. The tire carcass to be ground is placed on a shaft and rotated at a pre-determined speed. The carcass is then placed against a rotating rasp at a given pressure. The rasp moves across the surface of the carcass in a programmed pattern. Both the coarse grind and the fine grind are performed during the same operation using the same rasp head. Emissions from the carcass grinder are exhausted through a simple cyclone and are discharged through a stack directly to the atmosphere. Figure 1 details the process air flow schematic from this process.

Production data during sampling was compiled by Michelin personnel and is presented in Appendix D. The sampling was performed during material processing. Tests were suspended during intermittent periods when the process was not being run. During the compliance test Michelin documented production rates at an average of 96.2 lbs of tire removed per run. There were no unusual process conditions noted during the sampling. The only operating parameters associated with the cyclone are whether it is operating or not operating. Trigon personnel verified that the cyclone was operational at all times during sampling.

Tire Carcass Grinder

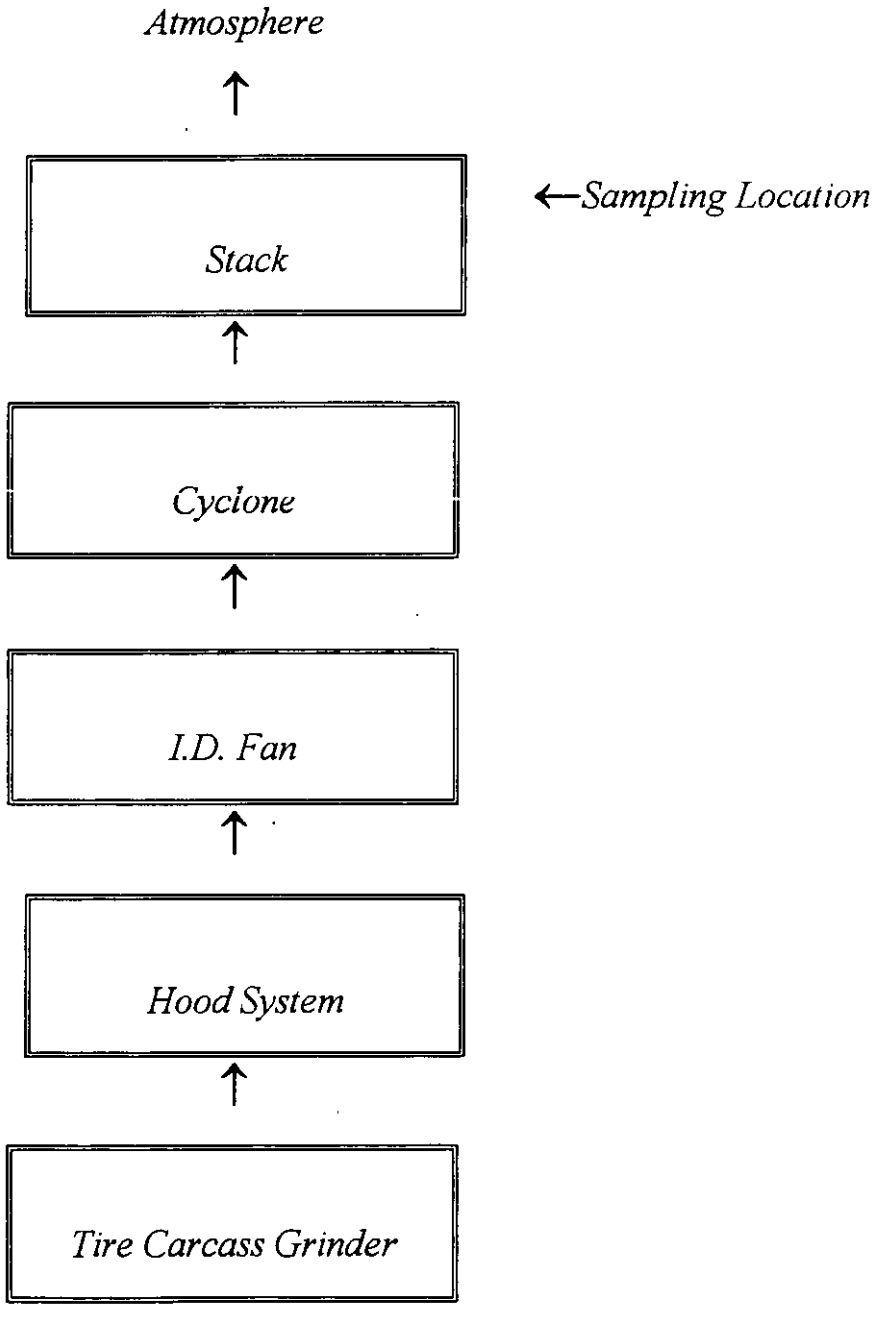


Figure 1

Process Air Flow Schematic

3.0 SAMPLING METHODS

This section describes the sampling strategy, sampling and analytical methods, and quality assurance/quality control procedures implemented during this project.

3.1 Sampling Strategy

The sampling and analytical procedures used during this test program were those established by the US EPA. Sampling runs were conducted in triplicate to validate the sampling. Tests were conducted during normal operating conditions. There were no unusual conditions noted during the sampling.

3.2 Sampling and Analytical Procedures

The US EPA methods used in this sampling program were Method 1 for the location of sampling ports and points, and determination of cyclonic flow, Method 2 for volumetric flow rate determination, and assignment of the dry molecular weight of the stack gas, and Method 4 for the determination of moisture in the stack gas. Method 25A was used to determine concentrations and emission rates of total gaseous organic(s) expressed as carbon. A sampling and analysis synopsis is discussed briefly in the following subsection. These test methods are available in the Code of Federal Regulations Volume 40, Part 60 or by request from Trigon.

3.2.1 Sampling Ports, Traverse Points and Cyclonic Flow Determination

The sampling location was prepared according to the criteria in Method 1. The duct diameters upstream and downstream from the sampling ports were determined prior to sampling. The number of traverse points were chosen with respect to sampling port location. For non-particulate traverses Method 1 specifies a minimum of 12 traverse points for sampling ports located >8/>2 downstream/upstream stack diameters from flow disturbances and 16 traverse points when located >2/>0.5. The amount of cyclonic flow was determined according to the criteria detailed in Method 1.

3.2.2 Stack Gas Velocity and Volumetric Flow Rate Determination

Method 2 is used for determining the average gas velocity in a stack from measurements of gas density and the average velocity head with a Type S (Stausscheibe or reverse type) pitot tube. This method is applicable for quantifying gas flows which meet the criteria of Method 1.

In principle measurements of velocity head and temperature are performed at the traverse points specified by Method 1. A properly scaled differential pressure gauge was selected for the range of Δp values encountered during the traverse. A 0 - 10 inches of water inclined manometer was used as the differential pressure gauge.

During this project, the sampling locations met all of the criteria detailed in Method 1. Gas stream density was assigned a dry molecular weight of 29.0 according to Method 2, Section 3.6. Moisture determination was performed by Method 4. The principal components of the gas velocity measurement system were sequentially:

* A calibrated stainless steel Type S pitot tube and Type K thermocouple;
* Leak-free interface tubing between pitot tube and differential pressure gauge;
* A 0 to 10 inch inclined manometer and;
* An NIST traceable pyrometer.

The apparatus was set-up according to manufacturer and reference method recommendations. Pretest and posttest leak checks were conducted using procedures outlined in Method 2, Section 3.1. Velocity head and temperature measurements were performed at the traverse points specified by Method 1. The atmospheric and static pressure of the stack was also determined for each set of velocity head readings. The volumetric flow rate calculations used were those specified in Method 2, Section 5. A more comprehensive explanation of the reference method is detailed in the US EPA Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III (EPA/600/R-94/038c).

3.2.3 Dry Molecular Weight Determination

Method 3 is applicable for determining carbon dioxide and oxygen concentrations and dry molecular weight of a sample from a gas stream of a fossil-fuel combustion process. This method may also be applicable to other processes where it has been determined that compounds other than carbon dioxide, oxygen, carbon monoxide, and nitrogen are not present in concentrations sufficient to affect the results.

However, US EPA Method 2, Section 3.6 states that "For processes emitting essentially air, an analysis need not be conducted; use a dry molecular weight of 29.0." All of the emission sources associated with this process were emitting essentially air, therefore the emission rate calculations were based on a dry molecular weight of 29.0 as stated above.

3.2.4 Moisture Determination

Method 4 involves the determination of stack gas moisture. Stack gas moisture must be measured when the flue gas flow rate or a pollutant gas concentration is determined. The moisture content is used to correct the emission concentration or mass emission rate to a dry basis. EPA Method 4 and *Field Procedure 4* of the EPA's Quality Assurance Handbook, Volume III, EPA-600/R-94/038C, was used to measure stack gas moisture content. *Field Procedure 4* of the Quality Assurance Handbook, Volume III, provides detailed information on the application of Method 4.

The flue gas moisture content was determined using wet bulb/dry bulb thermometers and partial pressure, vapor and saturated vapor pressure equations. This technique is described in Method 4 and is summarized below:

* Moisten the wet bulb thermometer wick with deionized water;
* Insert both thermometers into the flue gas stream and monitor the wet bulb temperature;
* When the wet bulb temperature has stabilized, record both the wet bulb and dry bulb thermometer temperatures;
* Calculate the flue gas moisture content (PMV) using the equations below.

SVP = Vapor Pressure of Water at Saturation, inches of Mercury

$$SVP = 10x^{y}(6.6911 - (3144/(\text{Wet Bulb} + 390.86)))$$

PMV = Percent Moisture by Volume

$$PMV = (SVP - (0.000367(P_{abs})(\text{Dry Bulb} - \text{Wet Bulb})(1 + ((\text{Wet Bulb} - 32)/1571))))/(P_{abs}) \times 100$$

P_{abs} = Absolute Pressure of Stack Gas

P_{abs} = (Barometric Pressure + (Static Pressure/13.6))

3.2.5 Total Gaseous Organic(s) Flame Ionization Analyzer Procedure

Total gaseous organic(s) concentrations and emission rates were determined according to EPA Method 25A. Method 25A applies to the measurement of total gaseous organic concentration of vapors consisting primarily of alkanes, alkenes, and/or arenes (aromatic hydrocarbons). The concentration is expressed in terms of propane (or other appropriate organic calibration gas) or in terms of carbon. Results are reported as volume concentration equivalents of the calibration gas or carbon equivalents.

Testing for gaseous organic(s) was performed using a Ratfisch Instruments, Inc. Model RS55-CA total hydrocarbon analyzer system. Gaseous pollutants were withdrawn at a constant rate from the emission source and analyzed by a flame ionization analyzer (FIA). The principal components of the sampling system were sequentially:

* A heated stainless steel sample probe and in-situ filter;
* A heated calibration assembly and secondary filter;
* A heated sample line;
* A FIA analyzer;
* Calibration gases; and
* A data acquisition system that continuously logs 1 minute concentrations.

Prior to the test series, the heated sample line and hydrocarbon analyzer were heated above 250°F to prevent condensation. After temperatures were stabilized the hydrocarbon analyzer was ignited using zero grade hydrogen as fuel and hydrocarbon free air for combustion. Calibration procedures commenced with the introduction of zero and high-level calibration gas into the sampling system. All necessary adjustments were made and the response for low-level and mid-level gases were recorded.

The predicted values for the calibration gases and the actual responses were recorded on the field data sheet and by the data acquisition system. High-level and zero gas concentrations were introduced into the measurement systems and the response times were recorded on the field data sheets. Sampling was initiated immediately following instrument calibration.

At the conclusion of the first hour, the zero and mid-level calibration gases were reintroduced and their respective responses recorded on the field data sheet. The zero and calibration drift check was performed immediately following completion of each test run (approximately one hour) and at the conclusion of the test program. All data collected during the test program was archived on magnetic disk and is presented in Appendix F.

3.2.6 Toluene and Methylene Chloride Sampling and Analysis

Toluene and methylene chloride concentrations and emission rates were determined according to EPA Method 0030. Volatile species, including toluene and methylene chloride, are defined as organic compounds with boiling points less than or equal to 100 degrees Centigrade. Testing for toluene and methylene chloride was performed using an EPA Method 0030 (VOST) sampling system. Gaseous pollutants were withdrawn from the emission source at a constant rate of approximately 0.5 liters per minute for 40 minutes yielding a sample volume of approximately 20 liters. The principal components of the train were sequentially:

* A heated borosilicate probe;
* A recirculation cooling condenser followed by a Tenax trap;
* A moisture collection flask;
* A reflux cooling condenser followed by a Tenax/charcoal trap; and
* A silica gel drying tube.

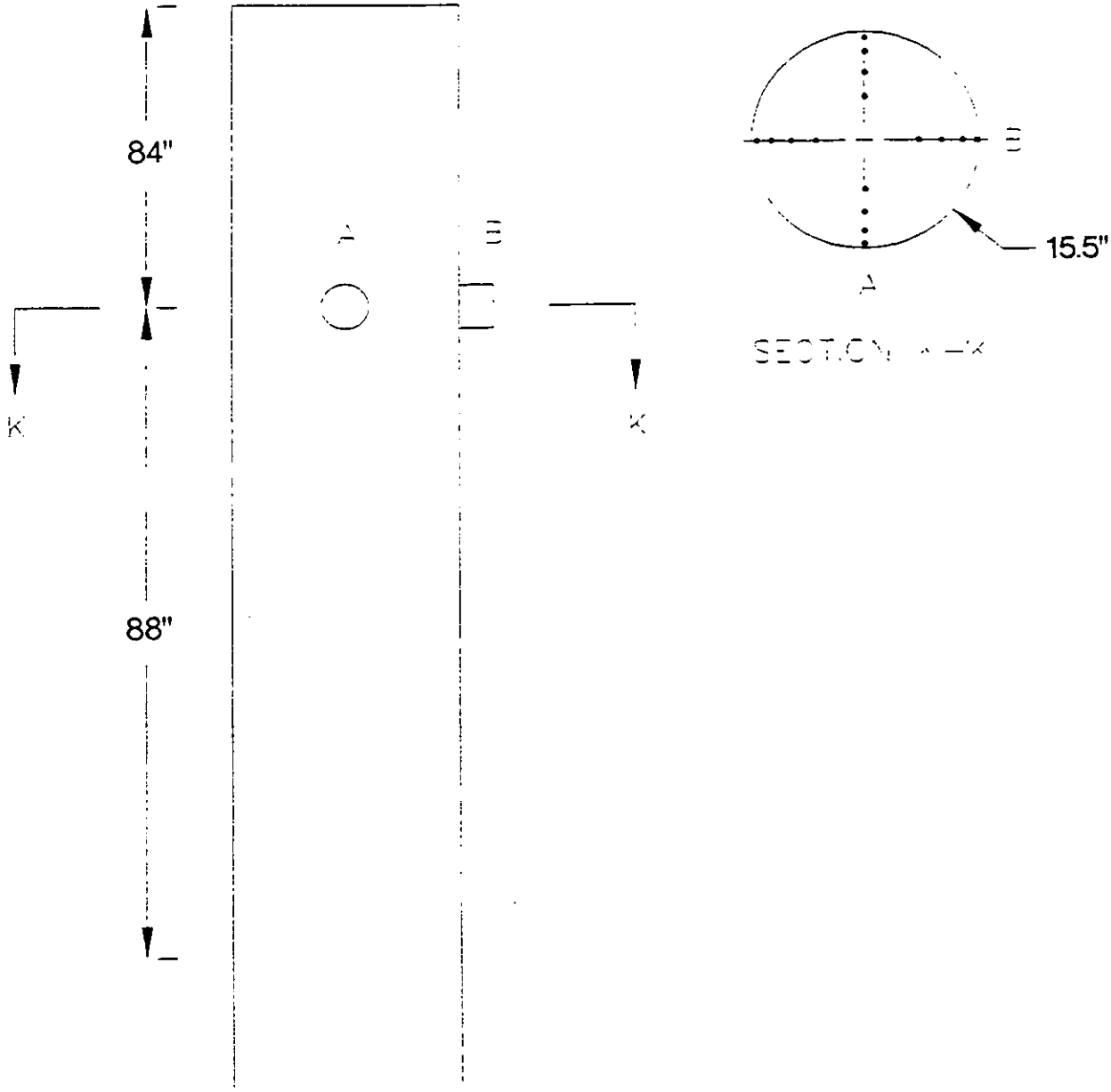
Following each test run the traps were capped, and kept cooled for transport to the analytical laboratory. Chain of custody documentation, case narratives, quantitation data, chromatographs and quality assurance data are provided in Appendix C. Triangle Laboratories Inc., Durham, North Carolina provided the Tenax and Tenax/charcoal traps used in the sample collection and the analysis

for toluene and methylene chloride according to Method 8260 utilizing the gas chromatography/mass spectrometry method of analysis.

3.2.7 Sampling Ports and Points

The dimensions of the sampling site and the location of the sampling ports and points are detailed in Figure 2. Method 1 sampling criteria was maintained. The stack cross section was divided into the appropriate equal areas as detailed in Method 1. The ports were labeled A and B. Sampling for total gaseous organic(s), toluene and methylene chloride was performed at a single representative point in each port during each 60 minute sampling run. Ports A and B were traversed during the sampling runs to determine the volumetric flow rate of the emission source.

Tire Carcass Grinder Exhaust



Not to Scale

Figure 2

Location of Sampling Ports and Points

3.3 Quality Assurance and Quality Control

Trigon Engineering Consultants, Inc., has established quality assurance and quality control (QA/QC) guidelines for providing the highest quality sampling and analytical data from source tests. These QA/QC procedures were implemented to ensure the acceptability and reliability of the data generated.

In summary, a high degree of data quality was maintained throughout this project. Instrumentation leak checks and QA criteria were met. Quality control procedures for Method 25A were followed including the calibration of the total hydrocarbon analyzer systems with EPA Protocol I propane gas standards. Copies of the EPA Protocol I Certificates can be found in Appendix E with the calibration data. Quality control procedures for Method 0030 have included the analysis of appropriate blanks and spikes. Analytical data for Method 0030 determinations are included in Appendix C.

Field data and final data reduction results were entered into Trigon's Air Quality Data System by an environmental scientist, independently audited by the Project Manager, and reviewed by the Quality Assurance Manager for verification of data. After QC review by the QA Manager, the Department Manager verified the final report for completeness and reasonableness of data. The report was returned to the Project Manager for review and preparation of the final draft. The report requires the signature of the Project Manager, QA Manager, and the Department Manager before release to the client. Data and final reports are archived in a secured area for a minimum period of three years.

Trigon's field and laboratory test equipment has been maintained and calibrated in accordance with quality assurance procedures established by the US EPA in the Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III. Equipment calibrations including pre-test and post-test calibration data are presented in Appendix E.

4.0 RESULTS

This section presents the mean total gaseous organic(s), toluene and methylene chloride sampling results. Tabular results are also provided to present data from individual sampling runs collected during this project. Detailed sampling results and example calculations for the test program can be found in Appendix A. Field data sheets are presented in Appendix B.

4.1 Summary of Results

The table below is a synopsis of the sampling conducted at the Tire Carcass Grinder Exhaust.

Total Gaseous Organic(s), Toluene and Methylene Chloride Sampling Results			
	Total Gaseous Organic(s) as Carbon	Toluene	Methylene Chloride
Concentration	18_1	0.885_2	0.035_2
Emission Rate, pounds/hour	0.10	0.00060	0.000024

1-parts per million, dry 2-micrograms

4.2 Discussion

The Michelin, Duncan, South Carolina facility has been issued Air Quality Permit No. 2060-0183 by the South Carolina Department of Health and Environmental Control. The results from this test program will be provided to the US EPA to update draft AP-42 emission factors which were developed by the Rubber Manufacturers Association for submission to the US EPA.

4.3 Detailed Stack Sampling Results

Tables 1 and 2 present the data from individual sampling runs at the Tire Carcass Grinder Exhaust. Included in these tables are gas velocity and volumetric flow rates, exhaust gas temperatures, and pollutant concentrations, and emission rates.

TABLE 1

Summary of Results, Total Gaseous Organic(s) Sampling

Tire Carcass Grinder Exhaust

Run Number	1	2	3	Avg.
Date	01/28/99	01/28/99	01/28/99	---
Run Duration, Minutes	60	60	60	---
Sample Time, 24-hour clock	0840-0939	0950-1049	1105-1204	---
Average Stack Temperature, °F	94.7	94.4	93.6	94.2
Stack Gas Velocity, feet/second	41.0	41.1	40.7	40.9
Stack Gas Flow Rate, dry standard cubic feet/minute*(dscfm)	2970	2966	2931	2956
Stack Gas Flow Rate, actual cubic feet/minute(acfm)	3222	3230	3195	3216
Total Gaseous Organic(s):				
Concentration, ppm as propane	5.7	6.3	5.6	5.9
Concentration, ppm as carbon (dry)	17	19	17	18
Emission Rate, lbs/hr as carbon	0.10	0.11	0.09	0.10

* 68°F, 29.92 Inches Hg

TABLE 2

Summary of Results, Toluene and Methylene Chloride Sampling

Tire Carcass Grinder Exhaust

Run Number	1	2	3	Avg.
Date	01/28/99	01/28/99	01/28/99	---
Run Duration, Minutes	40	40	40	---
Sample Time, 24-hour clock	0840-0920	0950-1030	1105-1145	---
Volume Sampled at Standard Conditions, cubic feet	0.58	0.57	0.57	0.57
Average Stack Temperature, °F	94.7	94.4	93.6	94.2
Stack Gas Velocity, feet/second	41.0	41.1	40.7	40.9
Stack Gas Flow Rate, dry standard cubic feet/minute*(DSCFM)	2970	2965	2931	2956
Stack Gas Flow Rate, actual cubic feet/minute(ACFM)	3222	3230	3195	3216
Toluene:				
~~Concentration~~ mass, ug	1.098	0.770	0.788	0.885
Concentration, gr/dscf	0.000029	0.000021	0.000021	0.000024
Emission Rate, lbs/hr	0.00074	0.00053	0.00054	0.00060
Methylene Chloride:				
~~Concentration~~ mass, ug	0.034	0.038	0.032	0.035
Concentration, gr/dscf	0.0000009	0.0000010	0.0000009	0.0000009
Emission Rate, lbs/hr	0.000023	0.000026	0.000022	0.000024

* 68°F, 29.92 Inches Hg

5.0 APPENDICES

This section contains detailed supportive documentation that encompasses all aspects of the emission test program. Its contents serve as the foundation for the test report. The emission test report presents a summary of the information gathered during the sampling activities. The information contained in the appendices is necessary to facilitate the review of the emission test report and determine whether proper procedures were used to accomplish the test plan objectives.

Defensible data and the subsequent pollutant concentrations and emission rates is one of the primary objectives of any emission test program. To this end, all results, example calculations, field data sheets, sample recovery, laboratory results, chain of custody documentation, and equipment calibrations have been provided to support these objectives.

APPENDIX A

SUMMARY OF RESULTS AND EXAMPLE CALCULATIONS

SUMMARY OF RESULTS
EPA METHOD 0030
Determination of Volatile Organic Emissions
Michelin North America, Inc.
Duncan, South Carolina
Tire Buffer Exhaust

Run Number		1	2	3	Avg
Date:		01/29/99	01/29/99	01/29/99	---
θ	Net Time of Test, minutes	60	60	60	---
P_{bar}	Barometric Pressure, in. Hg	29.25	29.15	29.10	29.17
P_g	Static Pressure, in. Hg	-0.025	-0.026	-0.026	-0.026
P_S	Stack Pressure, Absolute, in. Hg	29.225	29.119	29.074	29.139
V_M	Actual Meter Volume Sampled, liters	16.89	17.09	17.34	17.11
T_M	Avg. Gas Meter Temp., Deg. F	68.7	87.6	95.5	83.9
V_{STD}	Volume Sampled at Stand. Cond., cu. ft.	0.58	0.57	0.57	0.57
B_{WS}	Moisture Content of Gas Stream	0.0086	0.0094	0.0102	0.0094
P_{MV}	Percent Moisture in Stack	0.86	0.94	1.02	0.94
M_{FD}	Mole Fraction of Dry Gas	0.991	0.991	0.990	0.991
$\%O_2$	Percent Oxygen, Dry	21	21	21	21
$\%CO_2$	Percent Carbon Dioxide, Dry	0	0	0	0
%CO	Percent Carbon Monoxide, Dry	0	0	0	0
M_d	Mole. Wt. Stack Gas, Dry Basis, lb/lb mole	29	29	29	29
M_S	Mole. Wt. Stack Gas, Wet Basis, lb/lb mole	28.747	28.738	28.730	28.738
Cp	Pitot Tube Constant	0.86	0.86	0.86	0.86
ΔPS	Avg. Sqrt. Delta P, in. H_2O	0.686	0.687	0.679	0.684
T_S	Avg. Stack Temp., Deg. F	94.7	94.4	93.6	94.2
V_S	Avg. Stack Velocity, ft/sec	41.0	41.1	40.7	40.9
A	Area Stack, ft^2	1.31	1.31	1.31	1.31
Q_{SD}	Gas Volume Flow, Dry Std. Cond., CFM	2970	2965	2931	2956
Q_A	Actual Gas Volume Flow, CFM	3222	3230	3195	3216
Q_{SW}	Gas Volume Flow, Wet Std. Cond., CFM	2996	2994	2961	2984

SUMMARY OF RESULTS
EPA METHOD 4
Determination of Moisture Content
Michelin North America, Inc.
Duncan, South Carolina
Tire Buffer Exhaust

Run Number		1	2	3	Avg
Date:		01/29/99	01/29/99	01/29/99	---
P_{bar}	Barometric Pressure, in. Hg	29.25	29.15	29.10	29.17
P_g	Static Pressure, in. Hg	-0.025	-0.026	-0.026	-0.026
P_S	Stack Pressure, Absolute, in. Hg	29.225	29.119	29.074	29.139
WB	Wet Bulb Temp., Deg. F	64.0	64.0	66.0	64.7
DB	Dry Bulb Temp., Deg. F	96.00	96.00	98.00	96.67
S_{VP}	Vapor Pressure of Water at Saturation, in. Hg	0.601	0.601	0.645	0.616
B_{WS}	Moisture Content of Gas Stream	0.0086	0.0087	0.0102	0.0091
P_{MV}	Percent Moisture in Stack	0.86	0.87	1.02	0.91
M_{FD}	Mole Fraction of Dry Gas	0.991	0.991	0.990	0.991

SUMMARY OF RESULTS
EPA METHOD 0030
Determination of Volatile Organic Emissions
Michelin North America, Inc.
Duncan, South Carolina
Tire Buffer Exhaust

Compound	Run 1	Run 2	Run 3
Mass Data (m_n)	µg	µg	µg
Methylene chloride	0.034	0.038	0.032
Toluene	1.098	0.770	0.788

Compound	Run 1	Run 2	Run 3
Concentration Data (C_s)	gr/dscf	gr/dscf	grdscf
Methylene chloride	8.99E-07	1.03E-06	8.71E-07
Toluene	2.90E-05	2.09E-05	2.14E-05

Compound	Run 1	Run 2	Run 3	Average
Emission Rate (C_{AW})	lbs/hr	lbs/hr	lbs/hr	lbs/hr
Methylene chloride	2.29E-05	2.62E-05	2.19E-05	2.37E-05
Toluene	7.39E-04	5.32E-04	5.39E-04	6.03E-04

TRIGON

SUMMARY OF RESULTS
EPA METHOD 0030
Determination of Volatile Organic Emissions
Michelin North America, Inc.
Duncan, South Carolina
Tire Buffer Exhaust

Example Calculations Run 1

Stack Pressure, Absolute, in. Hg
$P_S = P_{bar} + P_g =$ 29.225

Volume Sampled at Stand. Cond., cu. ft.

$$V_{STD} = \frac{17.647 * (V_M * 0.03531) * (P_{bar} + \Delta H / 13.6)}{T_M + 460} =$$ 0.58

Mole. Wt. Stack Gas, Dry Basis, lb/lb mole
$M_d = 0.44 * \%CO_2 + 0.32 * \%O_2 + 0.28 * (100 - \%CO_2 - \%O_2) =$ 29

Mole. Wt. Stack Gas, Wet Basis, lb/lb mole
$M_S = M_d * (1 - B_{ws}) + 18.0 * B_{ws} =$ 28.747

Avg. Stack Velocity, ft/sec

$$V_S = 85.49 * C_p * \Delta PS * \text{SQRT}\ \frac{(T_S + 460)}{(P_S * M_s)} =$$ 41.0

Gas Volume Flow, Dry Std. Cond., CFM

$$Q_{SD} = \frac{1058.82 * V_S * A * P_S * (1 - B_{ws})}{T_S + 460} =$$ 2970

Actual Gas Volume Flow, CFM
$Q_A = V_S * A * 60 =$ 3222

Gas Volume Flow, Wet Std. Cond., CFM
$Q_{SW} = Q_{SD} * [1/(1-B_{WS})] =$ 2996

Phenol Concentration, gr/dscf
(At Standard Conditions)
$C_S = 0.0154 * m_n / V_{STD} =$ 8.99E-07

Phenol Emission Rate, lbs/hr
(At Standard Conditions)
$C_{AW} = 0.00857 * C_s * Q_{Sd} =$ 2.29E-05

Standard Conditions 68 Deg. F, 29.92 in. Hg

TRIGON

SUMMARY OF RESULTS
EPA METHOD 4
Determination of Moisture Content
Michelin North America, Inc.
Duncan, South Carolina
Tire Buffer Exhaust

Example Calculations Run 1

Stack Pressure, Absolute, in. Hg

$P_S = P_{bar} + P_g =$ 29.225

Vapor Pressure of Water at Saturation, in. Hg

$S_{VP} = 10\ x^y(6.6911 - (3144/WB + 390.86)))$ 0.601

Moisture Content of Gas Stream

$$B_{WS} = \frac{(S_{VP} - (0.000367 * P_S * (DB-WB) * (1 + (WB-32) / 1571)))}{P_S} =$$ 0.0086

Percent Moisture in Stack

$P_{MV} = B_{WS} * 100$ 0.86

Mole Fraction of Dry Gas

$$M_{FD} = \frac{100 - P_{MV}}{100} =$$ 0.991

Standard Conditions 68 Deg. F, 29.92 in. Hg

SUMMARY OF RESULTS
EPA METHOD 25A
Determination of Total Gaseous Organics as Carbon
Michelin North America, Inc.
Duncan, South Carolina
Tire Buffer Exhaust

Run Number		1	2	3	Avg
Date:		01/29/99	01/29/99	01/29/99	---
θ	Net Time of Test, minutes	60	60	60	---
P_{bar}	Barometric Pressure, in. Hg *	29.25	29.15	29.10	29.17
P_g	Static Pressure, in. Hg *	-0.025	-0.026	-0.026	-0.026
P_S	Stack Pressure, Absolute, in. Hg	29.225	29.119	29.074	29.139
WB	Wet Bulb Temp., Deg. F *	64.0	65.0	65.5	64.8
DB	Dry Bulb Temp., Deg. F *	96.0	97.0	96.5	96.5
S_{VP}	Vapor Pressure of Water at Saturation, in. Hg	0.60	0.62	0.63	0.62
B_{WS}	Moisture Content of Gas Stream	0.0086	0.0094	0.0102	0.0094
P_{MV}	Percent Moisture in Stack	0.86	0.94	1.02	0.94
M_{FD}	Mole Fraction of Dry Gas	0.991	0.991	0.990	0.991
$\%O_2$	Percent Oxygen, Dry	21	21	21	21
$\%CO_2$	Percent Carbon Dioxide, Dry	0	0	0	0
%CO	Percent Carbon Monoxide, Dry	0	0	0	0
M_d	Mole. Wt. Stack Gas, Dry Basis, lb/lb mole	29	29	29	29
M_S	Mole. Wt. Stack Gas, Wet Basis, lb/lb mole	28.747	28.738	28.730	28.738
Cp	Pitot Tube Constant	0.86	0.86	0.86	0.86
ΔPS	Avg. Sqrt. Delta P, in. H_20 *	0.686	0.687	0.679	0.684
T_S	Avg. Stack Temp., Deg. F *	94.7	94.4	93.6	94.2
V_S	Avg. Stack Velocity, ft/sec	41.0	41.1	40.7	40.9

SUMMARY OF RESULTS
EPA METHOD 25A
Determination of Total Gaseous Organics as Carbon
Michelin North America, Inc.
Duncan, South Carolina
Tire Buffer Exhaust

A	Area Stack, ft^2	1.31	1.31	1.31	1.31
Q_{Sd}	Gas Volume Flow, Dry Std. Cond. CFM	2970	2966	2931	2956
Q_A	Actual Gas Volume Flow, CFM	3222	3230	3195	3216
Q_{SW}	Gas Volume Flow, Wet Std. Cond., CFM	2996	2994	2962	2984
Total Gaseous Organic(s) Concentrations and Emission Rates					
M_{WC}	Mole Weight of Carbon, g/mole	12.01	12.01	12.01	12.01
C_{meas}	Organic Concentration, ppm as propane (wet)	5.7	6.3	5.6	5.9
C_c	Organic Concentration, ppm as carbon (wet)	17	19	17	18
C_d	Organic Concentration, ppm as carbon (dry)	17	19	17	18
C_{ON}	Organic Concentration, mg/dscm as carbon	9	10	8	9
C_{AN}	Organic Concentration, gr/dscf as carbon	0.0038	0.0042	0.0037	0.0039
C_{AW}	Organic Emission Rate, lbs/hr	0.10	0.11	0.09	0.10

SUMMARY OF RESULTS
EPA METHOD 25A
Determination of Total Gaseous Organics as Carbon
Michelin North America, Inc.
Duncan, South Carolina
Tire Buffer Exhaust

Example Calculations Run 1

Stack Pressure, Absolute, in. Hg

$P_S = P_{bar} + P_g =$ 29.225

Vapor Pressure of Water at Saturation, in. Hg

$S_{VP} = 10\ x^y(6.6911 - (3144/WB + 390.86)))$ 0.6

Moisture Content of Gas Stream

$$B_{WS} = \frac{(S_{VP} - (0.000367 * P_S * (DB-WB) * (1 + (WB-32) / 1571)))}{P_S} =$$ 0.009

Percent Moisture in Stack

$P_{MV} = B_{WS} * 100$ 0.9

Mole Fraction of Dry Gas

$$M_{FD} = \frac{100 - P_{MV}}{100} =$$ 0.991

Mole. Wt. Stack Gas, Dry Basis, lb/lb mole

$M_d = 0.44 * \%CO_2 + 0.32 * \%O_2 + 0.28 * (100 - \%CO_2 - \%O_2) =$ 29

Mole. Wt. Stack Gas, Wet Basis, lb/lb mole

$M_S = M_d * (1 - B_{ws}) + 18.0 * B_{ws} =$ 28.747

Avg. Stack Velocity, ft/sec

$$V_S = 85.49 * C_P * \Delta PS * SQRT \frac{(T_S+460)}{(P_S * M_d)} =$$ 41.0

Gas Volume Flow, Dry Std. Cond. CFM

$$Q_{Sd} = \frac{1058.82 * V_S * A * P_S * (1 - B_{ws})}{T_S + 460} =$$ 2970

SUMMARY OF RESULTS
EPA METHOD 25A
Determination of Total Gaseous Organics as Carbon
Michelin North America, Inc.
Duncan, South Carolina
Tire Buffer Exhaust

Actual Gas Volume Flow, CFM
$Q_A = V_S * A * 60 =$ 3222

Gas Volume Flow, Wet Std. Cond., CFM
$Q_{SW} = Q_{Sd} * [1/(1-B_{WS})] =$ 2996

Organic Concentration, ppm as carbon (wet)
$C_c = C_{meas} * 3 =$ 17

Organic Concentration, ppm as carbon (dry)

$$C_d = \frac{C_c}{(1 - B_{WS})} =$$ 17

Organic Concentration, mg/dscm as carbon
(At Standard Conditions)

$$C_{ON} = C_d * \frac{(M_{WC})}{24.054048} =$$ 9

Organic Concentration, gr/dscf as carbon
(At Standard Conditions)
$C_{an} = C_{ON} * 0.0004371 =$ 0.0038

Organic Emission Rate, lbs/hr
(At Standard Conditions)
$C_{AW} = 0.00857 * C_{AN} * Q_{Sd} =$ 0.10

* Values Represent Beginning and Ending Run Averages
Standard Conditions 68 Deg. F, 29.92 in. Hg

APPENDIX B

FIELD DATA SHEETS

EPA Method 1
Determination of Sampling Ports and Points

Client Michelin — City/State Duncan, SC

Sampling Location Tire Buffer Exhaust — Date 01/27/99

Sampling Location Dimensions:

From Far Wall to Outside of Port	15.5
Nipple Length	0.0
Depth of Duct	15.5
Width (Rectangular Duct)	—

Equivalent Diameter Calculation (DE):

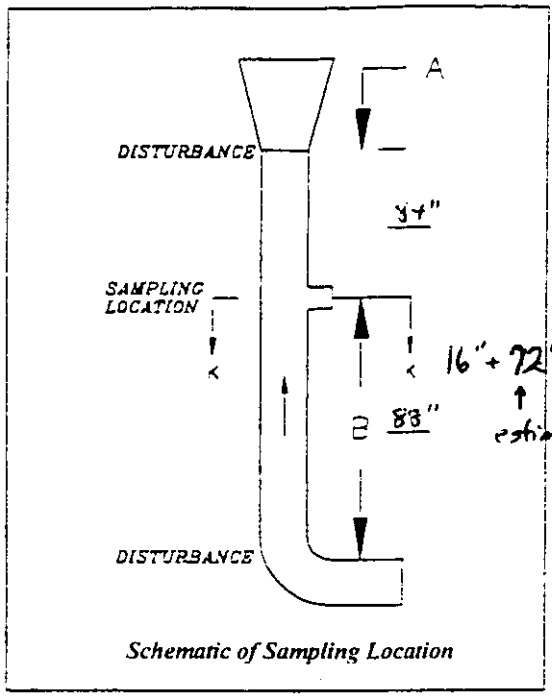
$$DE = \frac{2 \times \text{Length} \times \text{Width}}{\text{Length} + \text{Width}} = \frac{2 (\ - \ )(\ - \ )}{(\ - \ + \ - \ )} = —$$

Distance to Ports From Nearest Flow Disturbance:

	Upstream - A	Downstream - B
Dimensions in Inches	84"	88"
Duct Diameters	5.42	5.68 ~~88"~~ AY

Stack Area, in Square Feet 1,310

Calculations By AY



Schematic of Sampling Location

Location of Traverse Points in Circular Stacks

	4	6	8	10	12
1	6.7	4.4	3.2	2.6	2.1
2	25.0	14.6	10.5	8.2	6.7
3	75.0	29.6	19.4	14.6	11.8
4	93.3	70.4	32.3	22.6	17.7
5		85.4	67.7	34.2	25.0
6		95.6	80.6	65.8	35.6
7			89.5	77.4	64.4
8			96.8	85.4	75.0
9				91.8	82.3
10				97.4	88.2
11					93.3
12					97.9

Location of Traverse Points in Rectangular Stacks

	2	3	4	5	6	7	8
1	25.0	16.7	12.5	10.0	8.3	7.1	6.3
2	75.0	50.0	37.5	30.0	25.0	21.4	18.8
3		83.3	62.5	50.0	41.7	35.7	31.3
4			87.5	70.0	58.3	50.0	43.8
5				90.0	75.0	64.3	56.3
6					91.7	78.6	68.8
7						92.9	81.3
8							93.8
9							
10							
11							
12							

Point No.	% of Stack ID	Stack ID, in.	Distance From Inside Wall, in.	Nipple Length, in.	Distance From Outside of Port, in.
1	3.2	15.5	0.50	0.0	0.50
2	10.5		1.63		1.63
3	19.4		3.01		3.01
4	32.3		5.01		5.01
5	67.7		10.49		10.49
6	80.6		12.49		12.49
7	89.5		13.87		13.87
8	96.8		15.00		15.00

Stack Diameter = 12 - 24 inches Relocate to 0.50 inches

Stack Diameter > 24 inches Relocate to 1.00 inches

Audited by: TRC Date: 2/3/99

PASSED QA

TRIGON

Determination of Stack Gas Velocity and Volumetric Flow Rate

Client Michelin
City, State Duncan, SC
Sampling Location Tire Buffer Exhaust
Project Number 046.98-181
Run Date 01/29/99
Operators RT
Pitot Tube I.D. No. 200-062
Pitot Tube Coefficient, C_p 0.86
Date Calibrated 01/04/99
Leak Check, in H_2O <0.1 @ 3.6; 5.0 <0.1 / 3.3; 5.2
Stack Dimensions, in., diameter/side 1 15.5
Side 2, in. —

Field Data

Run No./Sample No.	1	2	3	End 3
Time (24-Hour Clock)	0840 - 0940	0950 - 1050	1105 - 1205	NA - 1205
Bar. Press., in. Hg	29.35	29.15	29.14	29.06
Static Press., H_2O	- 0.33	- 0.34	- 0.38	- 0.34
Static Press., in. Hg	- 0.024	- 0.025	- 0.028	- 0.025
Stack Press., in. Hg	29.326	29.125	29.112	29.035
Stack Temp., Dry, °F	96	96	98	95
Stack Temp., Wet, °F	64	64	66	65
Difference, °F	32	32	32	30
Moisture, %	0.85	0.87	1.01	1.02

29.25 / - 0.335 / 0.86   29.145 / - 0.36 / 0.94   29.10 / - 0.36 / 1.015

Field Data

Traverse Point Number	Velocity Head Δp Inches H_2O	Stack Temperature °F	Velocity Head Δp Inches H_2O	Stack Temperature °F	Velocity Head Δp Inches H_2O	Stack Temperature °F	Velocity Head Δp Inches H_2O	Stack Temperature °F
A 1	0.50	96	0.68	93	0.57	94	0.55	94
2	0.53	95	0.66	92	0.54	97	0.47	93
3	0.47	101	0.60	92	0.49	97	0.45	98
4	0.45	98	0.39	98	0.40	95	0.35	97
5	0.37	96	0.38	94	0.40	93	0.33	95
6	0.37	95	0.33	94	0.43	93	0.33	94
7	0.28	99	0.30	93	0.40	93	0.35	93
8	0.28	101	0.28	93	0.29	95	0.35	93
B 1	0.57	92	0.65	93	0.54	93	0.54	93
2	0.57	92	0.47	99	0.47	95	0.52	92
3	0.53	92	0.47	95	0.45	94	0.51	92
4	0.42	91	0.38	94	0.34	93	0.58	92
5	0.65	91	0.60	94	0.57	93	0.53	92
6	0.58	90	0.58	99	0.60	92	0.48	92
7	0.52	91	0.48	98	0.58	92	0.47	92
8	0.50	90	0.47	99	0.51	92	0.51	91
Averages	0.47	94.4	0.48	95.0	0.47	93.8	0.46	93.3

Comments 0.475 0.475 0.465
94.7 94.4 93.6

Audited by: TRP Date: 2 3 99

PASSED QA

TRIGON

Determination of Stack Gas Velocity, Volumetric Flow Rate and Cyclonic Flow

Client Michelin
Sampling Location Tire Buffer Exhaust
Run Date 01/22/99
Barometric Pressure, in. Hg 29.35
Static Pressure, in. H_2O -0.33
Static Pressure, in. Hg -0.024
Stack Pressure, in. Hg 29.326
Stack Dimensions, in., diameter/side 1 15.5

City, State Duncan, SC
Operators AM
Time 0948
Pitot Tube I.D. No. 2CC 04.2
Date Calibrated 01/04/99
Pitot Tube Coefficient 0.86
Leak Check, in. H_2O <0.1 @ 3.0 5.0 ; 3.8 , 5.2
Side 2, in. ~~NA~~ NA

Field Data

Traverse Point Number	Velocity Head Δp Inches H_2O		Stack Temperature °F		Cyclonic Flow Determination			
	A	B	A	B	A Δp_s at 0° Reference	B	A Angle Which Yields a Null Δp	B
1	See Run sheet cyclonic				0.02	0.02	<5	<5
2	determination only.				0.00	0.00	0	0
3					0.05	0.00	7	0
4					0.00	0.00	0	0
5					0.00	-0.05	0	5
6					-0.02	-0.08	<5	10
7					-0.02	-0.05	<5	8
8					-0.05	-0.02	8	<5
Averages							<4	

Stack Temperature, Dry, °F (A) 93
Stack Temperature, Wet °F (B) NA
Difference (A - B) —
Preliminary Percent Moisture —

Comments

Audited by: TRO Date: 2.3.99

PASSED QA

TRIGON

EPA Method 25A Determination of Gaseous Organic Concentrations as Carbon Using Flame Ionization Analyzer Procedure

Client Michelin City/State Duncan, SC

Sampling Location Tire Buffer Exhaust Stack Instrument 1211090N

Run Date 01/28/99 Operators PY Observer — Agency —

Instrument Readiness:

Oven Temperature:	150 °C	Fuel Pressure:	6 psi
Sample Line Temperature:	380 °F	Air Pressure:	12 psi
Sample Back Pressure:	20 psi	Calibration Factor:	1.00

System Calibration Error Check

Range 1 Span: 0-100	Cylinder Pressure (psig)	Cylinder Value (ppm)	Predicted Value (ppm)	System Value (ppm)	Difference (ppm)	Allowable Difference (ppm)	Spec.
Zero	1800	0		0.0	0	3	± 3% of Span
High Range	850	85.1		85.0	0.1	4.3	± 5% of Gas Value
Mid Range	550	50.0	50.0	50.5	0.5	2.5	± 5% of Gas Value
Low Range	1750	30.1	30.1	30.1	0.0	1.5	± 5% of Gas Value

Hourly System and Drift Data

	Run Time 24 Hour Clock	Initial System Response (ppm)		Final System Response (ppm)		Drift Difference (ppm)		Calibration Drift (percent)		Spec. (% Of Span)
		Zero	Upscale	Zero	Upscale	Zero	Upscale	Zero	Upscale	± 3%
1st Run	0840 - 0940	0.0	50.5	0.9	50.2	0.9	0.3	0.9	0.3	± 3%
2nd Run	0950 - 1050	0.0	50.5	0.6	50.3	0.6	0.2 (0.1) (JM)	0.6	0.2 (0.1) (JM)	± 3%
3rd Run	1105 - 1205	0.0	50.5	0.5	49.4	0.5	1.1	0.5	1.1	± 3%
4th Run										± 3%
5th Run										± 3%
6th Run										± 3%

System Response Time

Zero 20 20 20 Avg. 20 Upscale 15 15 15 Avg. 15

Must be a step change of at least 95%.

Comments: all readings for response time were between 15-20 seconds
8 Tires per Run

Audited by: JM Date: 02/04/99

PASSED QA

TRIGON

EPA Method 0030 VOST Field Data Sheet

Client: Michelin
City/State: Duncan, SC
Sample Location: Fire Butler Stack
Date: 01/28/99 Operator: KH/PAS

Console No.: 400.032
Meter Coef.: 1.00
Pitot Tube No.: 200.642
Pitot Tube Coef.: 0.86

Sample ID No.: 8181-01
Train ID No.: 400.034
Bar. Pressure: 29.35 In. Hg.
Static Pressure: -0.33 In. H_2O

Sampling Train Leak Checks: 2 3 3
Pretest: <0.1 @ 15 In. Hg.
Posttest: <0.1 @ 25.2 In. Hg.
Start Time: 08:40 End Time: 0920

Point Number	Time Δ T	Meter Volume Vm Liters	Rotameter Setting	Sampling Rate LPM	Train Vacuum Inches Hg	Meter Pressure Inches H_2O WC	Stack Temp. °F	Sampling Train Temperatures °C			
								#1 Probe	#2 Condenser Outlet	Meter Inlet	Meter #5 Outlet
	0	0.00									
0845	5	KH ~~2.95~~	1.95 42	0.48	6.5	1.4	Use M2	130	3	NA	17
0850	10	3.90	42	0.48	6.5	1.4		133	3		18
0855	15	6.04	42	0.48	6.5	1.4		130	3		19
0900	20	8.22	42	0.48	6.5	1.4		130	3		19
0905	25	10.41	42	0.48	6.5	1.4		132	3		21
0910	30	12.56	42	0.48	6.5	1.4		134	3		22
0915	35	14.70	42	0.48	6.5	1.4		132	3		23
0920	40	16.89	42	0.48	6.5	1.4		131	4		24
	0=40	Vm=16.99		Avg=0.48		Avg=1.4	T_s=68.7				Avg=24.4

68.7°F

Samples Recovered:
Tenax Tube No.: 8181-01T
Tenax/Charcoal Tube No.: 8181-01TC
Filter: ☐ Yes ☐ No ✓
Condensate: ☐ Yes ✓ No

Comments:

PASSED QA

TRIGON

EPA Method 0030 VOST Field Data Sheet

Client	Michelin	Console No.	400.032	Sample ID No.	8181-02	Sampling Train Leak Checks:	25,7
City/State	Duncan, SC	Meter Coef.	1.00	Train ID No.	400.034	Pretest	<0.1 @ 15 In. Hg.
Sample Location	Tire Buffer Stack	Pitot Tube No.	200.062	Bar. Pressure	29.15 In. Hg.	Posttest	<0.1 @ 25,2 In. Hg.
Date	6/28/99 Operator	KN/PAS	Pitot Tube Coef.	0.86	Static Pressure	-0.34 In. H_2O	Start Time 0950 End Time 1030

Point Number	Time Δ T	Meter Volume Vm Liters	Rotameter Setting	Sampling Rate LPM	Train Vacuum Inches Hg	Meter Pressure Inches H_2O wc	Stack Temp. °F	Sampling Train Temperatures °C			
								#1 Probe	#2 Condenser Outlet	Meter Inlet	#15 Meter Outlet
	0	0.00									
0955	5	2.14	42	0.48	8.0	1.4	Use M2	133	3	NA	29
1000	10	4.27	42	0.48	8.0	1.4		133	3		30
1005	15	6.44	42	0.48	8.0	1.4		130	3		30
1010	20	8.56	42	0.48	8.0	1.4		132	4		31
1015	25	10.67	42	0.48	8.0	1.4		134	3		31
1020	30	12.73	42	0.48	8.0	1.4		129	3		32
1025	35	14.89	42	0.48	8.0	1.4		131	3		32
1030	40	17.09	42	0.48	8.0	1.4		128	3		32
	0=40	Vm=17.09		Avg=0.48		Avg=1.4	T_s=97.4				Avg =30.9

87.6°F

Samples Recovered:
Tenax Tube No. 8181-01T
Tenax/Charcoal Tube No. 8181-01TC
Filter: ☐ Yes ☑ No —
Condensate: ☐ Yes ☑ No

Comments:

PASSED QA

TRIRON

EPA Method 0030 VOST Field Data Sheet

Client: Michelin | Console No.: 400.032 | Sample ID No.: 8181-03 | Sampling Train Leak Checks: 25.4
City/State: Duncan, SC | Meter Coef.: 1.00 | Train ID No.: 400.034 | Pretest: <0.1 @ 25 In. Hg.
Sample Location: Tire Butter Stack | Pitot Tube No.: 200.062 | Bar. Pressure: 29.14 In. Hg. | Posttest: <0.1 @ 25.0 In. Hg.
Date: 01/29/99 | Operator: KH / AMS | Pitot Tube Coef.: 0.86 | Static Pressure: -0.38 In. H_2O | Start Time: 1105 | End Time: 1145
Kevin M. Howlett

Point Number	Time Δ T	Meter Volume Vm Liters	Rotameter Setting	Sampling Rate LPM	Train Vacuum Inches Hg	Meter Pressure Inches H_2O	Stack Temp. °F	Sampling Train Temperatures °C			
								#1 Probe	#2 Condenser Outlet	Meter Inlet	#3 Meter Outlet
	0	0.00									
1110	5	2.15	42	0.48	6.0	1.4	use M2	134	5	NA	34
1115	10	4.27	42	0.48	6.0	1.4		131	4		34
1120	15	6.40	42	0.48	6.0	1.4		132	4		35
1125	20	8.60	42	0.48	6.0	1.4		130	4		35
1130	25	10.85	42	0.48	6.0	1.4		130	4		35
1135	30	13.01	42	0.48	6.0	1.4		135	4		36
1140	35	15.12	42	0.48	6.0	1.4		132	4		37
1145	40	17.34	42	0.48	6.0	1.4		132	4		36
	θ = 40	Vm = 17.34		Avg = 0.48		Avg = 1.4	T_s = 93.6				Avg = 35.3

95.5°F

Samples Recovered:
Tenax Tube No. 8181-03T
Tenax/Charcoal Tube No. 8181-03TC
Filter: ☐ Yes ☑ No
Condensate: ☐ Yes ☑ No

Comments:

PASSED QA

TRIGON

APPENDIX C

LABORATORY DATA

[redacted]

TRIANGLE LABS

CASE NARRATIVE

Analysis of Samples for the Presence of

Volatile Analytes by

High-Resolution Gas Chromatography / Low-Resolution Mass Spectrometry

METHOD 8260B Rev. 2 (12/96)

Date : February 5, 1999

Client ID : Trigon Engineering Consultants, Inc.

TLI Project Number : 47818

Triangle Laboratories, Inc.
801 Capitola Drive
Durham, NC 27713-4411
919-544-5729
P.O. Box 13485
Research Triangle Park, NC 27709-3485
Fax # 919-544-5491

Objective: Analysis of four VOST tube pairs for the volatile compounds methylene chloride and toluene, using Method 8260B.

Method:

Four VOST tube pairs were received at Triangle Laboratories, Inc. on January 29, 1999 at 6°C in good condition. The samples were stored in a refrigerator at 4°C prior to analysis. The VOST tubes were analyzed according to the guidelines of Methods 8260B and 5040. The internal standards and surrogate standards were added in the amount of 0.25 micrograms (ug) immediately prior to analysis by GC/MS. The internal standards are pentafluorobenzene and 1,4-difluorobenzene, and the surrogate standards reported are dibromofluoromethane and toluene-d_8. The results reported relate only to the items tested.

The GC/MS analysis conditions are listed below:

Purge and trap:	Tekmar LSC-2000
Purge:	11 min.
Desorb Temperature:	250 C
Desorb Time:	4 min.

GC Conditions:

Column:	30 m x .53 mm x 0.3*u* J&W DB624 0 C hold .5 min, 10 C/min to 45C, 6 C/min to 90C, hold 1.5 min, 50 C/min to 200C.

MS Conditions:

Instrument:	VG-TRIO-1 Lab Base data system
Scan:	35-350 amu at .6s/scan
Interface:	Jet Separator, 200 C

Report:

Enclosed with the case narrative are copies of the sample identification index, the project summary sheets, client paperwork, sample log-in sheets, and log book pages. A sample identification index summarizes the client sample name, TLI sample number, and analytical file name for each sample and blank. The project summary lists the amounts for detected analytes in gray. The estimated detection limits will be listed in parentheses when the target analytes are not detected.

The data are reported as quantitation reports, chromatograms, interim reports, and spectra of detected target analytes. The quantitation report header lists the TLI project number, analysis method, instrument sample file name, client sample name, client project number, TLI sample number, calibration file, date received, and analysis date. The response factors used for all calculations are from the calibration file listed in the header. All initial and continuing calibration data are located in the back of the data package. The amount is reported in total ug for the VOST tubes. The retention time (RT) will be listed for all internal standards and analytes that are

detected. If a target analyte is not detected, it will be flagged with a "U" and a detection limit will be listed. Estimated detection limits are calculated for all analytes that were not found in the samples by using an area of 2000. The estimated detection limits reported are the average detection limits achievable over time on an instrument type. The actual detection limit for a given compound on a given day may vary from the estimate reported. The quantitation limit for all analytes is half of the low point of the initial calibration. Below this point the calibration cannot be considered to be linear. Any amount reported at a level below the quantitation limit will be flagged with a "J" and should be considered estimated. If any compounds are found at a level above the upper calibration range, the analyte will be flagged with an "E" and the amounts reported should be considered estimated. If any target analytes found in the laboratory blanks are detected in the associated samples, they will be flagged with a "B" on each sample topsheet. All analytes are quantitated against the internal standard preceding them on the target analyte list. Surrogate standards are quantitated against the internal standard with the matching internal standard reference number. For example, toluene-d_8 has 2 in the IS Ref column and would be quantitated against the internal standard that has IS2 listed in the flag column.

Results:

The VOST tube pairs were analyzed within the fourteen day sampling to analysis holding time. The VOST tube pairs were analyzed separately, per client request.

The laboratory blank contained toluene at a level below the quantitation limit. The target analytes in a laboratory blank should not be considered as truly present in the native samples unless found at a level at least five times the amount found in the associated blank. In the event that the amount of a target analyte found in the samples is twenty times the amount found in the associated blank, the contribution from the blank can be considered negligible.

Sample 8181-01-T contained toluene at a level greater than the instrument's calibration range. It was flagged with an "E" and theamount should be considered estimated.

All surrogate standard percent recoveries were within quality control limits for all samples and blanks.

Sample Calculations:

$$\text{Response Factor (RF)} = \frac{(\text{area analyte}) \times (\text{amt IS})}{(\text{area IS}) \times (\text{amt analyte})}$$

$$\text{Amount (ug)} = \frac{(\text{area analyte in sample}) \times (\text{amt IS})}{(\text{area IS}) \times (\text{avg ical RF})}$$

Where:

amt IS = amount of internal standard = 0.25 ug
ical = initial calibration

The data in this package have been judged to be valid according to the guidelines of Methods 8260B and 5040, except as noted above. Should you have any questions, please feel free to contact a Customer Service Representative at (919) 544-5729.

For Triangle Laboratories, Inc.,

Report Preparation:

Valgena Respass
Report Preparation Chemist

Quality Control:

Sarah A. Hubbard
Report Preparation Chemist

The total number of pages in this data package is 77.

Client Id:	TLI Id:	File Name:
8181-01-T	229-17-1A	FY515
8181-01-TC	229-17-1B	FY510
8181-02-T	229-17-2A	FY516
8181-02-TC	229-17-2B	FY511
8181-03-T	229-17-3A	FY519
8181-03-TC	229-17-3B	FY512
8181-04-T	229-17-4A	FY520
8181-04-TC	229-17-4B	FY513
VOSTBLK020199	VOSTBLK020199	FY509
	VL215199	

Triangle Laboratories, Inc.

Project Summary for Project 47818

Client ID:	8181-01-T	8181-01-TC	8181-02-T	8181-02-TC	8181-03-T
Filename :	FY515	FY510	FY516	FY511	FY519
TLI Id :	229-17-1A	229-17-1B	229-17-2A	229-17-2B	229-17-3A
Matrix :	VOST	VOST	VOST	VOST	VOST
Units :	ug	ug	ug	ug	ug
Methylene chloride	0.027	0.007	0.031	0.007	0.016
Toluene	1.092	0.006	0.765	0.005	0.783

( )-Estimated Detection Limit Page 1

Client ID:	8181-03-TC	8181-04-T	8181-04-TC	VOSTBLK020 199
Filename :	FY512	FY520	FY513	FY509
TLI Id :	229-17-3B	229-17-4A	229-17-4B	VOSTBLK02019
Matrix :	VOST	VOST	VOST	VOST
Units :	ug	ug	ug	ug
Methylene chloride	0.016	0.002	(0.001)	(0.001)
Toluene	0.005	0.011	0.004	0.003

( )-Estimated Detection Limit

Triangle Laboratories, Inc.
801 Capitola Drive • Durham, North Carolina 27713
Phone: (919) 544-5729 • Fax: (919) 544-5491

TRIANGLE LABS

TRIANGLE LABORATORIES, INC.

LIST OF CERTIFICATIONS AND ACCREDITATIONS

ENVIRONMENTAL

American Association for Laboratory Accreditation. Expires July 31, 1999. Certificate Number 0226-01. Accreditation for technical competence in Environmental Testing. 8280, 8290, 1613A Dioxin in Wastewater; Solid or Hazardous Waste, and Air Matrices: XAD Trains - M23, 8290X and PUF Trains 8290X. Adsorbable Organic Halides (AOX)/ Toxic Organic Halides (TOX) in Pulp/Paper. Method 1613A & B, 2,3,7,8 TCDD for Drinking Water.

State of Alabama, Department of Environmental Management. Expires December 31, 1999. Laboratory I.D. # 40950. 2,3,7,8 TCDD (Dioxin) in drinking water.

State of Alaska, Department of Environmental Conservation. Expires December 21, 1998. Lab ID #OS-00397. Certificate number NC00140. 2,3,7,8 TCDD (Dioxin) in drinking water. *Currently applying for renewal.*

State of Arizona, Department of Health Services. Expires May 26, 1999. Certificate #AZ0423. Drinking Water for Dioxin, Dioxin in Waste Water and Solid or Hazardous Waste.

State of Arkansas, Department of Pollution Control and Ecology. Expires February 19, 1999. Pulp/paper, soil, water, and Hazardous Waste for Dioxin/Furan; Adsorbable Organic Halides(AOX)/Toxic Organic Halides(TOX); Volatiles and Semi-volatiles organics; and Metals including Hexavalent Chromium.

State of California, Department of Health Services. Expires August 31, 1999. Certificate #1922. Selected Metals in Hazardous Waste and Wastewater; Volatiles under 8260A and 8240 B; Semi-volatiles under 8270B; 8080A PCBs and organochlorine pesticides only, PCBs and organichlorine pesticides only; Dioxin/Furan in Wastewater Method 613 and 1613, and Solid or Hazardous Waste Method 8280, 8290. *Method 1613 in drinking water.*

State of Connecticut, Department of Health Services. Expires September 30, 1999. Registration # PH-0117. 2,3,7,8 TCDD (Dioxin) in drinking water.

Delaware Health and Social Services. Expires December 31, 1998. Certificate #NC 140. Dioxin in drinking water. *Currently applying for renewal.*

Triangle Laboratories, Inc.
801 Capitola Drive
Durham, NC 27713-4411
919-544-5729
P.O. Box 13485
Research Triangle Park, NC 27709-3485
Fax # 919-544-5491

Florida Department of Health and Rehabilitative Services. Expires June 30, 1999. Method 1613 for Dioxin in Drinking Water. Drinking Water ID HRS# 87424.

Hawaii Department of Health. Expires March 1, 1999. Dioxin in drinking water. "Accepted" status for regulatory purposes.

Idaho Department of Health and Welfare. Expires December 31, 1998. Dioxin in drinking water. *Currently applying for renewal*

Illinois Environmental Protection Agency. Sent initial application, Drinking Water, Wastewater and Hazardous Waste, Methods 608, 610, 624, 625, 8081A, 8260B, 8260C, 8270B, 8270C, 8310, 8315A. Application shipped 12/18/98.

State of Kansas, Department of Health and Environment. Expires January 31, 2000. Method 1613, 2,3,7,8 TCDD for drinking water. ID #'s - Drinking water and/or pollution control - Cert. # E-10215. Solid or Hazardous Waste 8081A, 8260B, 8270C - Cert #E-101209.

Commonwealth of Kentucky, Department for Environmental Protection. Expired December 31, 1998, extended through March 31, 1999. ID#90060. 2,3,7,8 TCDD (Dioxin) in drinking water. *Currently applying for renewal.*

Louisiana Department of Health & Hospitals. Initial application. Drinking water program - chemistry. *Sent application 12/21/98.*

Maryland Department of Health and Mental Hygiene. Expires September 30, 1999. Certification #235 2,3,7,8 TCDD (Dioxin) by 1613A for Water Quality.

State of Michigan, Department of Public Health. Expires June 30, 1999. 2,3,7,8 TCDD by Method 1613. Current certification is extended, based on New York certificate renewal.

Mississippi State Department of Health. *No expiration date. Dioxin in drinking water.*

Montana Department of Health and Environmental Services. Expires December 31, 1998. Dioxin in drinking water. *Currently applying for renewal.*

State of Nevada, Department of Conservation and Natural Resources. Expires December 31, 1998. Dioxins, under Clean Water Act. *Currently applying for renewal.*

State of Nevada, Department of Human Resources. Expires June 30, 1999. Dioxin, under Safe Drinking Water Act.

State of New Jersey, Department of Environmental Protection and Energy. Expired June 30, 1998. Extended until December 30, 1998 per letter dated October 14, 1998. ID #67851. 8290 and 2,3,7,8 TCDD, 1613. *Currently applying for renewal.*

State of New Mexico, Environment Department. Expires July 31, 1999. Dioxin in Drinking Water per A2LA.

New York State Department of Health. No expiration. Received updated certificates. ID #11026. Environmental Analyses of Solid and Hazardous Waste for purgeable hydroarbons, chlorinated hydrocarbons, pesticides, priority pollutant phenols; potable water 2,3,7,8 TCDD (Dioxin).

State of North Carolina, Department of Environment Health and Human Services. Expires. December 31, 1999. Certificate # 37751. Dioxin in drinking water. (Department is currently in transition with requirements for recertification due to changes in EPA/ELAP verification.

State of North Carolina, Department of Environment, Health, and Natural Resources, Division of Environmental Management. Expires December 31, 2000. Certificate # 485. Metals, pesticides & PCBs by method 8080; semi-volatiles by method 8270; and volatiles by method 5030/8240 and 8260.

North Dakota State Department of Health and Consolidated Laboratories. Expires December 31, 1998. Certificate # R-076. Effective October 4, 1993. Dioxin in drinking water. *Currently applying for renewal.*

Oklahoma Department of Environmental Quality. Expires August 31, 1999. Laboratory #9612. 2,3,7,8 TCDD (Dioxin) by 613, 1613A, 8290 and 8280.

Commonwealth of Pennsylvania Department of Environmental Protection. Sent initial application, dioxin in drinking water, 9/11/98. Auditors on-site 1/5 and 1/6/99.

State of South Carolina, Department of Health and Environmental Control. Expires August 31, 1999. Certificate number #99040001 (Other parameters). Dioxin/Furans by method 1613A, 8280, 8290; Base/Neutral/Acids by method 8270B; Volatiles by method 8240B; and PCBs/Pesticides by method 8080A, and selected metals, under Clean Water Act and Safe Drinking Water Act; 2,3,7,8-TCDD for Drinking Water, and Organic extractables for Solid and Hazardous Waste.

State of Tennessee. Department of Environment and Conservation. Expires February 5, 1999. ID #02992. Dioxin in Drinking water.

U.S. Department of Agriculture Soil Permit. Expires September 30, 2001. Permit No. S-3790. Under the authority of the Federal Plant Pest Act, permission is granted to receive foreign soil samples for use in laboratory analysis.

U.S. Army Corps of Engineers. Expires October 19, 1999. Validated to perform analyses for the Fort Belvoir, VA (Contract Number DACA31-97-D-0029), Vint Hill Farms Station, Vint Hill, VA (Contract Number DACA31-95-D-0083), and Selma Pressure Treating Superfund Site, Selma, CA (Contract number DACW45-94-D-0054). 8280 and 8290, water and solids.

U.S. EPA Region V. Expires November 14, 1999. 2,3,7,8 TCDD (Dioxin) in drinking water.

U.S. EPA Region VIII, for the State of Wyoming. Expires October 9, 1999. Method 1613 for Dioxin in drinking water.

State of Utah, Department of Health. Expires May 30, 2000. Certificate Number E-166. Certification for the following parameters: Volatiles by 8240; Dioxin/furans by Method 1613, 8280 and 8290; Drinking water for Dioxin by Method 1613; Metals including Mercury and Microwave Digestion.

Commonwealth of Virginia, Department of General Services, Division of Consolidated Laboratory Services. Expires June 30, 1999. ID # 00341. 2,3,7,8-TCDD (Dioxin) in drinking water.

State of Washington, Department of Ecology. Expires September 11, 1999. Lab Accreditation Number C067. Scope of Accreditation applies to water analyses 613 & 1613A; also Volatiles and Semi-volatiles, Method 8260 and 8270, selected metals.

State of Washington, Department of Health. Expires April 30, 1999. Dioxin by 1613A in drinking water. Lab I.D. 129.

State of West Virginia, Department of Health. Expires December 31, 1999. Certificate No. 9923(C). 2,3,7,8-TCDD (Dioxin) in drinking water.

State of Wisconsin, Department of Natural Resources. Laboratory ID Number 999869530. Expires August 31, 1999: Certification for PCDD/PCDF. Expires November 14, 1999: Certified for 2,3,7,8-TCDD (Dioxin) in drinking water.

PHARMACEUTICAL

Drug Enforcement Agency (DEA). Expires November 30, 1999. Registration number RT01195835. Controlled substance registration for schedules 1,2,3,3N,4,5.

N.C. Department of Human Resources. Expires October 31, 1999. Registration number NC-PT 0000 0031. North Carolina controlled substances registration.

Food & Drug Administration (FDA) Registration. Registered July 2, 1998. ID #'s 001500 1053481. Annual registration of drug establishment.

OTHER

Clinical Laboratory Improvement Amendments (CLIA) Registration. Expires May 30, 1999. ID # 34D0705123. Department of Health & Human Services, Health Care Financing Administration.

U.S. EPA Large Quantity Hazardous Waste Generator. No expiration date. EPA ID #NCD982156879. Permit indicates that the laboratory is a large generator of hazardous waste.

North Carolina General License for Radiation Protection. No expiration date. No License. 032-875-OG. The general license applies only to radioactive material contained in devices which have been manufactured and labeled in accordance with specific requirements.

DOCUMENT CONTROL

Triangle Laboratories, Inc.
801 Capitola Drive
Durham, NC 27713-4411
919-544-5729
P.O. Box 13485
Research Triangle Park, NC 27709-348
Fax # 919-544-5491

BE SURE TO MINIMIZE POSSIBLE LAB CONTAMINATION

14

CLIENT CHAIN OF CUSTODY **SAMPLER'S SIGNATURE** Paul Jenkins **Quote 9900000034**

From (1): Trigon Engineering Consultants, Inc
6200 Harris Technology Blvd.
Charlotte, NC 28269
Project (1): Michelin

Contact: Paul Jenkins
Phone: 704-598-1049
Fax: 704-598-1050
P.O.# (1): AM7903

(TRI01 /UN)

If the data will be reported to a state agency, which one? SC DHEC EPA 4

Analysis Wanted (2): 8260

Total Number of Containers: 4 pairs (8 tubes)

Turn Around Time (In Calendar Days): 7 days was promised Best possible < 10 days

Sample ID (3)	Date / Time	Preservation (4)	Matrix *	Sample Amt.	8260	Remarks
8181-01 T	01/28/99 0840-0920	Ice pack	Air	16.89 liters	✓	Report only Toluene and Methylene Chloride for all samples
8181-01 TC	01/28/99 0840-0920	Ice Pack	Air	16.89 liters	✓	
8181-02 T	01/28/99 0950-1030	Ice pack	Air	17.09 liters	✓	
8181-02 TC	01/28/99 0950-1030	Ice pack	Air	17.09 liters	✓	
8181-03 T	01/28/99 1105-1145	Ice pack	Air	17.34 liters	✓	
8181-03 TC	01/28/99 1105-1145	Ice pack	Air	17.34 liters	✓	
8181-04 T	01/28/99 1035	Ice pack	Air	0.0 liters	✓	
8181-04 TC	01/28/99 1035	Ice pack	Air	0.0 liters	✓	
Temp. Blank	enclosed	with tubes	All samples sealed with security tape by me 01/28/99 1700			

* Air = Tire Buffer Exhaust Stack = VOC ppm by Method 25A ≅ 6 ppm as propane

Relinquished By/Sign.	Date/Time	Received By/Sign.	Relinquished By/Sign.	Date/Time	Received By/Sign.
Paul Jenkins	01/28/99 1700				

Received for Laboratory By/Signature	Date/Time
	1/29/99 10:30

Send Samples to: **Triangle Laboratories, Inc.**
Attn: Sample Custodian
801 Capitola Drive
Durham, NC 27713 USA
Phone: (919) 544-5729 • Fax: (919) 544-5491

Directions:
(1) Provide and/or correct client and project information.
(2) Verify analysis, check approriate boxes for each sample.
(3) Enter the sample ID to be used when reporting the samples.
(4) Please indicate the preservation used for each sample.

COPY 1/29/99

TRIANGLE LABORATORIES, INC. -- LOG IN RECORD/CHAIN OF CUSTODY

Custody Seal : Absent
Chain of Custody : Present
Sample Tags : Absent
Sample Tag Numbers: Not Listed on Chain of Custody
SMO Forms : N/A

Sample Seals: Present
Container...: Intact

TLI Project Number 47818
Client: TRI01 - Trigon Engineering Consultants, Inc

Book 229 Page 17

Date Received 01/29/99 By

Carrier and Number *FedEx/*

Ice Chest ICE PACKS Temp 6.0 C

TLI Number.. / mR/H:CPM.	Client Sample ID / Client COC ID / Location	Matrix	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	DISPOSED Date/Init
229-17-1A	8181-01-T 8181-01-T R03	TENAX									
229-17-1B	8181-01-TC 8181-01-TC R03	TNX/CHAR									
229-17-2A	8181-02-T 8181-02-T R03	TENAX									
229-17-2B	8181-02-TC 8181-02-TC R03	TNX/CHAR									
229-17-3A	8181-03-T 8181-03-T R03	TENAX									
229-17-3B	8181-03-TC 8181-03-TC R03	TNX/CHAR									
229-17-4A	8181-04-T 8181-04-T R03	TENAX									
229-17-4B	8181-04-TC 8181-04-TC R03	TNX/CHAR									

Receiving Remarks:

Archive Remarks:

Triangle Laboratories, Inc.
Run Log

Column Type	Column #	Analysis*	Acquisition Method	GC Method*	Find DBs*	Other*
DB624	6252663	8260B	VOA	VOA3	8260B	

Standards		
Internal / Surrogate / Recovery	Internal / Surrogate / Recovery	Analyte
VSG-134-3 exp. 2/2/99 @ 25ug/ml	VSG-135-3 exp. 2/3/99 @ 25ug/ml	

~~Extract / Sample~~ volume ______ Circle unit µL mL

Signature: [signature] Date: 1/26/99

Date**	Time**	Project	Sample#	Client ID	Filename	pH*	Operator/Date	Backup*	Proc	Comments***
1/26/99	13:15	—	2ul VSG-134-3 exp. 2/2/99	BFB	FY430	N/A	[initials] 1/26/99		[initials]	
1/26/99	~~1~~ 13:45 (E) 1/26 [initials]	—	1ul VSG-136-1 exp. 2/5/99	VOSTD0.25 T/TC	FY431	N/A	[initials] 1/26/99		[initials]	
1/26/99	15:29	—	10ul VSG-135-3 exp. 2/3/99	(E) 1/26/99 VOSTBLK T/TC ~~VOSTD0.25 T/TC~~	FY432	N/A	[initials] 1/26/99		[initials]	
1/26/99	16:17	—	10ul VSG-135-3 exp. 2/3/99	VOSTBLK T/TC	FY433	N/A	[initials] 1/26/99		[initials]	
1/26/99	16:56	—	10ul VSG-137-2 exp. 2/5/99	VOSTD0.10 T/TC	FY434	N/A	[initials] 1/26/99		[initials]	
1/26/99	17:29	—	10ul VSG-137-2 exp. 2/5/99	VOSTD0.10 T/TC	FY435	N/A	[initials] 1/26/99		[initials]	
1/27/99	00:38	—	2ul VSG-134-3 exp 2/2/99	BFB	FY436	N/A	16 1/27/99	1/26/99	16	
1/27/99	1:17	—	10ul VSG-137-2 exp 2/5/99	VOSTD0.10 T/TC	FY437	N/A	16 1/27/99		16	
1/27/99	2:05	—	10ul VSG-136-1 exp 2/5/99	VOSTD0.25 T/TC	FY438	N/A	16 1/27/99		16	
1/27/99	2:55	—	10ul VSG-137-1 exp 2/5/99	VOSTD0.50 T/TC	FY439	N/A	16 1/27/99		16	Ical [initials] 1/27/99

* Volatile Data Only ** Transcribed Data *** Dated Signature/Initials Required

SRVR4\APMSRL\LRRUNLOG.DOC (10/16/97)

Triangle Laboratories, Inc.
Run Log

Column Type	Column #	Analysis*	Acquisition Method	GC Method*	Find DBs*	Other*
DB624	6252663	8260B	VOA	VOA3	8260B	

Standards		
Internal / Surrogate / Recovery	Internal / Surrogate / Recovery	Analyte
VSG-134-3 exp 2/2/99 @ 25 ug/ml	VSG-135-3 exp 2/3/99 @ 25 ug/ml	

Extract / Sample volume _____ Circle unit µL mL

Signature _____ Date 1/27/99

Date**	Time**	Project	Sample#	Client ID	Filename	pH*	Operator/Date	Backup*	Proc	Comments***
1/27/99	3:39	—	10ml VSG-137-2 exp 2/6/99	VOSTD0.75 T/TC	FY440	N/A	LG 1/27/99	1/28/99	LG	ICal Pt 1/27/99
1/27/99	4:40	—	10ml VSG-137-3 exp 2/6/99	VOSTD1.00 T/TC	FY441	N/A	LG 1/27/99		LG	ICal Pt 1/27/99
1/27/99	5:29	—	10ml VSG-135-3 exp 2/3/99	VOSTBLK T/TC	FY442	N/A	LG 1/27/99		LG	
1/27/99	6:15	—	10ml VSG-135-3 exp 2/3/99	VOSTBLK T/TC	FY443	N/A	LG 1/27/99		LG	
1/27/99	7:01	—	10ml VSG-135-3 exp 2/3/99	VOSTBLK T/TC	FY444	N/A	LG 1/27/99		LG	
1/27/99	07:39	—	2ml VSS-134-3 exp 2/2/99	BFB	FY445	N/A	JL 1/27/99		JL	
1/27/99	08:32	—	10ml VSG-138-4 exp. 2/9/99	VOSTD0.25 T/TC	FY446	N/A	JL 1/27/99		JL	
1/27/99	09:21	—	10ml VSG-136-4 exp. 2/4/99	VOSTD0.25 T/TC	FY447	N/A	JL 1/27/99		JL	ICal Pt 1/27/99
1/27/99	10:07	—	10ml VSG-136-3 exp. 2/3/99	VOSTD0.10 T/TC	FY448	N/A	JL 1/27/99		JL	
1/27/99	11:54	—	10ml VSG-135-3 exp. 2/3/99	VOSTBLK T/TC	FY449	N/A	JL 1/27/99	JL 1/28/99	JL	

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Triangle Laboratories, Inc.
Run Log

Column Type	Column #	Analysis'	Acquisition Method	GC Method*	Find DBs*	Other*
DB624	G2526G3	8260	VOA	VOA3	8260B	

Standards		
Internal / Surrogate / Recovery	Internal / Surrogate / Recovery	Analyte
VSG-138-3 exp 2/2/99 @ 25ug/ml	VSG-135-3 exp. 2/2/99 @ 25ug/ml	

Extract / Sample volume _____ Circle unit µL mL

Signature _____ Date 1/27/99

Date**	Time**	Project	Sample#	Client ID	Filename	pH*	Operator/Date	Backup*	Proc	Comments***
1/27/99	12:40	—	10ul VSG-136-3 exp 2/9/99	VOSTD0.10 T1TC	FY450	N/A	JL 1/27/99	JL 1/28/99	JL	
1/27/99	13:11	—	10ul VSG-136-3 exp. 2/9/99	VOSTD0.10 T1TC	FY451	N/A	JL 1/27/99		JL	Encl Pk JL 1/27/99
1/27/99	13:55	—	10ul VSG-136-3 exp. 2/9/99	VOSTBIK T1TC	FY452	N/A	JL 1/27/99		JL	
1/27/99	14:35	—	10ul VSG-136-3 exp. 2/9/99	VOSTBIK. T1TC	FY453	N/A	JL 1/27/99		JL	
1/27/99	15:54	—	10ul VSG-136-3 exp. 2/9/99	VOSTBIK T1TC	FY454	N/A	JL 1/27/99		JL	
1/27/99	16:35	47702	227-SB-4A,B	CU-V-C13-C2A-1,2 T1TC	FY455	N/A	JL 1/27/99		JL	
1/27/99	17:21	47702	227-SS-5A,B	CU-V-C13-R2B-1,2 T1TC	FY456	N/A	JL 1/27/99		JL	
1/27/99	17:55	47702	227-SW6A,B	CU-V-C13-R2C-1,2 T1TC	FY457	N/A	JL 1/27/99		JL	
1/28/99	00:06	—	10ul VSG-134-3 exp 2/2/99	BFB	FY458	N/A	16 1/28/99		16	
1/28/99	00:26	—	10ul VSG-136-4 exp 2/9/99	VOSTD0.25 T1TC	FY459	N/A	16 1/28/99	JL 1/28/99	16	

* Volatile Data Only ** Transcribed Data *** Dated Signature/Initials Required

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Triangle Laboratories, Inc.
Run Log

Column Type	Column #	Analysis*	Acquisition Method	GC Method*	Find DBs*	Other*
DB624	6252663	8260B	VOA	VOA3	8260B	

Standards		
Internal / Surrogate / Recovery	Internal / Surrogate / Recovery	Analyte
U59-134-3 exp 2/2/99 @ 25ug/ml	U54-135-4 exp 2/3/99 @ 25ug/ml	

Extract / Sample volume __ µL mL (Circle unit)

Corey C. Spruell 1/25/99
Signature Date

Date**	Time**	Project	Sample#	Client ID	Filename	pH*	Operator/Date	Backup*	Proc	Comments***
1/29/99	13:05	47763	228-61-19AB	UA-12299-VC18-V26 t,tc T/TC	FY500	NA	Jcl 1/29/99	Jcl 1/29/99	Jcl	
1/29/99	13:46	47763	228-61-20AB	UA 12299-VC18-V26 t,tc T/TC	FY501	N/A	Jcl 1/29/99	Jcl 1/29/99	Jcl	
2/1/99	00:19	—	2ml U54-134-3 exp 2/2/99	BFB	FY502	N/A	lb 2/1/99		lb	
2/1/99	00:57	—	10ml U54-137-4 exp 2/6/99	VOSTD0.25 T/TC	FY503	N/A	lb 2/1/99		lb	
2/1/99	2:11	—	10ml U54-137-4 exp 2/6/99	VOSTD0.25 T/TC	FY504	N/A	lb 2/1/99		lb	
2/1/99	3:53	—	20ml U59-134-3 exp 2/2/99	BFB	FY505	N/A	lb 2/1/99		lb	
2/1/99	4:22	—	10ml U54-137-4 exp 2/6/99	VOSTD0.25 T/TC	FY506	N/A	lb 2/1/99		lb	
2/1/99	5:26	—	10ml U54-135-4 exp 2/3/99	VOSTBLK T/TC	FY507	N/A	lb 2/1/99		lb	
2/1/99	6:15	—	10ml U54-135-4 exp 2/3/99	VOSTBLK T/TC	FY508	N/A	lb 2/1/99		lb	
2/1/99	07:34	—	10ml U54-135-4 exp 2/3/99	VOSTBLK T/TC	FY509	N/A	lb 2/1/99		lb	

C-19

* Volatile Data Only ** Transcribed Data *** Dated Signature/Initials Required

SRVR4\\APMSRL\LRRUNLOG.DOC (10/16/97)

Triangle Laboratories, Inc.
Run Log

Column Type	Column #	Analysis*	Acquisition Method	GC Method*	Find DBs*	Other*
DB624	62526G3	8260B	VOA	VOA3	8260B	

Standards		
Internal / Surrogate / Recovery	Internal / Surrogate / Recovery	Analyte
VSG-134-3 exp. 2/2/99 @ 25ug/ml	VSG-135-4 exp. 2/3/99 @ 25ug/ml	

Extract / Sample volume _____ Circle unit µL mL

Tonya C. Harrell 2/1/99
Signature Date

Date**	Time**	Project	Sample#	Client ID	Filename	pH*	Operator/Date	Backup*	Proc	Comments***
2/1/99	08:20	47818	229-17-1B	8181-01-TC TC	FY510	N/A	2/1/99/tcl		tcl	
2/1/99	09:11	47818	229-17-2B	8181-02-TC TC	FY511	N/A	tcl 2/1/99		tcl	
2/1/99	09:57	47818	229-17-3B	8181-03-TC TC	FY512	N/A	tcl 2/1/99		tcl	
2/1/99	10:40	47818	229-17-4B	8181-04-TC TC	FY513	N/A	tcl 2/1/99		tcl	
2/1/99	11:14	—	10ul VSX-135-4 exp. 2/3/99 @ tcl 2/1/99	VOSTBLK TITC	FY514	N/A	tcl 2/1/99		tcl	
2/1/99	12:29	47818	229-17-1A	8181-01-T T	FY515	N/A	tcl 2/1/99		tcl	
2/1/99	13:08	47818	229-17-2A	8181-02-T T	FY516	N/A	tcl 2/1/99		tcl	
2/1/99	13:40	—	10ul VSX-135-4 exp. 2/3/99	VOSTBLK TITC	FY517	N/A	tcl 2/1/99		tcl	
2/1/99	14:16	—	10ul VSX-135-4 exp. 2/3/99	VOSTBLK IITC	FY518	N/A	tcl 2/1/99		tcl	
2/1/99	14:51	47818	229-17-3A	8181-03-T T	FY519	N/A	tcl 2/1/99		tcl	

* Volatile Data Only ** Transcribed Data *** Dated Signature/Initials Required

Triangle Laboratories, Inc.
Run Log

Column Type	Column #	Analysis*	Acquisition Method	GC Method*	Find DBs*	Other*
DB624	6252663	8260	VOA	Vom3	8260s	

Standards		
Internal / Surrogate / Recovery	Internal / Surrogate / Recovery	Analyte
VSS-1353 exp. 2/2/99 @ 25ug/ul	VSS-1354 exp. 2/3/99 @ 25ug/ul	

Extract / Sample volume ______ µL mL (Circle unit)

Signature: Lonny C. Spruell Date: 2/1/99

Date**	Time**	Project	Sample#	Client ID	Filename	pH*	Operator/Date	Backup*	Proc	Comments***
2/1/99	15:28	47818	229-17-4A	8181-04-T T	FY520	NA	[illegible] 2/1/99		[illegible]	

C - 21

* Volatile Data Only ** Transcribed Data *** Dated Signature/Initials Required

SRVR4\APMSRL\LRRUNLOG.DOC (10/16/97)

SAMPLE DATA

Triangle Laboratories, Inc.
801 Capitola Drive
Durham, NC 27713-4411
919-544-5729
P.O. Box 13485
Research Triangle Park, NC 27709-3485
Fax # 919-544-5491

Trigon Engineering Consultants, Inc.

Project Number: 47818
Sample File: FY515

Method 8260B VOST
Sample ID: 8181-01-T

Client Project: Michelin
TLI ID: 229-17-1A

Date Received: 01/29/99
Date Analyzed : 02/01/99

Response File: ICALF127

Analyte	Amount ug	FLAG	RT	Det. Limit ug	Quan. Limit ug
Pentafluorobenzene		IS 1	5.38		
Methylene chloride	0.027	J	3.35		0.05
1,4-Difluorobenzene		IS 2	6.17		
Toluene	1.092	BE	8.19		0.05

Surrogate Summary	Amount (ug)	RT	IS Ref	%REC
Dibromofluoromethane	0.218	5.25	1	87
Toluene-d_8	0.325	8.09	2	130

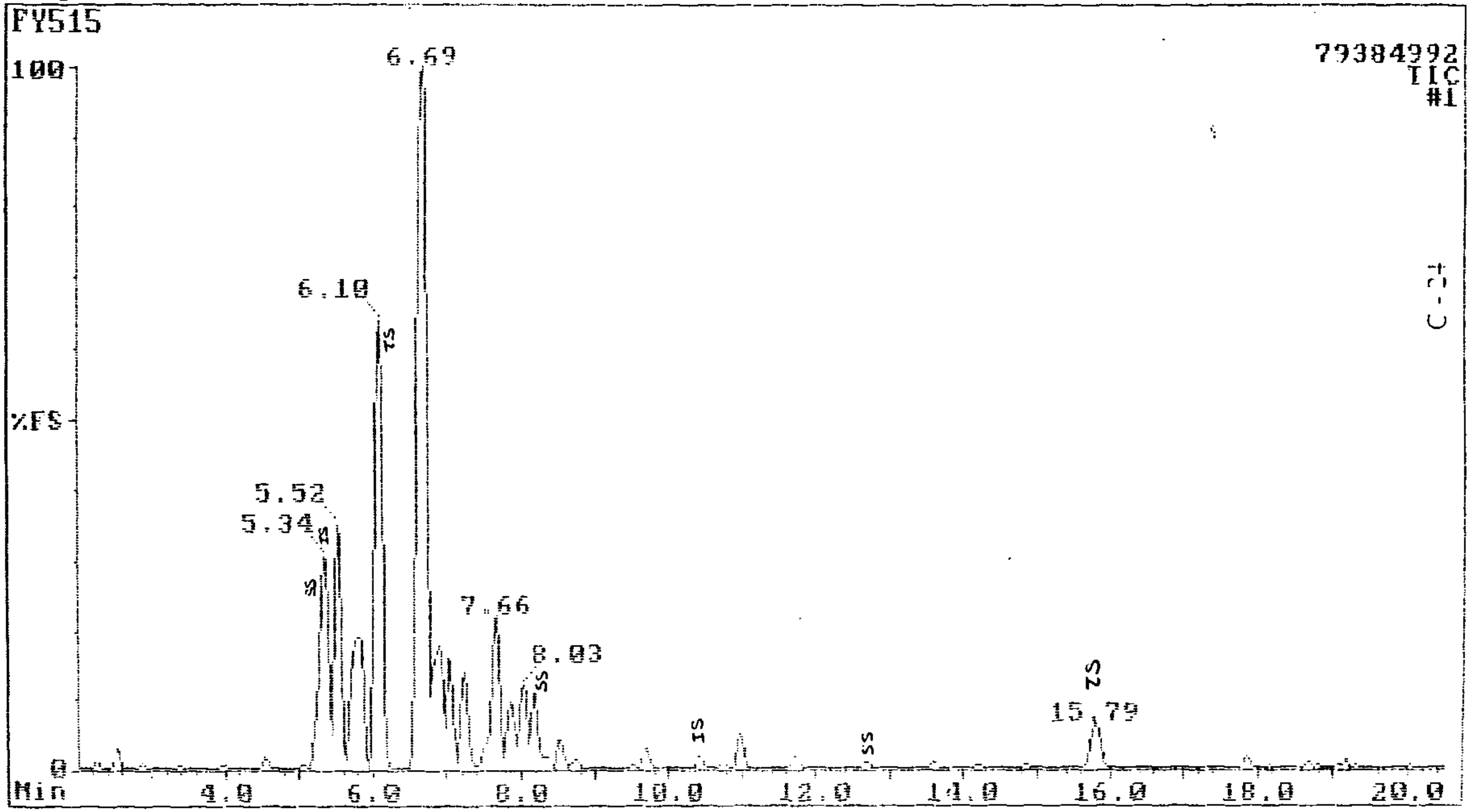
Reviewed by YR Date 2/5/99

NA- Not Applicable; Det. Limit: Detection Limit; Quan. Limit: Quantitation Limit

IS: Internal Standard; U: Undetected; B: Present In Blank; J: Estimated- Below Quantitation Limit; E: Estimated- Above Calibration Range

01-Feb-99 12:29 Triangle Laboratories, Inc. (919) 544-5729

Sample: 8181-01-T T 229-17-1A TLI#47818 Instrument F



Data Review: YL
Date: 2/5/99

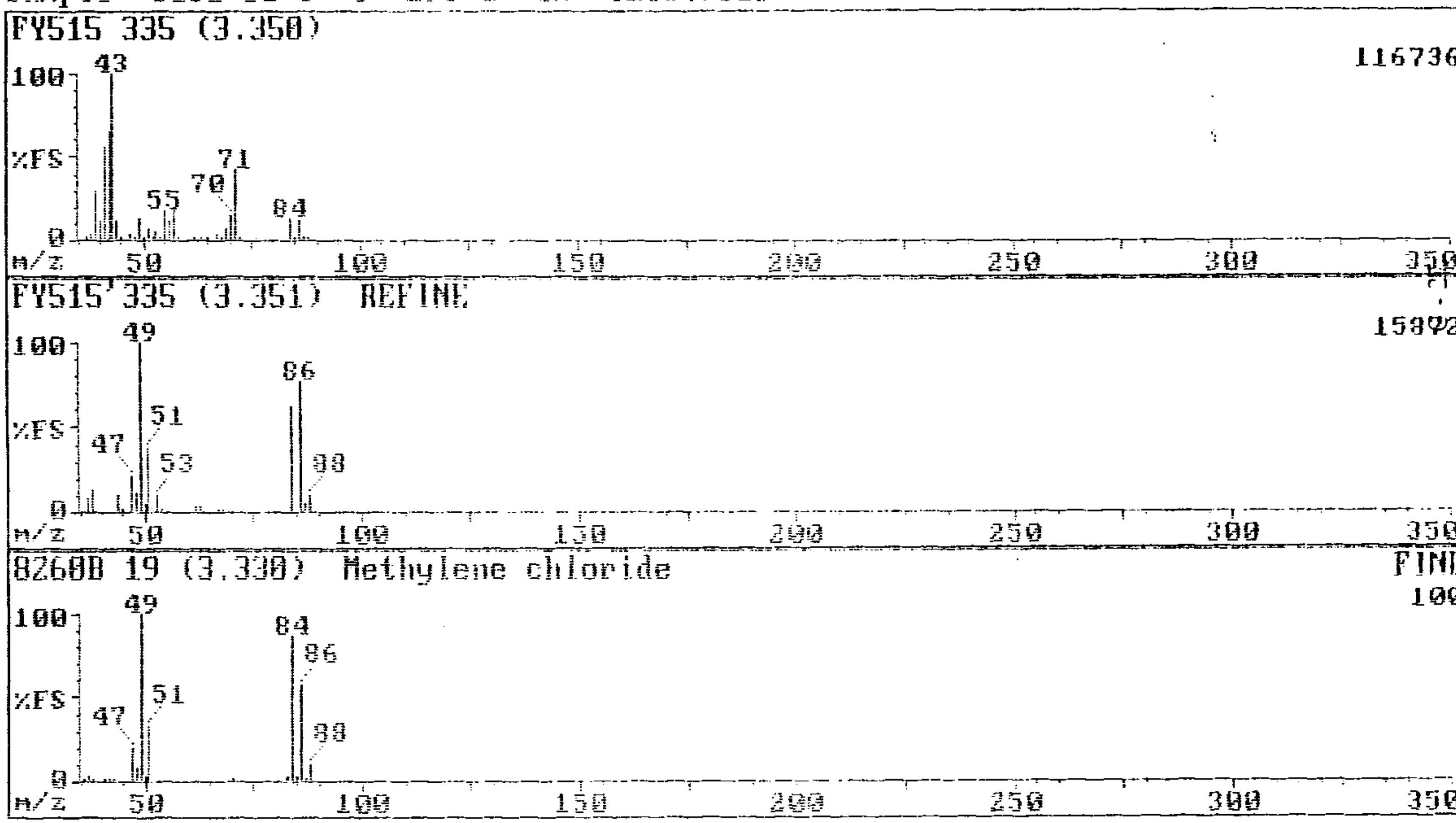
No.	MAT	FOR	REV	Delta	Area	P.Flags	RT	QM	Name
1	36	14	45	2	4302220	bv	5.381	168	Pentafluorobenzene
2	100	71	92	2	4343840	bv	6.171	114	1,4-Difluorobenzene
3	100	92	95	-5	3464944	bv	10.421	117	Chlorobenzene-d5
4	50	17	63	1	1426867	bv	15.792	152	1,4-Dichlorobenzene-d4
5	0	0	0	0	1310304	A	5.251	113	Dibromofluoromethane
6	79	54	76	-2	5808704	bv	8.091	98	Toluene-d8
7	95	87	95	-7	1524266	vv	12.701	95	4-Bromofluorobenzene
8	0	0	0	0	0		0.000	85	Dichlorodifluoromethane
9	0	0	0	0	0		0.000	50	Chloromethane
10	0	0	0	0	0		0.000	62	Vinyl Chloride
11	0	0	0	0	0		0.000	94	Bromomethane
12	0	0	0	0	0		0.000	64	Chloroethane
13	98	68	93	0	554012	bb	2.110	101	Trichlorofluoromethane
14	0	0	0	0	0		0.000	96	1,1-Dichloroethene
15	0	0	0	0	0		0.000	142	Iodomethane
16	91	73	76	1	3565936	bv	2.860	76	Carbon disulfide
17	78	50	91	5	113904	bv	2.930	43	Acetone
18	0	0	0	0	0		0.000	41	Allyl chloride
19	0	0	0	0	100592	A	3.350	84	Methylene chloride
20	24	10	33	-5	33912	A	3.630	53	Acrylonitrile
21	0	0	0	0	0		0.000	96	trans-1,2-Dichloroethene
22	0	0	0	0	0		0.000	63	1,1-Dichloroethane
23	0	0	0	0	0		0.000	43	Vinyl acetate
24	0	0	0	0	0		0.000	77	2,2-Dichloropropane
25	0	0	0	0	0		0.000	96	cis-1,2-Dichloroethene
26	60	48	51	1	17088	bb	4.821	43	2-Butanone
27	0	0	0	0	0		0.000	83	Chloroform
28	0	0	0	0	0		0.000	128	Bromochloromethane
29	0	0	0	0	0		0.000	97	1,1,1-Trichloroethane
30	0	0	0	0	0		0.000	117	Carbon tetrachloride
31	0	0	0	0	0		0.000	75	1,1-Dichloropropene
32	0	0	0	0	0		0.000	78	Benzene
33	0	0	0	0	0		0.000	62	1,2-Dichloroethane
34	0	0	0	0	0		0.000	130	Trichloroethene
35	0	0	0	0	0		0.000	63	1,2-Dichloropropane
36	0	0	0	0	0		0.000	93	Dibromomethane
37	50	50	58	-11	19050790	!v	6.911	41	Methyl methacrylate
38	0	0	0	0	0		0.000	83	Bromodichloromethane
39	0	0	0	0	0		0.000	75	cis-1,3-Dichloropropene
40	48	28	53	-3	1932742	bv	8.041	43	4-Methyl-2-pentanone
41	100	92	98	-1	15166550	bv	8.191	92	Toluene
42	0	0	0	0	0		0.000	75	trans-1,3-Dichloropropene
43	0	0	0	0	0		0.000	97	1,1,2-Trichloroethane
44	0	0	0	0	0		0.000	69	Ethyl methacrylate
45	100	70	94	1	252328	bb	9.011	164	Tetrachloroethene
46	0	0	0	0	0		0.000	76	1,3-Dichloropropane
47	40	21	58	-8	207958	A	9.301	43	2-Hexanone
48	0	0	0	0	0		0.000	129	Dibromochloromethane
49	0	0	0	0	0		0.000	107	1,2-Dibromoethane
50	0	0	0	0	0		0.000	112	Chlorobenzene

Data Review: YL
Date: 2/5/99

No.	MAT	FOR	REV	Delta	Area	P.Flags	RT	QM	Name
51	0	0	0	0	0		0.000	131	1,1,1,2-Tetrachloroethane
52	100	94	99	0	970609	bv*	10.741	106	Ethylbenzene
53	100	90	94	0	5238480	vv	10.971	106	m-/p-Xylene
54	100	89	92	0	1096800	bv	11.691	106	o-Xylene
55	100	92	96	0	2926967	bv	11.751	104	Styrene
56	0	0	0	0	0		0.000	173	Bromoform
57	95	64	91	-1	493496	bv	12.461	105	Cumene
58	0	0	0	0	0		0.000	83	1,1,2,2-Tetrachloroethane
59	0	0	0	0	0		0.000	156	Bromobenzene
60	48	14	62	-1	741444	bv	12.701	75	1,2,3-Trichloropropane
61	100	73	90	0	220060	bb	13.341	120	n-Propylbenzene
62	29	12	59	-22	741444	bv	12.701	75	trans-1,4-Dichloro-2-buten
63	54	31	58	-1	1524	bb	13.411	126	2-Chlorotoluene
64	0	0	0	0	0		0.000	126	4-Chlorotoluene
65	100	74	96	-2	1352108	vv	13.842	105	1,3,5-Trimethylbenzene
66	0	0	0	0	0		0.000	119	tert-Butylbenzene
67	100	87	97	-2	2000063	bv	14.852	105	1,2,4-Trimethylbenzene
68	57	23	71	-1	93522	bv	15.382	105	sec-Butylbenzene
69	100	83	94	-2	1510253	vv	16.022	119	p-Cymene
70	0	0	0	0	0		0.000	146	1,3-Dichlorobenzene
71	0	0	0	0	0		0.000	146	1,4-Dichlorobenzene
72	0	0	0	0	0		0.000	91	Benzyl chloride
73	68	45	69	-1	249595	vv	17.362	91	n-Butylbenzene
74	0	0	0	0	0		0.000	146	1,2-Dichlorobenzene
75	0	0	0	0	0		0.000	75	1,2-Dibromo-3-chloropropan
76	0	0	0	0	0		0.000	180	1,2,4-Trichlorobenzene
77	0	0	0	0	0		0.000	225	Hexachlorobutadiene
78	0	0	0	0	0		0.000	128	Naphthalene
79	0	0	0	0	0		0.000	180	1,2,3-Trichlorobenzene

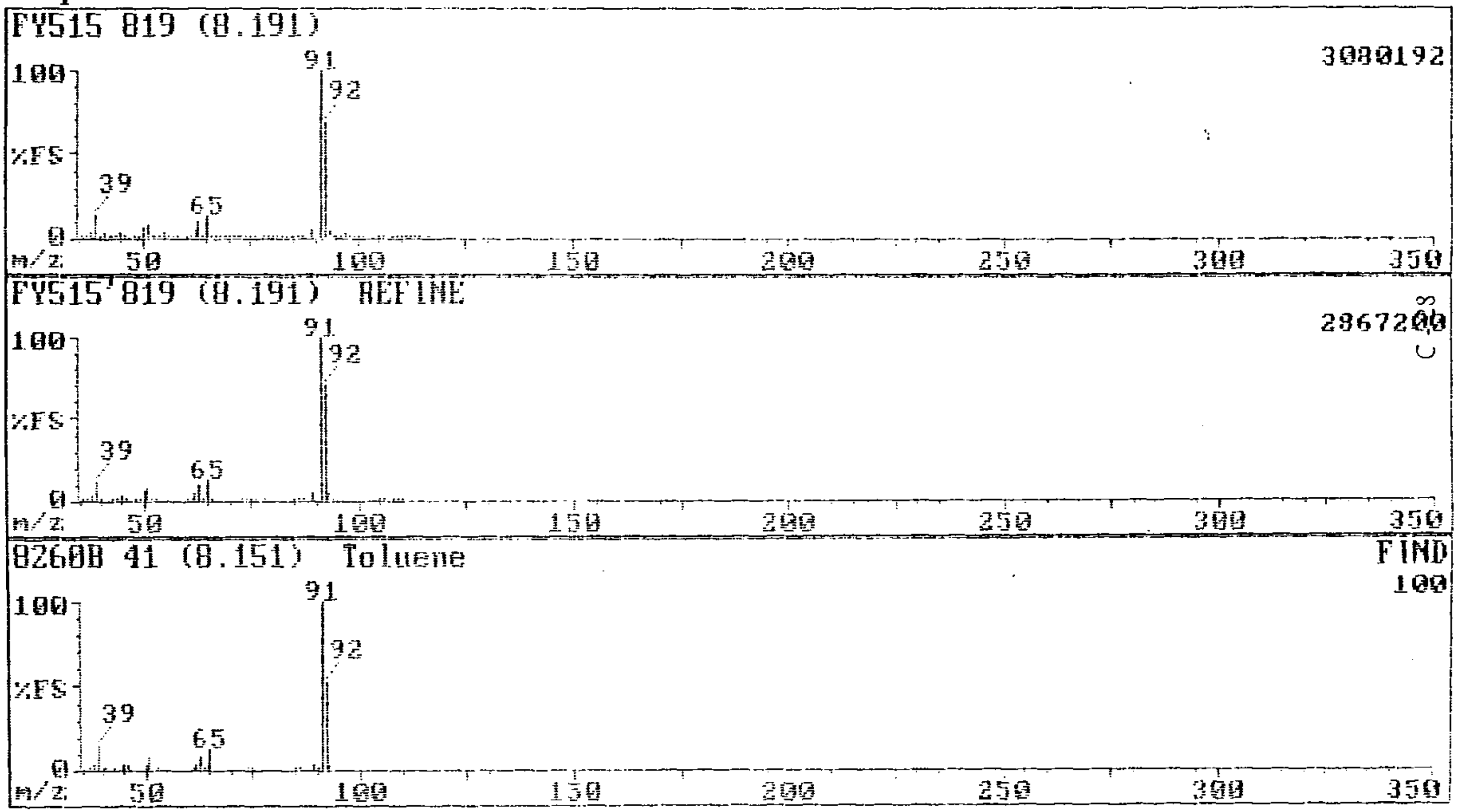
01-Feb-99 12:29 Triangle Laboratories, Inc. (919) 544-5729

Sample: 8181-01-T T 229-17-1A TLI#47818 Instrument F



01-Feb-99 12:29 Triangle Laboratories, Inc. (919) 544-5729

Sample: 8181-01-I I 229-17-1A TLI#47818 Instrument F



Trigon Engineering Consultants, Inc.

Project Number: 47818
Sample File: FY510

Method 8260B VOST
Sample ID: 8181-01-TC

Client Project: Michelin
TLI ID: 229-17-1B

Date Received: 01/29/99
Date Analyzed : 02/01/99

Response File: ICALF127

Analyte	Amount ug	FLAG	RT	Det. Limit ug	Quan. Limit ug
Pentafluorobenzene		IS 1	5.38		
Methylene chloride	0.007	J	3.35		0.05
1,4-Difluorobenzene		IS 2	6.15		
Toluene	0.006	BJ	8.16		0.05

Surrogate Summary	Amount (ug)	RT	IS Ref	%REC
Dibromofluoromethane	0.322	5.25	1	129
Toluene-d_3	0.264	8.07	2	106

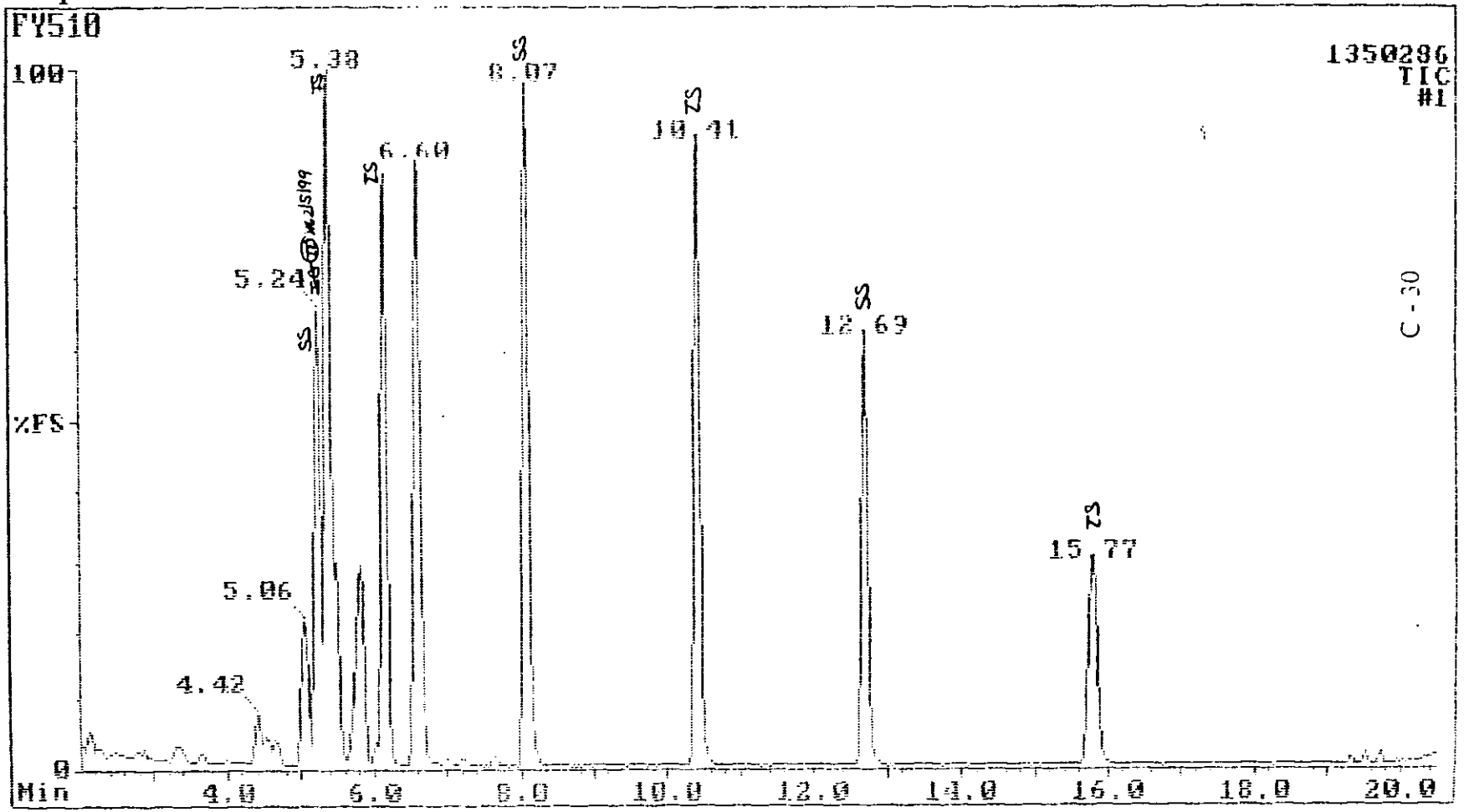
Reviewed by YR Date 2/5/99

NA- Not Applicable; Det. Limit: Detection Limit; Quan. Limit: Quantitation Limit

IS: Internal Standard; U: Undetected; B: Present In Blank; J: Estimated- Below Quantitation Limit; E: Estimated- Above Calibration Range

Data Review: K
Date: 2/5/99 30

01-Feb-99 00:20 Triangle Laboratories, Inc. (919) 544-5729
Sample: 8181-01-TC TC 220-17-1B TL1047818 Instrument F



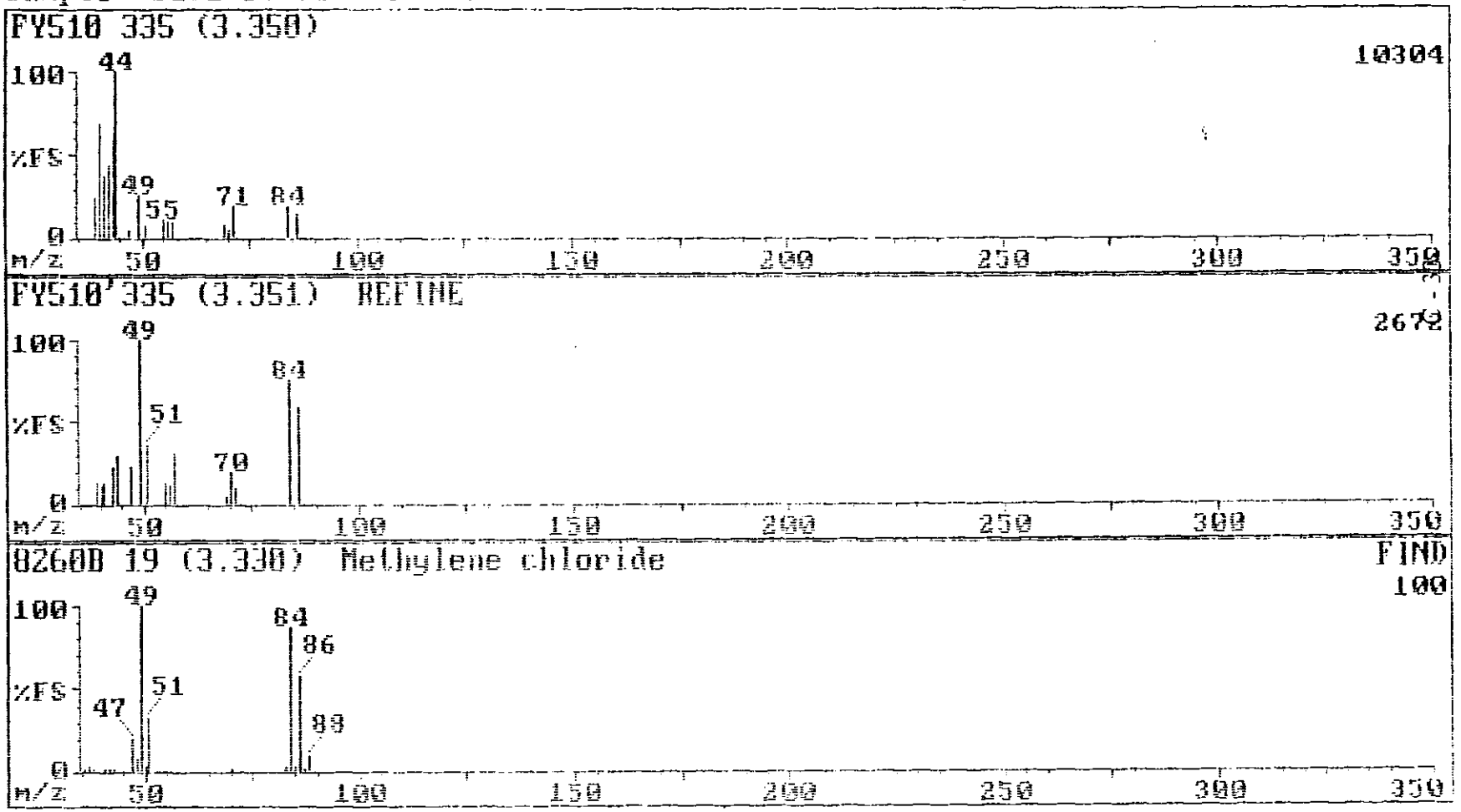
AN DB : FY510 LAB-BASE QUAN 01-Feb-99 09:21

No.	MAT	FOR	REV	Delta	Area	P.Flags	RT	QM	Name
1	100	69	97	2	2438426	bv	5.381	168	Pentafluorobenzene
2	100	95	97	0	3184496	bv	6.151	114	1,4-Difluorobenzene
3	100	94	95	-2	2967256	bv	10.411	117	Chlorobenzene-d5
4	100	81	98	-1	816828	bv	15.762	152	1,4-Dichlorobenzene-d4
5	100	62	98	0	1097128	bv	5.251	113	Dibromofluoromethane
6	100	92	98	-2	3463568	bv	8.071	98	Toluene-d8
7	100	90	93	-4	1323160	bv	12.691	95	4-Bromofluorobenzene
8	0	0	0	0	0		0.000	85	Dichlorodifluoromethane
9	0	0	0	0	0		0.000	50	Chloromethane
10	0	0	0	0	0		0.000	62	Vinyl Chloride
11	0	0	0	0	0		0.000	94	Bromomethane
12	0	0	0	0	0		0.000	64	Chloroethane
13	86	51	90	1	150852	bb	2.120	101	Trichlorofluoromethane
14	0	0	0	0	0		0.000	96	1,1-Dichloroethene
15	0	0	0	0	0		0.000	142	Iodomethane
16	63	46	57	1	86840	bv	2.860	76	Carbon disulfide
17	51	11	87	7	16208	A	2.950	43	Acetone
18	0	0	0	0	0		0.000	41	Allyl chloride
19	0	0	0	0	15264	A	3.350	84	Methylene chloride
20	0	0	0	0	0		0.000	53	Acrylonitrile
21	0	0	0	0	0		0.000	96	trans-1,2-Dichloroethene
22	0	0	0	0	0		0.000	63	1,1-Dichloroethane
23	0	0	0	0	0		0.000	43	Vinyl acetate
24	0	0	0	0	0		0.000	77	2,2-Dichloropropane
25	0	0	0	0	0		0.000	96	cis-1,2-Dichloroethene
26	24	35	53	24	577721	bv	5.051	43	2-Butanone
27	0	0	0	0	0		0.000	83	Chloroform
28	0	0	0	0	0		0.000	128	Bromochloromethane
29	0	0	0	0	0		0.000	97	1,1,1-Trichloroethane
30	0	0	0	0	0		0.000	117	Carbon tetrachloride
31	0	0	0	0	0		0.000	75	1,1-Dichloropropene
32	0	0	0	0	0		0.000	78	Benzene
33	0	0	0	0	0		0.000	62	1,2-Dichloroethane
34	0	0	0	0	0		0.000	130	Trichloroethene
35	0	0	0	0	0		0.000	63	1,2-Dichloropropane
36	0	0	0	0	0		0.000	93	Dibromomethane
37	0	0	0	0	0		0.000	41	Methyl methacrylate
38	0	0	0	0	0		0.000	83	Bromodichloromethane
39	0	0	0	0	0		0.000	75	cis-1,3-Dichloropropene
40	41	3	67	3	18264	bb	8.081	43	4-Methyl-2-pentanone
41	81	58	75	-2	58264	bb	8.161	92	Toluene
42	0	0	0	0	0		0.000	75	trans-1,3-Dichloropropene
43	0	0	0	0	0		0.000	97	1,1,2-Trichloroethane
44	0	0	0	0	0		0.000	69	Ethyl methacrylate
45	0	0	0	0	0		0.000	164	Tetrachloroethene
46	0	0	0	0	0		0.000	76	1,3-Dichloropropane
47	0	0	0	0	0		0.000	43	2-Hexanone
48	0	0	0	0	0		0.000	129	Dibromochloromethane
49	0	0	0	0	0		0.000	107	1,2-Dibromoethane
50	0	0	0	0	0		0.000	112	Chlorobenzene

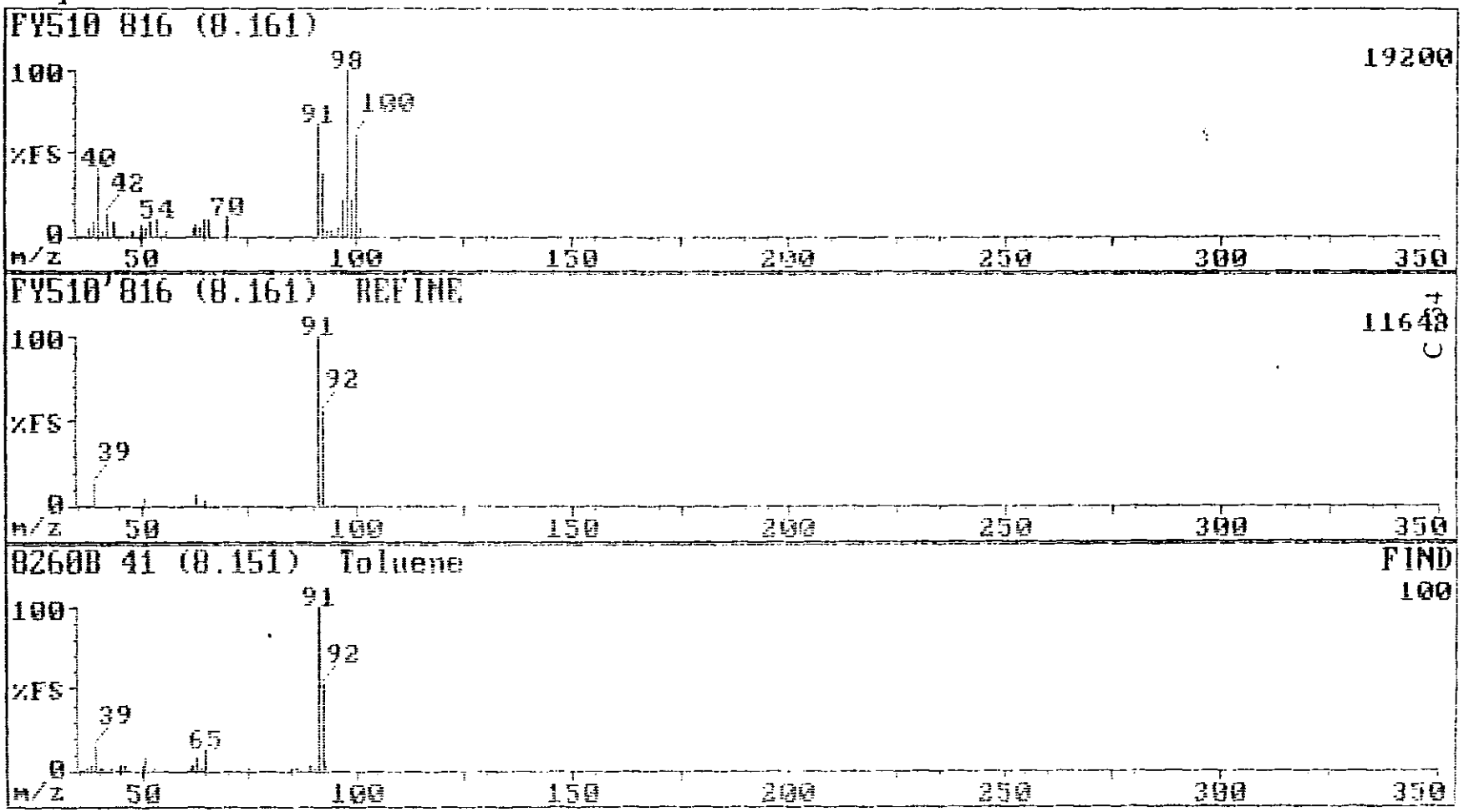
Data Review: VC
Date: 2/5/99

No.	MAT	FOR	REV	Delta	Area	P.Flags	RT	QM	Name
51	0	0	0	0	0		0.000	131	1,1,1,2-Tetrachloroethane
52	0	0	0	0	0		0.000	106	Ethylbenzene
53	0	0	0	0	0		0.000	106	m-/p-Xylene
54	0	0	0	0	0		0.000	106	o-Xylene
55	0	0	0	0	0		0.000	104	Styrene
56	0	0	0	0	0		0.000	173	Bromoform
57	0	0	0	0	0		0.000	105	Cumene
58	0	0	0	0	0		0.000	83	1,1,2,2-Tetrachloroethane
59	0	0	0	0	0		0.000	156	Bromobenzene
60	39	13	51	0	685840	bv	12.691	75	1,2,3-Trichloropropane
61	0	0	0	0	0		0.000	120	n-Propylbenzene
62	0	0	0	0	0		0.000	75	trans-1,4-Dichloro-2-buten
63	0	0	0	0	0		0.000	126	2-Chlorotoluene
64	0	0	0	0	0		0.000	126	4-Chlorotoluene
65	0	0	0	0	0		0.000	105	1,3,5-Trimethylbenzene
66	0	0	0	0	0		0.000	119	tert-Butylbenzene
67	0	0	0	0	0		0.000	105	1,2,4-Trimethylbenzene
68	0	0	0	0	0		0.000	105	sec-Butylbenzene
69	0	0	0	0	0		0.000	119	p-Cymene
70	0	0	0	0	0		0.000	146	1,3-Dichlorobenzene
71	0	0	0	0	0		0.000	146	1,4-Dichlorobenzene
72	0	0	0	0	0		0.000	91	Benzyl chloride
73	0	0	0	0	0		0.000	91	n-Butylbenzene
74	0	0	0	0	0		0.000	146	1,2-Dichlorobenzene
75	0	0	0	0	0		0.000	75	1,2-Dibromo-3-chloropropan
76	67	40	69	-1	14028	bb	19.312	180	1,2,4-Trichlorobenzene
77	80	46	88	-2	12736	bb	19.502	225	Hexachlorobutadiene
78	0	0	0	0	0		0.000	128	Naphthalene
79	72	44	74	-2	17304	bb	19.712	180	1,2,3-Trichlorobenzene

01-Feb-99 08:20 Triangle Laboratories, Inc. (919) 544-5729
Sample: 8181-01-IC TC 229-17 1D TLI#47818 Instrument F



01-Feb-99 08:20 Triangle Laboratories, Inc. (919) 544-5729
Sample: 8181-01-TC TC 229-17-1D TLI#47018 Instrument F



Trigon Engineering Consultants, Inc.

Project Number: 47818
Sample File: FY516

Method 8260B VOST
Sample ID: 8181-02-T

Client Project: Michelin
TLI ID: 229-17-2A

Date Received: 01/29/99
Date Analyzed : 02/01/99

Response File: ICALF127

Analyte	Amount ug	FLAG	RT	Det. Limit ug	Quan. Limit ug
Pentafluorobenzene		IS 1	5.37		
Methylene chloride	0.031	J	3.34		0.05
1,4-Difluorobenzene		IS 2	6.14		
Toluene	0.765	B	8.19		0.05

Surrogate Summary	Amount (ug)	RT	IS Ref	%REC
Dibromofluoromethane	0.245	5.24	1	98
Toluene-d_8	0.281	8.09	2	112

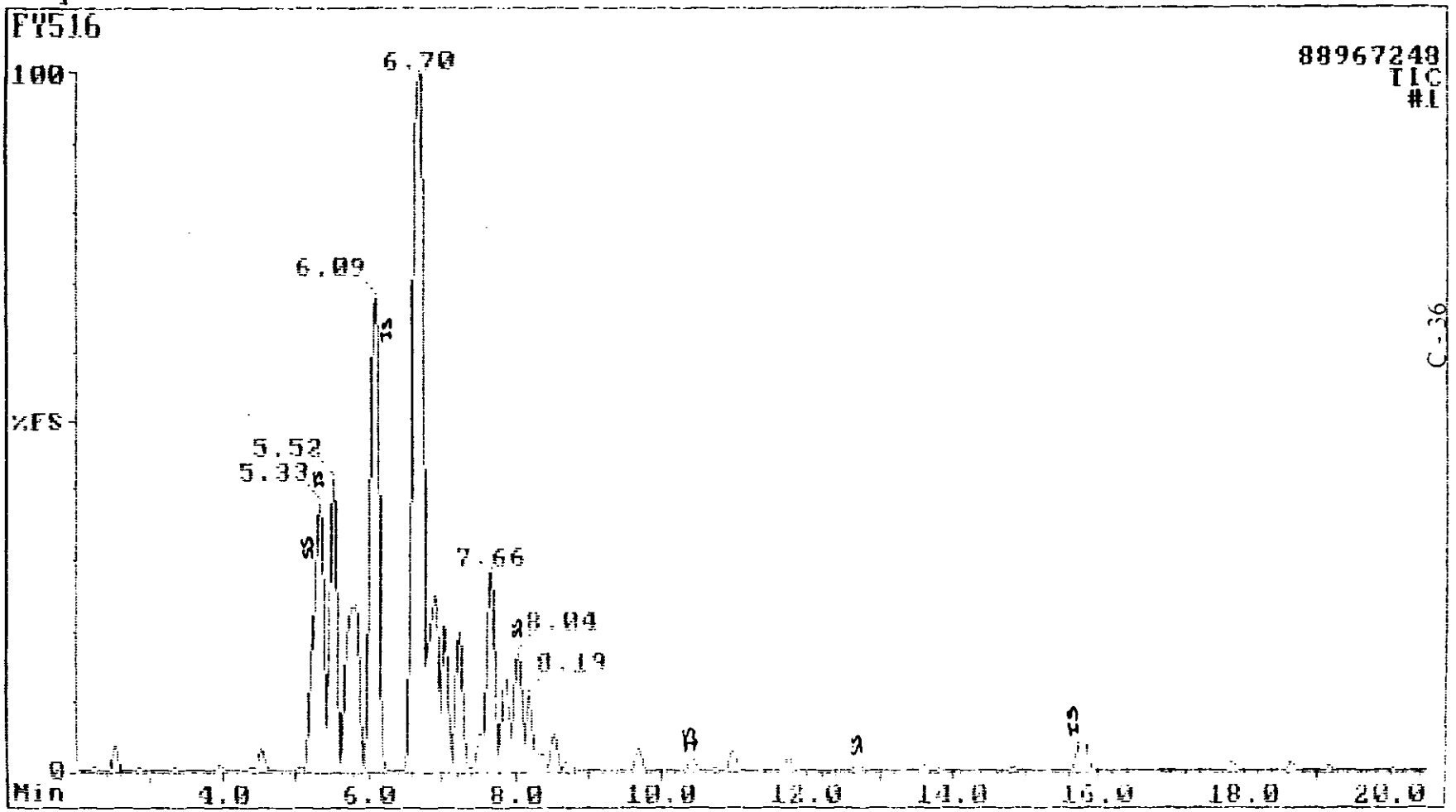
Reviewed by _____ Date 2/5/99

NA- Not Applicable; Det. Limit: Detection Limit; Quan. Limit: Quantitation Limit
IS: Internal Standard; U: Undetected; B: Present In Blank; J: Estimated- Below Quantitation Limit; E: Estimated- Above Calibration Range

Data Review: YR
Date: 2/5/99

01-Feb-99 13:08 Triangle Laboratories, Inc. (919) 544-5729

Sample: 8181-02-T T 229-17-2A TLI#47818 Instrument F



C-36

QUAN DB : FY516 LAB-BASE QUAN 01-Feb-99 13:59

No.	MAT	FOR	REV	Delta	Area	P.Flags	RT	QM	Name
1	38	14	47	1	6184058	bv	5.371	168	Pentafluorobenzene
2	0	0	0	0	6889706	A	6.141	114	1,4-Difluorobenzene
3	100	93	95	1	4955088	bv	10.411	117	Chlorobenzene-d5
4	64	26	76	0	2266303	bv	15.772	152	1,4-Dichlorobenzene-d4
5	0	0	0	0	2116786	A	5.241	113	Dibromofluoromethane
6	69	51	70	3	7974224	bv	8.091	98	Toluene-d8
7	100	89	95	0	2560034	vv	12.691	95	4-Bromofluorobenzene
8	0	0	0	0	0		0.000	85	Dichlorodifluoromethane
9	0	0	0	0	0		0.000	50	Chloromethane
10	0	0	0	0	0		0.000	62	Vinyl Chloride
11	0	0	0	0	0		0.000	94	Bromomethane
12	0	0	0	0	0		0.000	64	Chloroethane
13	95	66	93	2	488136	bb	2.120	101	Trichlorofluoromethane
14	0	0	0	0	0		0.000	96	1,1-Dichloroethene
15	0	0	0	0	0		0.000	142	Iodomethane
16	91	71	75	0	2305448	bv	2.850	76	Carbon disulfide
17	76	43	91	4	127232	bv	2.910	43	Acetone
18	0	0	0	0	0		0.000	41	Allyl chloride
19	0	0	0	0	165432	A	3.340	84	Methylene chloride
20	20	9	29	-6	27236	vb	3.620	53	Acrylonitrile
21	0	0	0	0	0		0.000	96	trans-1,2-Dichloroethene
22	0	0	0	0	0		0.000	63	1,1-Dichloroethane
23	0	0	0	0	0		0.000	43	Vinyl acetate
24	0	0	0	0	0		0.000	77	2,2-Dichloropropane
25	0	0	0	0	0		0.000	96	cis-1,2-Dichloroethene
26	47	36	41	1	2135188	A	5.051	43	2-Butanone
27	0	0	0	0	0		0.000	83	Chloroform
28	0	0	0	0	0		0.000	128	Bromochloromethane
29	0	0	0	0	0		0.000	97	1,1,1-Trichloroethane
30	0	0	0	0	0		0.000	117	Carbon tetrachloride
31	0	0	0	0	0		0.000	75	1,1-Dichloropropene
32	0	0	0	0	0		0.000	78	Benzene
33	0	0	0	0	0		0.000	62	1,2-Dichloroethane
34	0	0	0	0	0		0.000	130	Trichloroethene
35	0	0	0	0	0		0.000	63	1,2-Dichloropropane
36	0	0	0	0	0		0.000	93	Dibromomethane
37	58	49	56	-6	36844520	!v	6.911	41	Methyl methacrylate
38	0	0	0	0	0		0.000	83	Bromodichloromethane
39	0	0	0	0	0		0.000	75	cis-1,3-Dichloropropene
40	53	52	78	-15	20347960	vv	7.871	43	4-Methyl-2-pentanone
41	100	91	98	4	16851020	bv	8.191	92	Toluene
42	0	0	0	0	0		0.000	75	trans-1,3-Dichloropropene
43	0	0	0	0	0		0.000	97	1,1,2-Trichloroethane
44	62	40	63	2	721121	A	8.741	69	Ethyl methacrylate
45	100	79	98	2	325288	bb	9.011	164	Tetrachloroethene
46	0	0	0	0	0		0.000	76	1,3-Dichloropropane
47	34	15	51	-8	119866	vv	9.311	43	2-Hexanone
48	0	0	0	0	0		0.000	129	Dibromochloromethane
49	0	0	0	0	0		0.000	107	1,2-Dibromoethane
50	0	0	0	0	0		0.000	112	Chlorobenzene

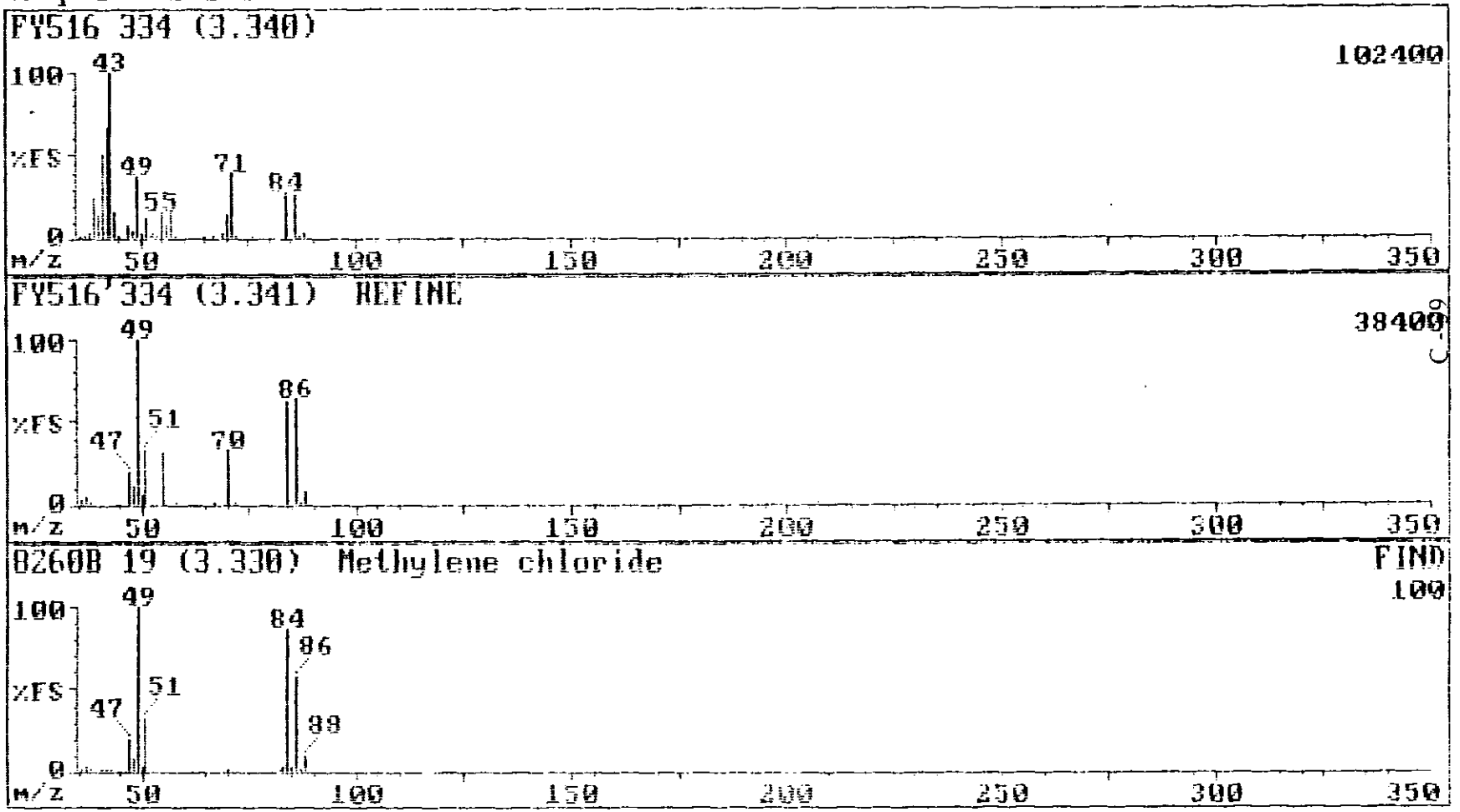
Data Review: YC
Date: 2/5/99

3

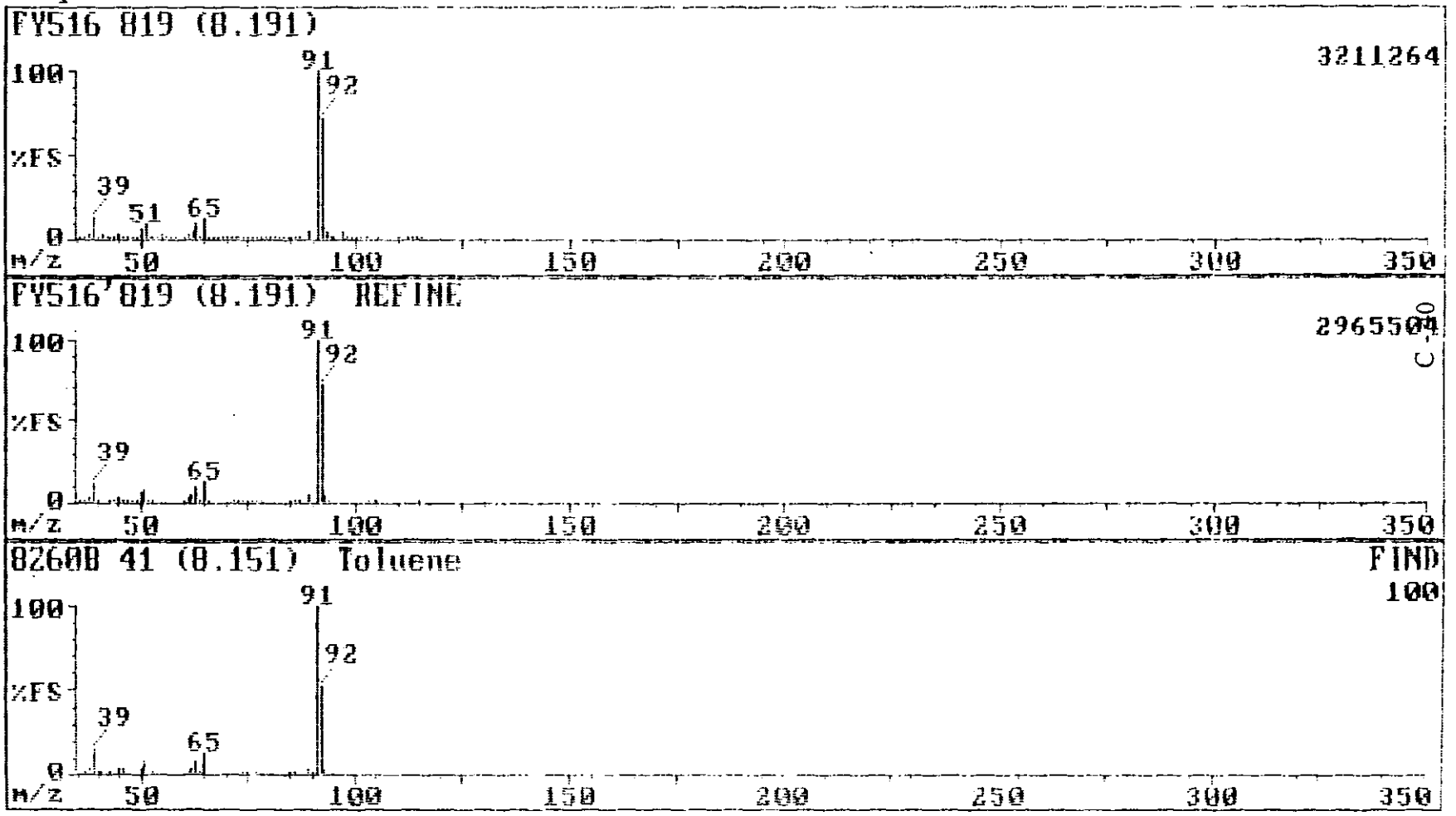
No.	MAT	FOR	REV	Delta	Area	P.Flags	RT	QM	Name
51	0	0	0	0	0		0.000	131	1,1,1,2-Tetrachloroethane
52	100	93	98	1	678639	bv*	10.741	106	Ethylbenzene
53	100	90	94	1	3739344	vv	10.971	106	m-/p-Xylene
54	100	88	91	0	950976	bv	11.681	106	o-Xylene
55	100	94	97	0	4521523	bv	11.741	104	Styrene
56	0	0	0	0	0		0.000	173	Bromoform
57	95	65	91	-1	576084	bv	12.451	105	Cumene
58	0	0	0	0	0		0.000	83	1,1,2,2-Tetrachloroethan
59	0	0	0	0	0		0.000	156	Bromobenzene
60	44	13	58	-1	1252008	bv	12.691	75	1,2,3-Trichloropropane
61	100	77	90	1	265852	bb	13.341	120	n-Propylbenzene
62	28	11	56	-22	1252008	bv	12.691	75	trans-1,4-Dichloro-2-but
63	0	0	0	0	0		0.000	126	2-Chlorotoluene
64	0	0	0	0	0		0.000	126	4-Chlorotoluene
65	100	76	96	-1	1609254	vv	13.832	105	1,3,5-Trimethylbenzene
66	0	0	0	0	0		0.000	119	tert-Butylbenzene
67	100	89	97	-2	2639620	bv	14.832	105	1,2,4-Trimethylbenzene
68	62	26	75	2	108352	A	15.392	105	sec-Butylbenzene
69	100	82	93	-2	1451572	vv	16.002	119	p-Cymene
70	0	0	0	0	0		0.000	146	1,3-Dichlorobenzene
71	0	0	0	0	0		0.000	146	1,4-Dichlorobenzene
72	0	0	0	0	0		0.000	91	Benzyl chloride
73	70	46	69	-1	273734	vv	17.342	91	n-Butylbenzene
74	0	0	0	0	0		0.000	146	1,2-Dichlorobenzene
75	0	0	0	0	0		0.000	75	1,2-Dibromo-3-chloroprop
76	0	0	0	0	0		0.000	180	1,2,4-Trichlorobenzene
77	0	0	0	0	0		0.000	225	Hexachlorobutadiene
78	0	0	0	0	0		0.000	128	Naphthalene
79	0	0	0	0	0		0.000	180	1,2,3-Trichlorobenzene

01-Feb-99 13:00 Triangle Laboratories, Inc. (919) 544-5729

Sample: 8181-02-T T 229-17-2A TLI#47818 Instrument F



01-Feb-99 13:08 Triangle Laboratories, Inc. (919) 544-5729
Sample: 8181-02-T T 229-17-2A TL1#47818 Instrument F



Trigon Engineering Consultants, Inc.

Project Number: 47818
Sample File: FY511

Method 8260B VOST
Sample ID: 8181-02-TC

Client Project: Michelin
TLI ID: 229-17-2B

Date Received: 01/29/99

Date Analyzed : 02/01/99

Response File: ICALF127

Analyte	Amount ug	FLAG	RT	Det. Limit ug	Quan. Limit ug
Pentafluorobenzene		IS 1	5.37		
Methylene chloride	0.007	J	3.35		0.05
1,4-Difluorobenzene		IS 2	6.14		
Toluene	0.005	BJ	8.16		0.05

Surrogate Summary	Amount (ug)	RT	IS Ref	%REC
Dibromofluoromethane	0.300	5.25	1	120
Toluene-d_3	0.272	8.07	2	109

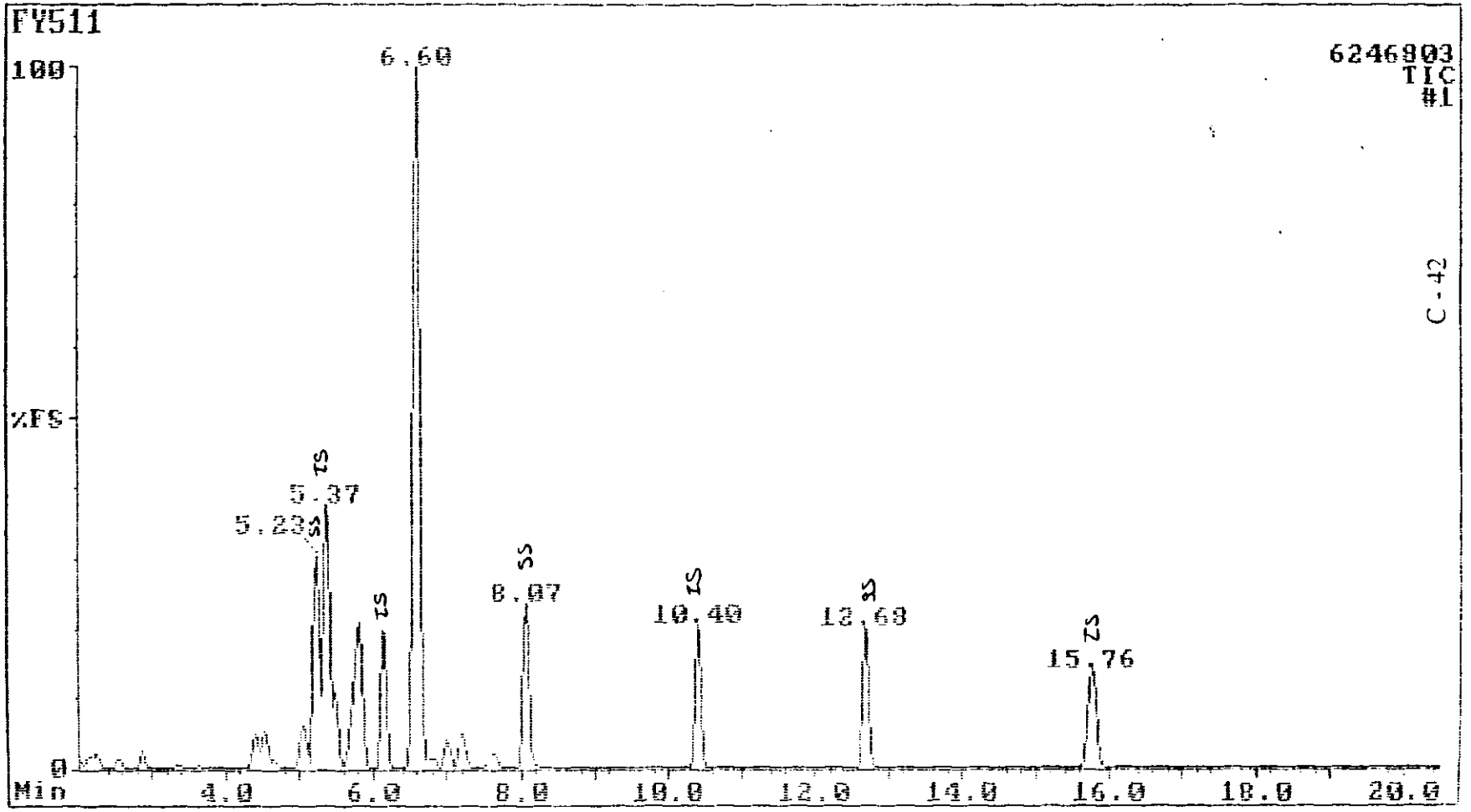
Reviewed by YB Date 2/5/99

NA- Not Applicable; Det. Limit: Detection Limit; Quan. Limit: Quantitation Limit

IS: Internal Standard; U: Undetected; B: Present In Blank; J: Estimated- Below Quantitation Limit; E: Estimated- Above Calibration Range

Data Review: YL 4/2
Date: 2/5/99

01-Feb-99 09:11 Triangle Laboratories, Inc. (919) 544-5729
Sample: 8181-02-TC TC 229-17-2B TLI#47818 Instrument F



C-42

CJAN DB : FY511 LAB-BASE QUAN 01-Feb-99 10:04

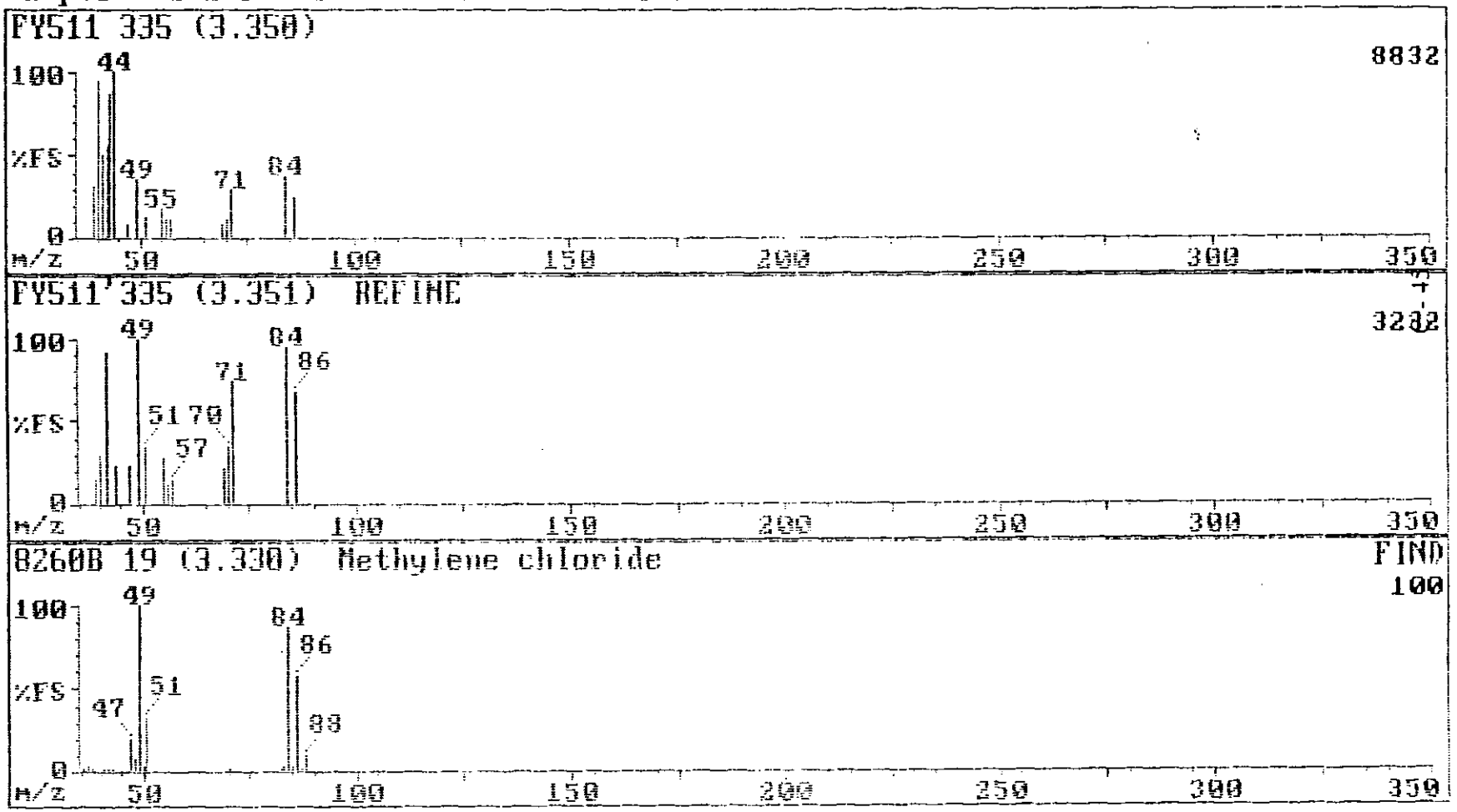
No.	MAT	FOR	REV	Delta	Area	P.Flags	RT	QM	Name
1	89	52	91	1	2926150	bv	5.371	168	Pentafluorobenzene
2	100	95	97	0	3411040	bv	6.141	114	1,4-Difluorobenzene
3	100	94	94	-2	3118800	bv	10.401	117	Chlorobenzene-d5
4	100	81	98	1	1721416	bv	15.762	152	1,4-Dichlorobenzene-d4
5	82	37	97	1	1226092	bb	5.251	113	Dibromofluoromethane
6	100	92	98	0	3813232	bv	8.071	98	Toluene-d8
7	100	90	94	-3	1999468	bv	12.681	95	4-Bromofluorobenzene
8	0	0	0	0	0		0.000	85	Dichlorodifluoromethane
9	0	0	0	0	0		0.000	50	Chloromethane
10	0	0	0	0	0		0.000	62	Vinyl Chloride
11	0	0	0	0	0		0.000	94	Bromomethane
12	0	0	0	0	0		0.000	64	Chloroethane
13	81	49	91	3	220092	bb	2.130	101	Trichlorofluoromethane
14	0	0	0	0	0		0.000	96	1,1-Dichloroethene
15	0	0	0	0	0		0.000	142	Iodomethane
16	89	71	75	1	603312	bv	2.860	76	Carbon disulfide
17	54	15	88	7	26892	bv	2.940	43	Acetone
18	0	0	0	0	0		0.000	41	Allyl chloride
19	0	0	0	0	18748	A	3.350	84	Methylene chloride
20	0	0	0	0	0		0.000	53	Acrylonitrile
21	0	0	0	0	0		0.000	96	trans-1,2-Dichloroethene
22	0	0	0	0	0		0.000	63	1,1-Dichloroethane
23	0	0	0	0	0		0.000	43	Vinyl acetate
24	0	0	0	0	0		0.000	77	2,2-Dichloropropane
25	0	0	0	0	0		0.000	96	cis-1,2-Dichloroethene
26	23	35	53	25	754272	bb	5.051	43	2-Butanone
27	0	0	0	0	0		0.000	83	Chloroform
28	0	0	0	0	0		0.000	128	Bromochloromethane
29	0	0	0	0	0		0.000	97	1,1,1-Trichloroethane
30	0	0	0	0	0		0.000	117	Carbon tetrachloride
31	0	0	0	0	0		0.000	75	1,1-Dichloropropene
32	0	0	0	0	0		0.000	78	Benzene
33	0	0	0	0	0		0.000	62	1,2-Dichloroethane
34	0	0	0	0	0		0.000	130	Trichloroethene
35	0	0	0	0	0		0.000	63	1,2-Dichloropropane
36	0	0	0	0	0		0.000	93	Dibromomethane
37	0	0	0	0	0		0.000	41	Methyl methacrylate
38	0	0	0	0	0		0.000	83	Bromodichloromethane
39	0	0	0	0	0		0.000	75	cis-1,3-Dichloropropene
40	37	4	60	4	23224	A	8.071	43	4-Methyl-2-pentanone
41	73	49	71	0	49452	A	8.161	92	Toluene
42	0	0	0	0	0		0.000	75	trans-1,3-Dichloropropene
43	0	0	0	0	0		0.000	97	1,1,2-Trichloroethane
44	0	0	0	0	0		0.000	69	Ethyl methacrylate
45	0	0	0	0	0		0.000	164	Tetrachloroethene
46	0	0	0	0	0		0.000	76	1,3-Dichloropropane
47	0	0	0	0	0		0.000	43	2-Hexanone
48	0	0	0	0	0		0.000	129	Dibromochloromethane
49	0	0	0	0	0		0.000	107	1,2-Dibromoethane
50	0	0	0	0	0		0.000	112	Chlorobenzene

Data Review: YC
Date: 2/5/99

No.	MAT	FOR	REV	Delta	Area	P.Flags	RT	QM	Name
51	0	0	0	0	0		0.000	131	1,1,1,2-Tetrachloroethane
52	0	0	0	0	0		0.000	106	Ethylbenzene
53	0	0	0	0	0		0.000	106	m-/p-Xylene
54	0	0	0	0	0		0.000	106	o-Xylene
55	0	0	0	0	0		0.000	104	Styrene
56	0	0	0	0	0		0.000	173	Bromoform
57	0	0	0	0	0		0.000	105	Cumene
58	0	0	0	0	0		0.000	83	1,1,2,2-Tetrachloroethane
59	0	0	0	0	0		0.000	156	Bromobenzene
60	41	13	53	-1	1006672	bb	12.681	75	1,2,3-Trichloropropane
61	0	0	0	0	0		0.000	120	n-Propylbenzene
62	0	0	0	0	0		0.000	75	trans-1,4-Dichloro-2-buten
63	0	0	0	0	0		0.000	126	2-Chlorotoluene
64	0	0	0	0	0		0.000	126	4-Chlorotoluene
65	0	0	0	0	0		0.000	105	1,3,5-Trimethylbenzene
66	0	0	0	0	0		0.000	119	tert-Butylbenzene
67	0	0	0	0	0		0.000	105	1,2,4-Trimethylbenzene
68	0	0	0	0	0		0.000	105	sec-Butylbenzene
69	0	0	0	0	0		0.000	119	p-Cymene
70	0	0	0	0	0		0.000	146	1,3-Dichlorobenzene
71	0	0	0	0	0		0.000	146	1,4-Dichlorobenzene
72	0	0	0	0	0		0.000	91	Benzyl chloride
73	0	0	0	0	0		0.000	91	n-Butylbenzene
74	0	0	0	0	0		0.000	146	1,2-Dichlorobenzene
75	0	0	0	0	0		0.000	75	1,2-Dibromo-3-chloropropan
76	0	0	0	0	0		0.000	180	1,2,4-Trichlorobenzene
77	58	30	67	-2	10820	bb	19.502	225	Hexachlorobutadiene
78	0	0	0	0	0		0.000	128	Naphthalene
79	0	0	0	0	0		0.000	180	1,2,3-Trichlorobenzene

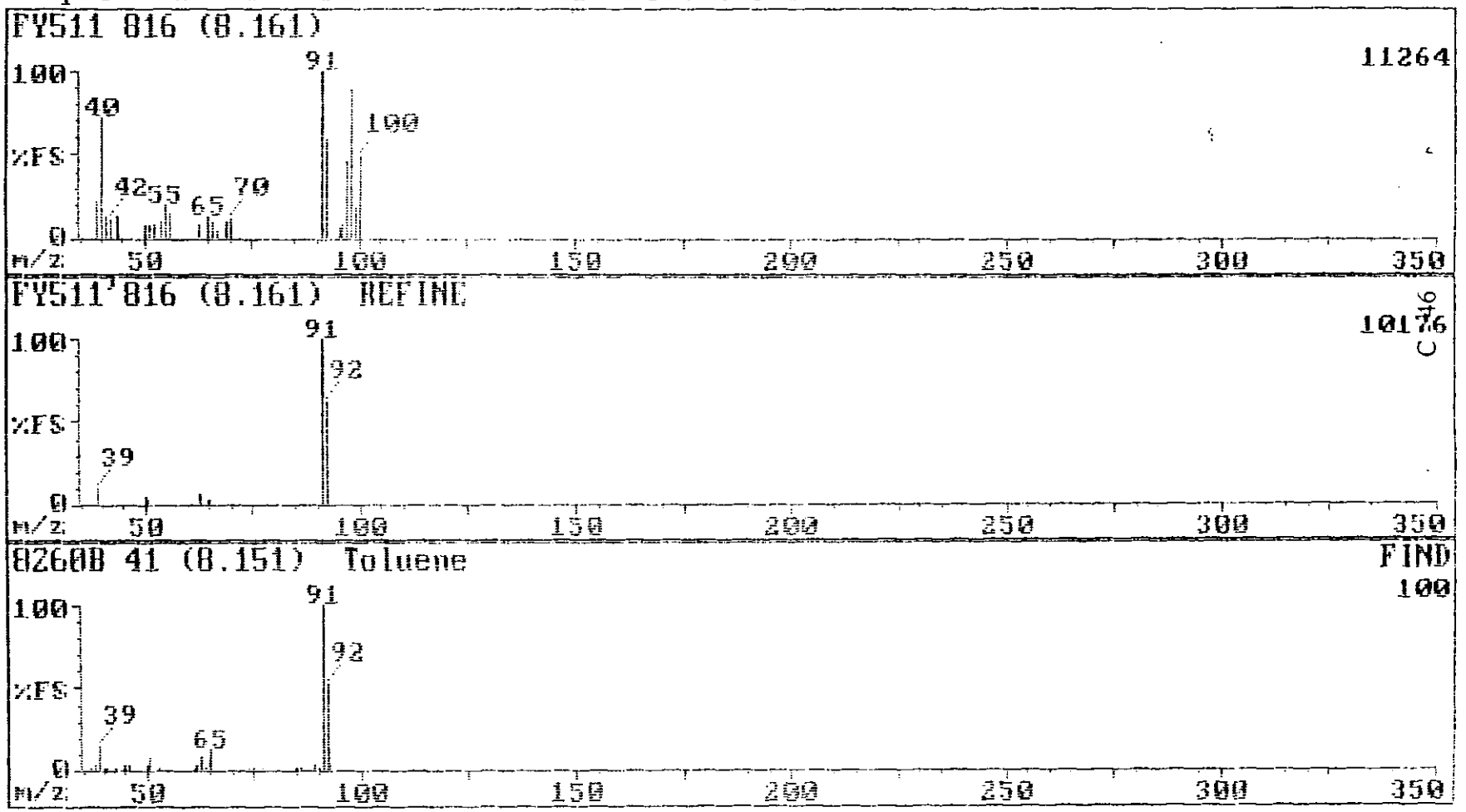
01-Feb-99 09:11 Triangle Laboratories, Inc. (919) 544-5729

Sample: 8181-0Z-IC TC 229-17-2B TL#47818 Instrument F



01-Feb-99 09:11 Triangle Laboratories, Inc. (919) 544-5729

Sample: 8181-02-TC TC 229-17-2B TLI#47818 Instrument F



Trigon Engineering Consultants, Inc.

Project Number: 47818
Sample File: FY519

Method 8260B VOST
Sample ID: 8181-03-T

Client Project: Michelin
TLI ID: 229-17-3A

Date Received: 01/29/99

Date Analyzed : 02/01/99

Response File: ICALF127

Analyte	Amount ug	FLAG	RT	Det. Limit ug	Quan. Limit ug
Pentafluorobenzene		IS 1	5.37		
Methylene chloride	0.016	J	3.34		0.05
1,4-Difluorobenzene		IS 2	6.13		
Toluene	0.783	B	8.18		0.05

Surrogate Summary	Amount (ug)	RT	IS Ref	%REC
Dibromofluoromethane	0.267	5.24	1	107
Toluene-d_3	0.310	8.08	2	124

Reviewed by _____ Date ____/____/____

NA- Not Applicable; Det. Limit: Detection Limit; Quan. Limit: Quantitation Limit

IS: Internal Standard; U: Undetected; B: Present In Blank; J: Estimated- Below Quantitation Limit; E: Estimated- Above Calibration Range

Data Review: JK
Date: 2/5/99

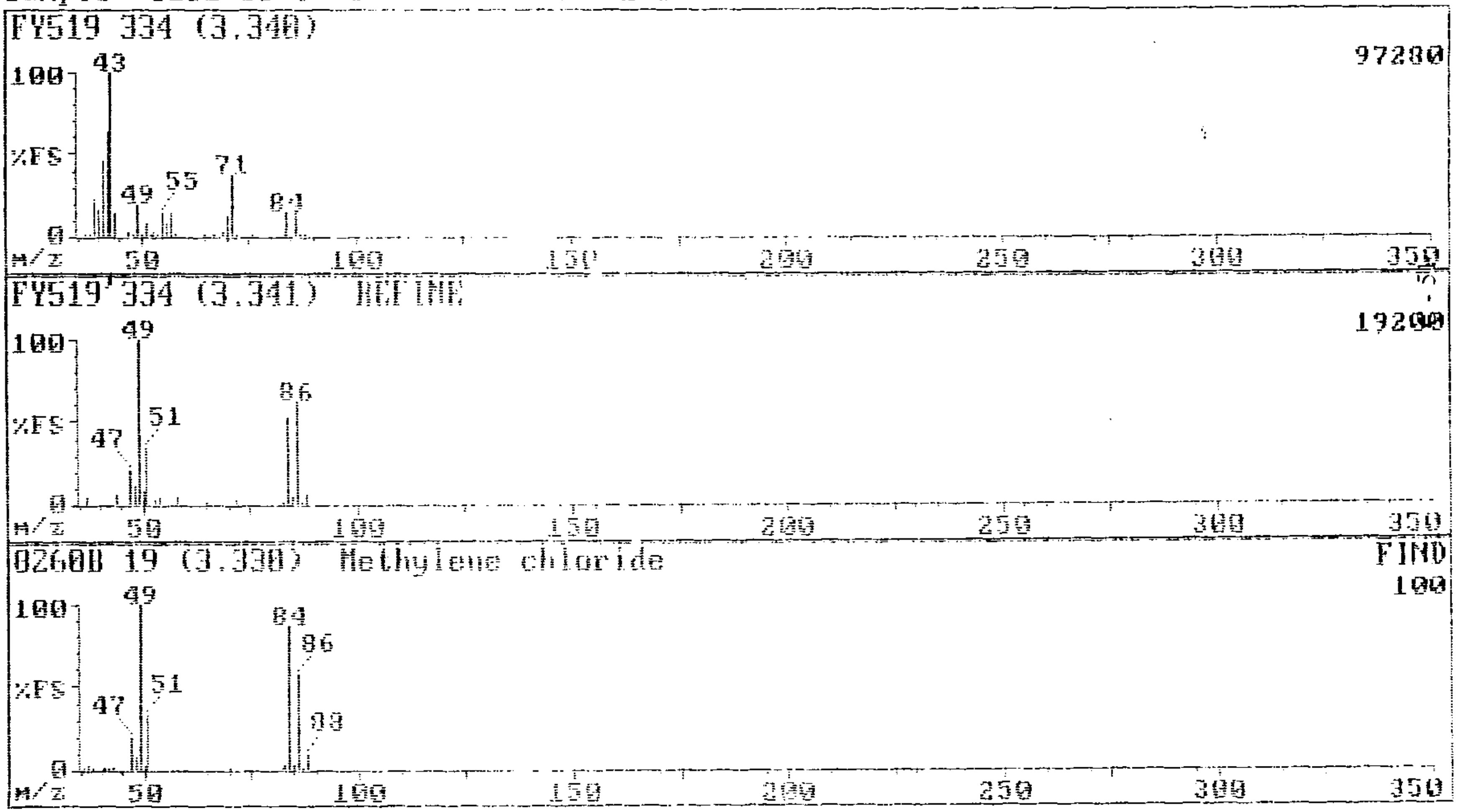
No.	MAT	FOR	REV	Delta	Area	P.Flags	RT	QM	Name
1	38	14	47	1	5973999	bv	5.371	168	Pentafluorobenzene
2	0	0	0	0	6915932	A	6.131	114	1,4-Difluorobenzene
3	100	92	94	0	4875691	bv	10.401	117	Chlorobenzene-d5
4	66	28	78	0	2583192	bv	15.752	152	1,4-Dichlorobenzene-d4
5	0	0	0	0	2228084	A	5.241	113	Dibromofluoromethane
6	71	51	71	2	8818456	bv	8.081	98	Toluene-d8
7	100	88	95	-1	2788195	vv	12.681	95	4-Bromofluorobenzene
8	0	0	0	0	0		0.000	85	Dichlorodifluoromethane
9	0	0	0	0	0		0.000	50	Chloromethane
10	0	0	0	0	0		0.000	62	Vinyl Chloride
11	0	0	0	0	0		0.000	94	Bromomethane
12	0	0	0	0	0		0.000	64	Chloroethane
13	100	69	94	0	642272	bb	2.100	101	Trichlorofluoromethane
14	0	0	0	0	0		0.000	96	1,1-Dichloroethene
15	0	0	0	0	0		0.000	142	Iodomethane
16	93	72	76	0	2312681	bv	2.850	76	Carbon disulfide
17	77	46	94	5	131168	bv	2.920	43	Acetone
18	0	0	0	0	0		0.000	41	Allyl chloride
19	0	0	0	0	82168	A	3.340	84	Methylene chloride
20	15	13	34	-21	29868	!b	3.470	53	Acrylonitrile
21	0	0	0	0	0		0.000	96	trans-1,2-Dichloroethene
22	0	0	0	0	0		0.000	63	1,1-Dichloroethane
23	0	0	0	0	0		0.000	43	Vinyl acetate
24	0	0	0	0	0		0.000	77	2,2-Dichloropropane
25	0	0	0	0	0		0.000	96	cis-1,2-Dichloroethene
26	48	39	41	1	18128	bb	4.811	43	2-Butanone
27	0	0	0	0	0		0.000	83	Chloroform
28	0	0	0	0	0		0.000	128	Bromochloromethane
29	0	0	0	0	0		0.000	97	1,1,1-Trichloroethane
30	0	0	0	0	0		0.000	117	Carbon tetrachloride
31	0	0	0	0	0		0.000	75	1,1-Dichloropropene
32	0	0	0	0	0		0.000	78	Benzene
33	0	0	0	0	0		0.000	62	1,2-Dichloroethane
34	0	0	0	0	0		0.000	130	Trichloroethene
35	0	0	0	0	0		0.000	63	1,2-Dichloropropane
36	0	0	0	0	0		0.000	93	Dibromomethane
37	58	49	57	-6	38914970	!v	6.911	41	Methyl methacrylate
38	0	0	0	0	0		0.000	83	Bromodichloromethane
39	0	0	0	0	0		0.000	75	cis-1,3-Dichloropropene
40	49	28	52	1	3285555	bv	8.031	43	4-Methyl-2-pentanone
41	100	92	98	3	17302540	bv	8.181	92	Toluene
42	0	0	0	0	0		0.000	75	trans-1,3-Dichloropropene
43	0	0	0	0	0		0.000	97	1,1,2-Trichloroethane
44	65	42	64	1	821514	A	8.721	69	Ethyl methacrylate
45	95	65	90	1	382768	bb	8.991	164	Tetrachloroethene
46	0	0	0	0	0		0.000	76	1,3-Dichloropropane
47	43	24	64	-9	452967	vv	9.291	43	2-Hexanone
48	0	0	0	0	0		0.000	129	Dibromochloromethane
49	0	0	0	0	0		0.000	107	1,2-Dibromoethane
50	0	0	0	0	0		0.000	112	Chlorobenzene

Data Review: JM
Date: 2/5/99

No.	MAT	FOR	REV	Delta	Area	P.Flags	RT	QM	Name
51	0	0	0	0	0		0.000	131	1,1,1,2-Tetrachloroethane
52	100	92	98	0	623460	bb*	10.721	106	Ethylbenzene
53	100	89	94	0	3698720	vv	10.951	106	m-/p-Xylene
54	100	87	91	0	858924	bv	11.671	106	o-Xylene
55	100	93	97	0	3871485	bv	11.731	104	Styrene
56	0	0	0	0	0		0.000	173	Bromoform
57	95	62	90	0	617939	bv	12.441	105	Cumene
58	0	0	0	0	0		0.000	83	1,1,2,2-Tetrachloroethane
59	0	0	0	0	0		0.000	156	Bromobenzene
60	46	14	60	0	1351092	bv	12.681	75	1,2,3-Trichloropropane
61	96	72	89	2	238884	bb	13.331	120	n-Propylbenzene
62	28	11	55	-21	1351092	bv	12.681	75	trans-1,4-Dichloro-2-buten
63	0	0	0	0	0		0.000	126	2-Chlorotoluene
64	0	0	0	0	0		0.000	126	4-Chlorotoluene
65	100	72	96	0	1363985	vv	13.822	105	1,3,5-Trimethylbenzene
66	0	0	0	0	0		0.000	119	tert-Butylbenzene
67	100	85	96	-1	1842702	vv	14.822	105	1,2,4-Trimethylbenzene
68	59	23	73	0	74987	!v	15.352	105	sec-Butylbenzene
69	100	78	93	0	534621	!v	16.002	119	p-Cymene
70	0	0	0	0	0		0.000	146	1,3-Dichlorobenzene
71	0	0	0	0	0		0.000	146	1,4-Dichlorobenzene
72	0	0	0	0	0		0.000	91	Benzyl chloride
73	68	42	67	1	110734	!v	17.342	91	n-Butylbenzene
74	0	0	0	0	0		0.000	146	1,2-Dichlorobenzene
75	0	0	0	0	0		0.000	75	1,2-Dibromo-3-chloropropan
76	0	0	0	0	0		0.000	180	1,2,4-Trichlorobenzene
77	0	0	0	0	0		0.000	225	Hexachlorobutadiene
78	0	0	0	0	0		0.000	128	Naphthalene
79	0	0	0	0	0		0.000	180	1,2,3-Trichlorobenzene

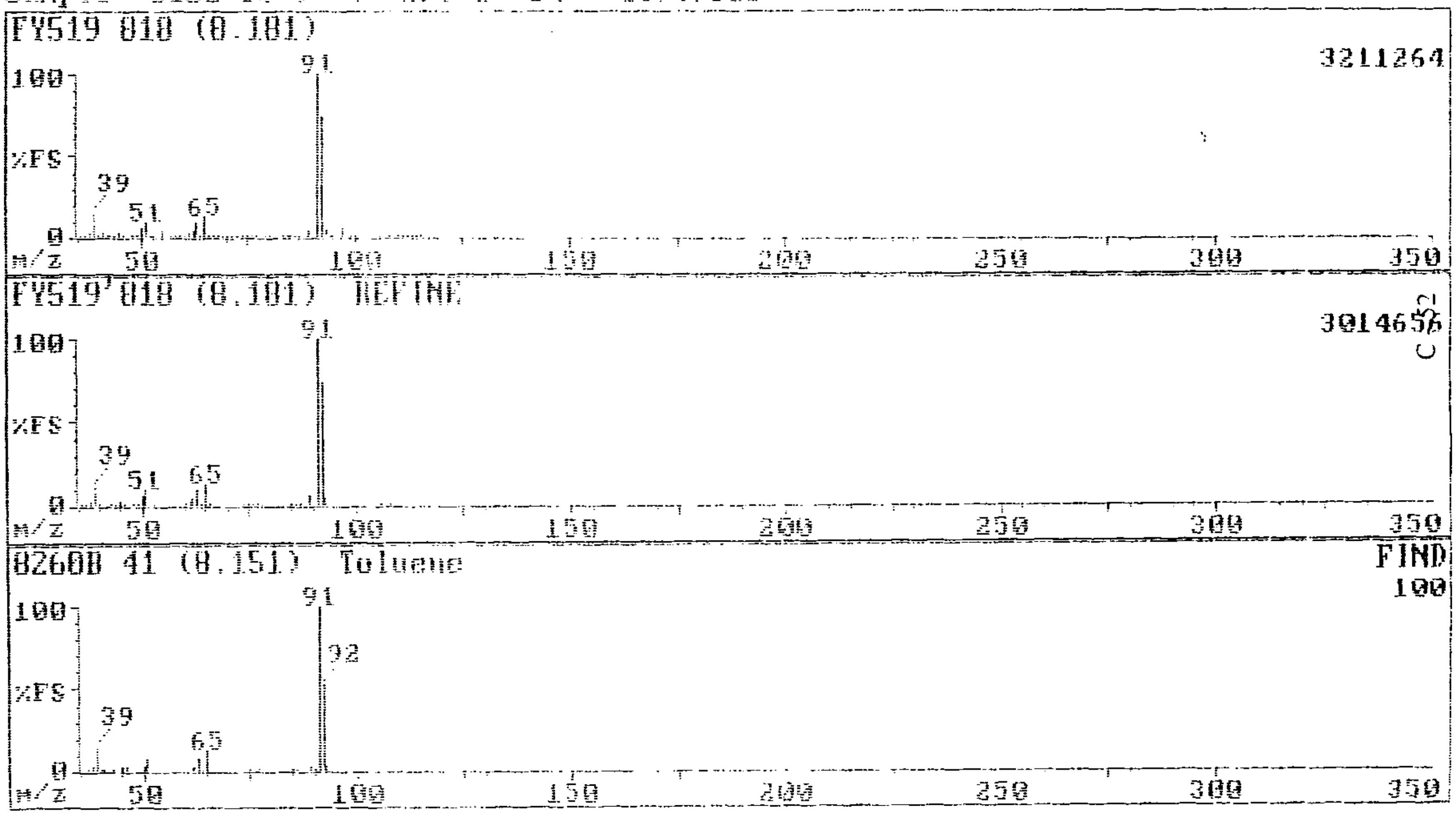
01-Feb-99 14:51 Triangle Laboratories, Inc. (919) 544-5729

Sample: 8181-03-T T 220-17-30 TLI#47818 Instrument F



01-Feb-99 14:51 Triangle Laboratories, Inc. (919) 544-5729

Sample: 8181-03-T T 2/29 17:30 TLI#47818 Instrument F



Trigon Engineering Consultants, Inc.

Project Number: 47818
Sample File: FY512

Method 8260B VOST
Sample ID: 8181-03-TC

Client Project: Michelin
TLI ID: 229-17-3B

Date Received: 01/29/99
Date Analyzed : 02/01/99

Response File: ICALF127

Analyte	Amount ug	FLAG	RT	Det. Limit ug	Quan. Limit ug
Pentafluorobenzene		IS 1	5.37		
Methylene chloride	0.016	J	3.35		0.05
1,4-Difluorobenzene		IS 2	6.14		
Toluene	0.005	BJ	8.15		0.05

Surrogate Summary	Amount (ug)	RT	IS Ref	%REC
Dibromofluoromethane	0.299	5.24	1	120
Toluene-d_8	0.269	8.06	2	108

Reviewed by YR Date 2/5/99

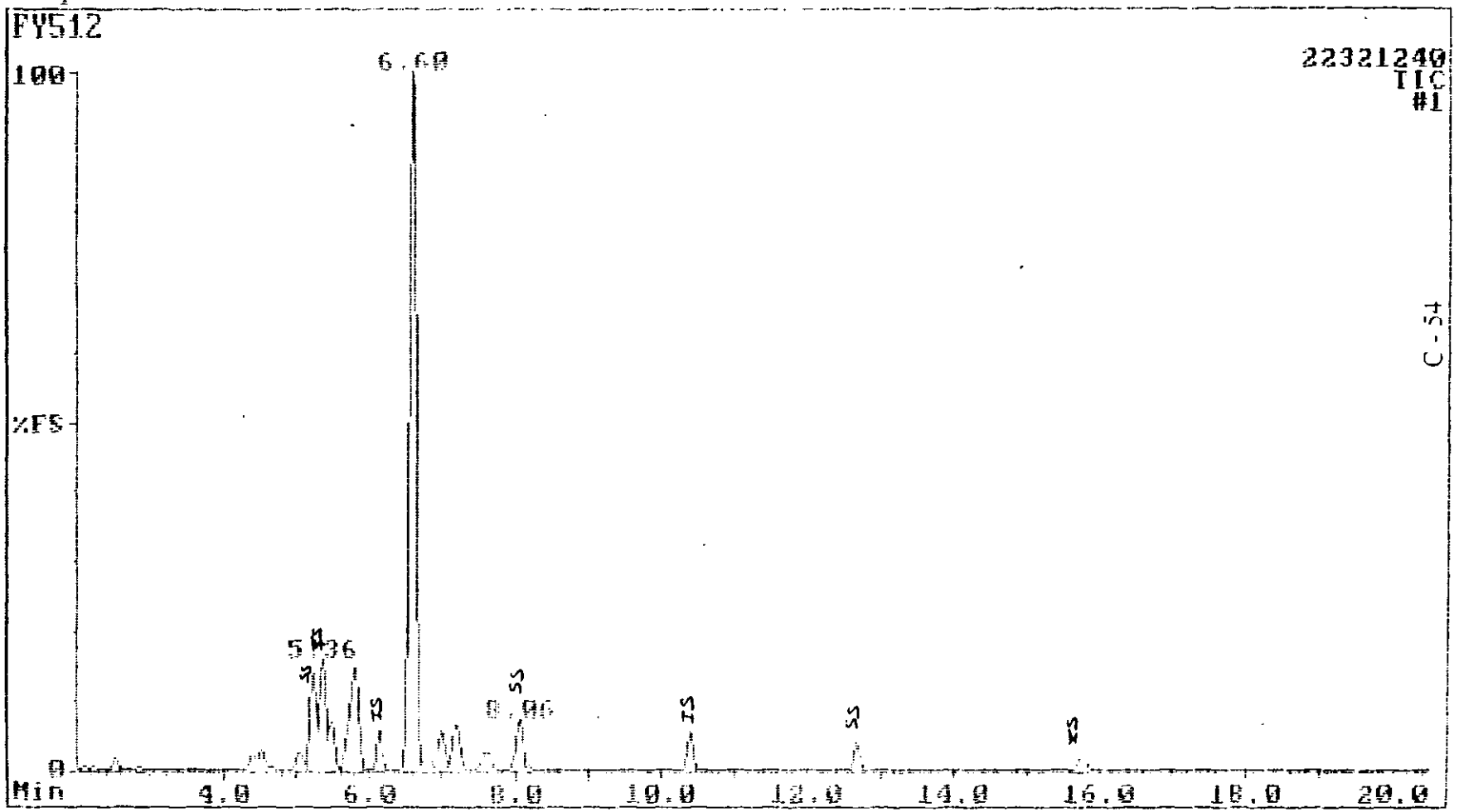
NA- Not Applicable; Det. Limit: Detection Limit; Quan. Limit: Quantitation Limit

IS: Internal Standard; U: Undetected; B: Present In Blank; J: Estimated- Below Quantitation Limit; E: Estimated- Above C. ibration Range

Data Review:
Date: 2/9/99

01-Feb-99 09:57 Triangle Laboratories, Inc. (919) 544-5729

Sample: 8181-93-TC TC 229-17-30 TL1847810 Instrument F



C - 54

QUAN DB : FY512 LAB-BASE QUAN 01-Feb-99 11:04

No.	MAT	FOR	REV	Delta	Area	P.Flags	RT	QM	Name
1	76	39	83	1	3289696	bb	5.371	168	Pentafluorobenzene
2	100	94	97	0	3772744	bv	6.141	114	1,4-Difluorobenzene
3	100	94	94	-2	3261320	bv	10.401	117	Chlorobenzene-d5
4	100	81	98	1	987868	bv	15.762	152	1,4-Dichlorobenzene-d4
5	0	0	0	0	1372136	A	5.241	113	Dibromofluoromethane
6	100	90	97	-1	4175972	bv	8.061	98	Toluene-d8
7	100	90	94	-3	1489276	bv	12.681	95	4-Bromofluorobenzene
8	0	0	0	0	0		0.000	85	Dichlorodifluoromethane
9	0	0	0	0	0		0.000	50	Chloromethane
10	0	0	0	0	0		0.000	62	Vinyl Chloride
11	0	0	0	0	0		0.000	94	Bromomethane
12	0	0	0	0	0		0.000	64	Chloroethane
13	93	64	92	2	349500	bb	2.120	101	Trichlorofluoromethane
14	0	0	0	0	0		0.000	96	1,1-Dichloroethene
15	0	0	0	0	0		0.000	142	Iodomethane
16	88	69	75	1	594967	bv	2.860	76	Carbon disulfide
17	56	19	89	6	30236	bv	2.930	43	Acetone
18	0	0	0	0	0		0.000	41	Allyl chloride
19	0	0	0	0	46804	A	3.350	84	Methylene chloride
20	5	2	6	-2	480	bb	3.660	53	Acrylonitrile
21	0	0	0	0	0		0.000	96	trans-1,2-Dichloroethene
22	0	0	0	0	0		0.000	63	1,1-Dichloroethane
23	0	0	0	0	0		0.000	43	Vinyl acetate
24	0	0	0	0	0		0.000	77	2,2-Dichloropropane
25	0	0	0	0	0		0.000	96	cis-1,2-Dichloroethene
26	25	36	55	24	1310012	bb	5.041	43	2-Butanone
27	0	0	0	0	0		0.000	83	Chloroform
28	0	0	0	0	0		0.000	128	Bromochloromethane
29	0	0	0	0	0		0.000	97	1,1,1-Trichloroethane
30	0	0	0	0	0		0.000	117	Carbon tetrachloride
31	0	0	0	0	0		0.000	75	1,1-Dichloropropene
32	0	0	0	0	0		0.000	78	Benzene
33	0	0	0	0	0		0.000	62	1,2-Dichloroethane
34	0	0	0	0	0		0.000	130	Trichloroethene
35	0	0	0	0	0		0.000	63	1,2-Dichloropropane
36	0	0	0	0	0		0.000	93	Dibromomethane
37	0	0	0	0	0		0.000	41	Methyl methacrylate
38	0	0	0	0	0		0.000	83	Bromodichloromethane
39	0	0	0	0	0		0.000	75	cis-1,3-Dichloropropene
40	33	7	48	3	69309	A	8.031	43	4-Methyl-2-pentanone
41	62	35	67	-1	60792	A	8.151	92	Toluene
42	0	0	0	0	0		0.000	75	trans-1,3-Dichloropropene
43	0	0	0	0	0		0.000	97	1,1,2-Trichloroethane
44	0	0	0	0	0		0.000	69	Ethyl methacrylate
45	0	0	0	0	0		0.000	164	Tetrachloroethene
46	0	0	0	0	0		0.000	76	1,3-Dichloropropane
47	0	0	0	0	0		0.000	43	2-Hexanone
48	0	0	0	0	0		0.000	129	Dibromochloromethane
49	0	0	0	0	0		0.000	107	1,2-Dibromoethane
50	0	0	0	0	0		0.000	112	Chlorobenzene

Data Review: YR
Date: 2/5/99

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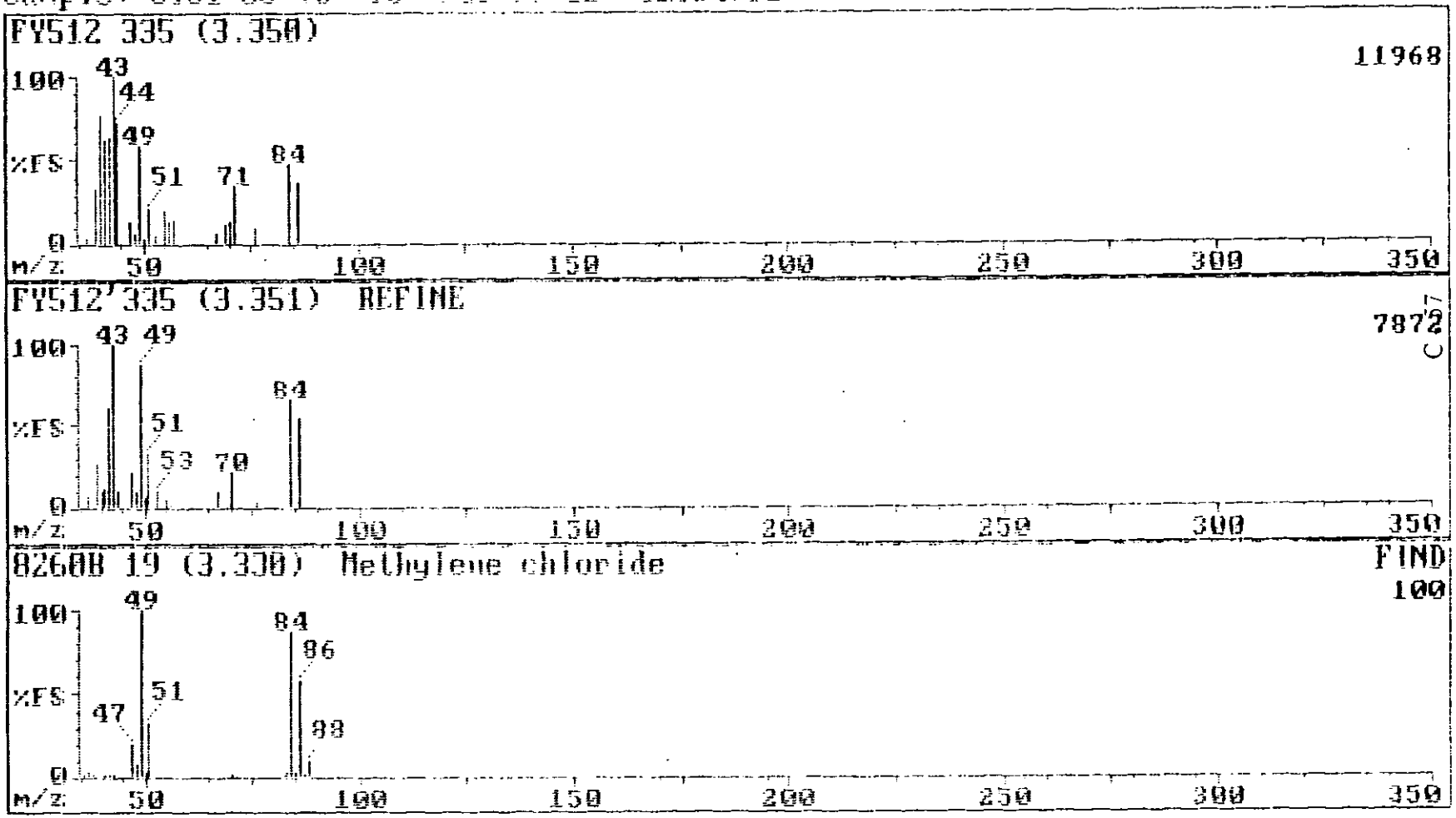
No.	MAT	FOR	REV	Delta	Area	P.Flags	RT	QM	Name
51	0	0	0	0	0		0.000	131	1,1,1,2-Tetrachloroethane
52	0	0	0	0	0		0.000	106	Ethylbenzene
53	0	0	0	0	0		0.000	106	m-/p-Xylene
54	0	0	0	0	0		0.000	106	o-Xylene
55	0	0	0	0	0		0.000	104	Styrene
56	0	0	0	0	0		0.000	173	Bromoform
57	0	0	0	0	0		0.000	105	Cumene
58	0	0	0	0	0		0.000	83	1,1,2,2-Tetrachloroethane
59	0	0	0	0	0		0.000	156	Bromobenzene
60	39	12	51	-1	743616	bb	12.681	75	1,2,3-Trichloropropane
61	0	0	0	0	0		0.000	120	n-Propylbenzene
62	0	0	0	0	0		0.000	75	trans-1,4-Dichloro-2-bute
63	0	0	0	0	0		0.000	126	2-Chlorotoluene
64	0	0	0	0	0		0.000	126	4-Chlorotoluene
65	0	0	0	0	0		0.000	105	1,3,5-Trimethylbenzene
66	0	0	0	0	0		0.000	119	tert-Butylbenzene
67	0	0	0	0	0		0.000	105	1,2,4-Trimethylbenzene
68	0	0	0	0	0		0.000	105	sec-Butylbenzene
69	0	0	0	0	0		0.000	119	p-Cymene
70	0	0	0	0	0		0.000	146	1,3-Dichlorobenzene
71	0	0	0	0	0		0.000	146	1,4-Dichlorobenzene
72	0	0	0	0	0		0.000	91	Benzyl chloride
73	0	0	0	0	0		0.000	91	n-Butylbenzene
74	0	0	0	0	0		0.000	146	1,2-Dichlorobenzene
75	0	0	0	0	0		0.000	75	1,2-Dibromo-3-chloroprop
76	0	0	0	0	0		0.000	180	1,2,4-Trichlorobenzene
77	39	13	52	-1	4228	bb	19.512	225	Hexachlorobutadiene
78	0	0	0	0	0		0.000	128	Naphthalene
79	0	0	0	0	0		0.000	180	1,2,3-Trichlorobenzene

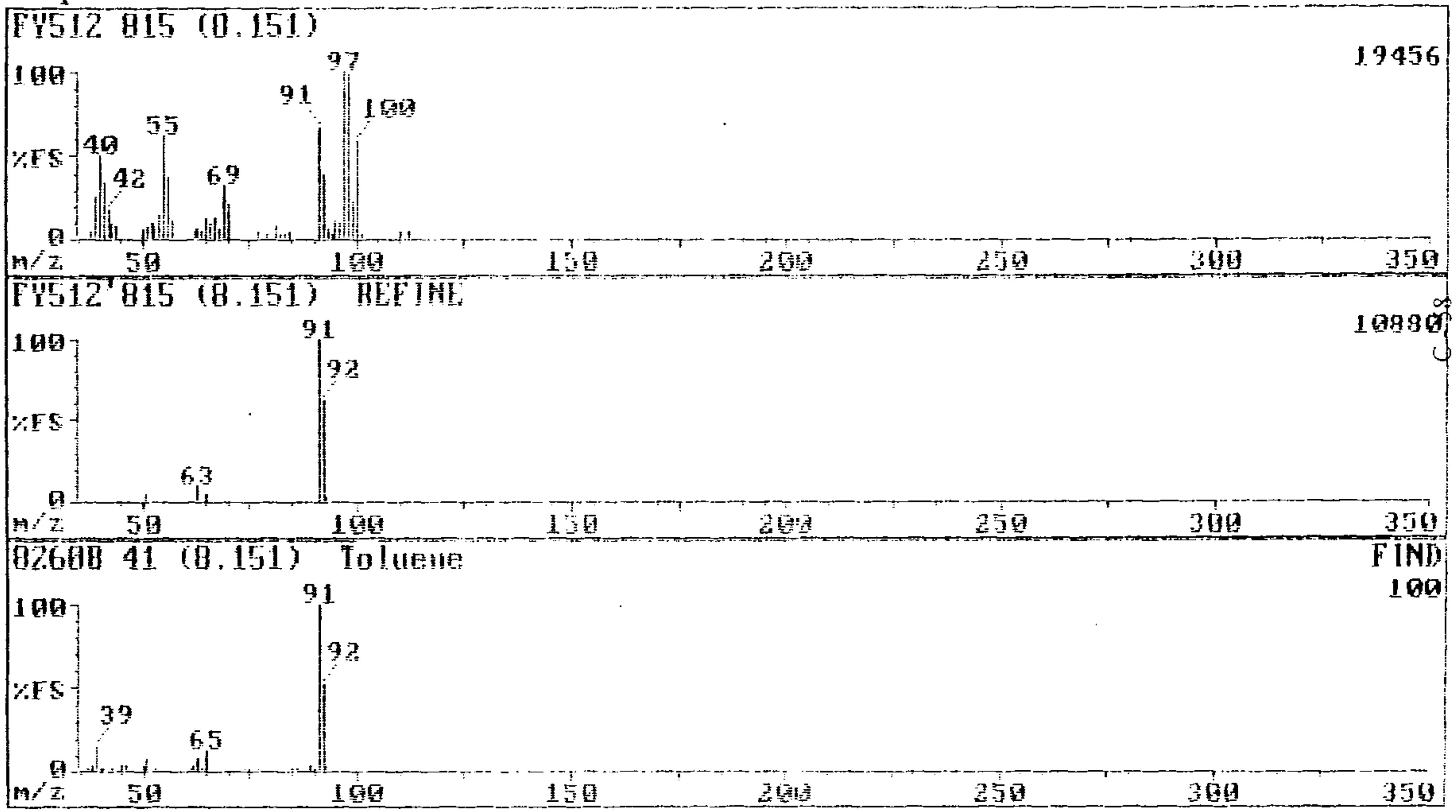
01-Feb-99 09:57 Triangle Laboratories, Inc. (919) 544-5729

Sample: 8181-03-TC TC 229-17-3D TLI#47010 Instrument F



01-Feb-99 09:57 Triangle Laboratories, Inc. (919) 544-5729

Sample: 8181-03 TC TC 229-17-3B TLI047810 Instrument F



Trigon Engineering Consultants, Inc.

Project Number: 47818
Sample File: FY520

Method 8260B VOST
Sample ID: 8181-04-T

Client Project: Michelin **Date Received: 01/29/99** **Response File: ICALF127**
TLI ID: 229-17-4A **Date Analyzed : 02/01/99**

Analyte	Amount ug	FLAG	RT	Det. Limit ug	Quan. Limit ug
Pentafluorobenzene		IS 1	5.37		
Methylene chloride	0.002	J	3.33		0.05
1,4-Difluorobenzene		IS 2	6.14		
Toluene	0.011	BJ	8.16		0.05

Surrogate Summary	Amount (ug)	RT	IS Ref	%REC
Dibromofluoromethane	0.291	5.24	1	116
Toluene-d$_8$	0.244	8.07	2	98

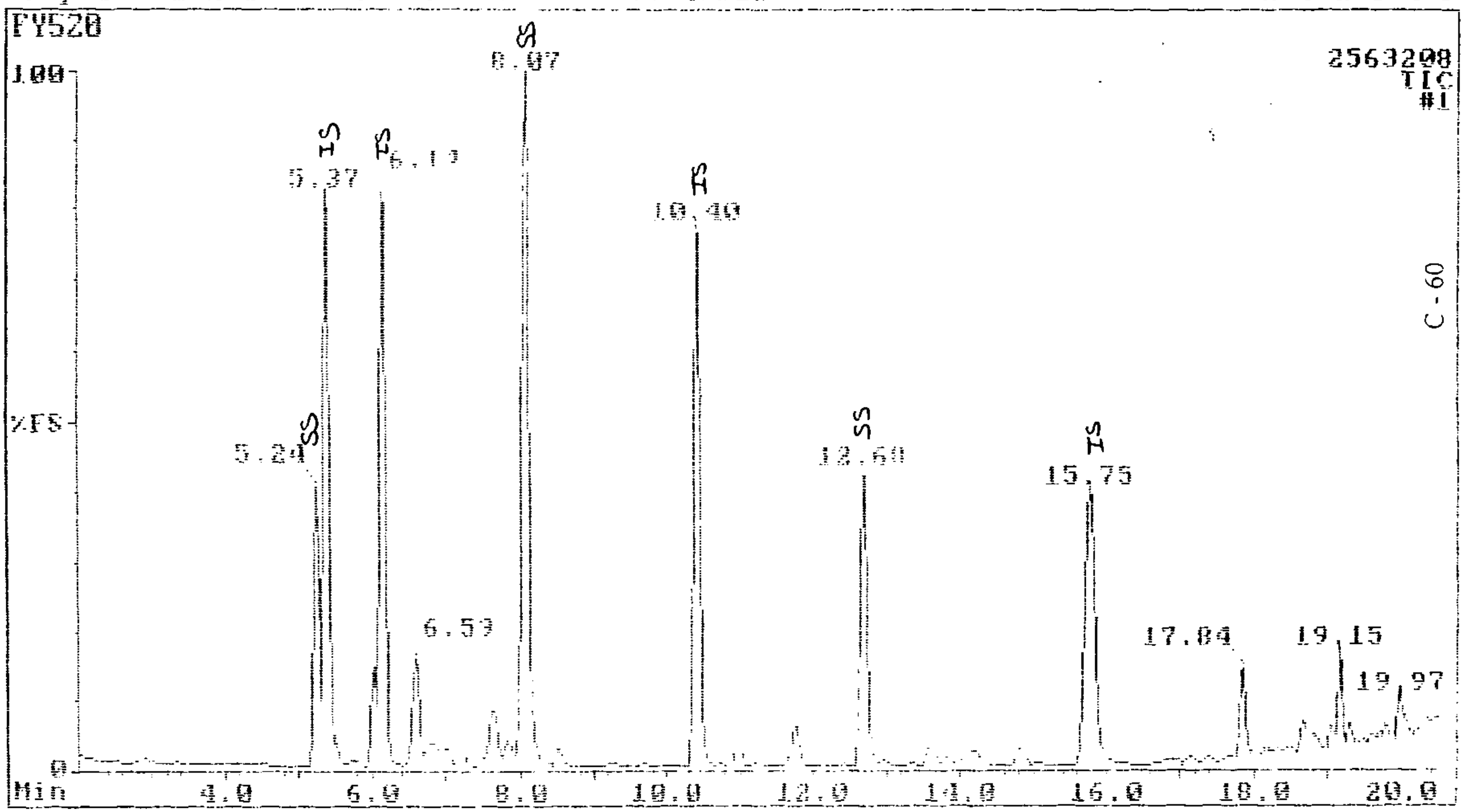
Reviewed by _____ Date ____/____/____

NA- Not Applicable; Det. Limit: Detection Limit; Quan. Limit: Quantitation Limit

IS. Internal Standard; U: Undetected; B: Present In Blank; J: Estimated- Below Quantitation Limit; E: Estimated- Above Calibration Range

01-Feb-99 15:28 Trianglе Laboratories, Inc. (919) 544-5729

Sample: 0101-04-T T 229-17-4A TLIW47010 Instrument F



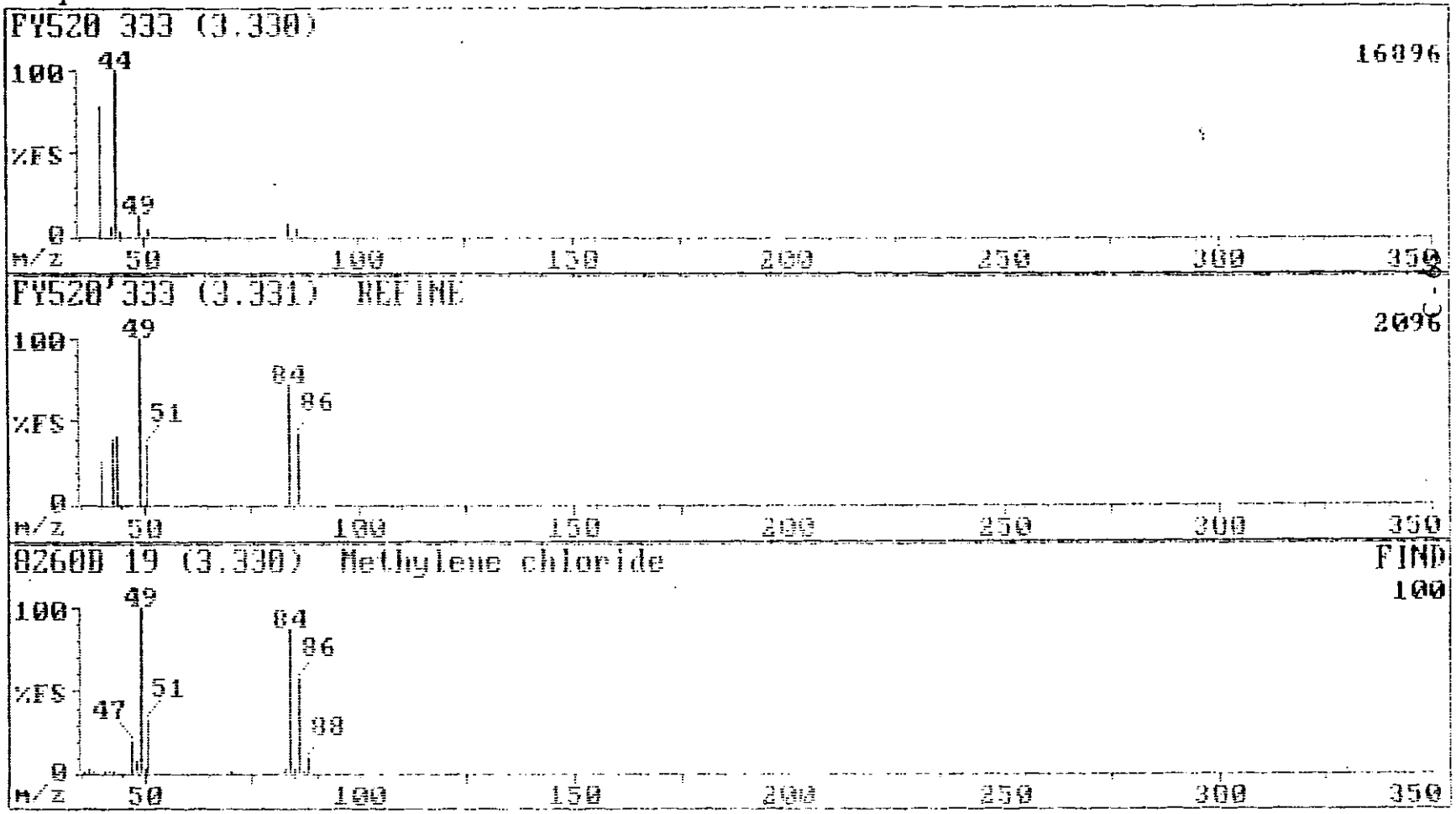
Data Review: YR
Date: 2/8/99

No.	MAT	FOR	REV	Delta	Area	P.Flags	RT	QM	Name
1	100	84	99	1	5101952	bb	5.371	168	Pentafluorobenzene
2	100	94	97	0	6396656	bv	6.141	114	1,4-Difluorobenzene
3	100	93	94	-2	5207605	bv	10.401	117	Chlorobenzene-d5
4	99	62	97	0	1591404	bv	15.752	152	1,4-Dichlorobenzene-d4
5	100	92	97	0	2074208	bv	5.241	113	Dibromofluoromethane
6	100	89	98	0	6417854	bv	8.071	98	Toluene-d8
7	100	90	94	-3	1791144	bv	12.681	95	4-Bromofluorobenzene
8	0	0	0	0	0		0.000	85	Dichlorodifluoromethane
9	0	0	0	0	0		0.000	50	Chloromethane
10	0	0	0	0	0		0.000	62	Vinyl Chloride
11	0	0	0	0	0		0.000	94	Bromomethane
12	0	0	0	0	0		0.000	64	Chloroethane
13	0	0	0	0	0		0.000	101	Trichlorofluoromethane
14	0	0	0	0	0		0.000	96	1,1-Dichloroethene
15	0	0	0	0	0		0.000	142	Iodomethane
16	0	0	0	0	0		0.000	76	Carbon disulfide
17	65	20	95	4	52572	bb	2.910	43	Acetone
18	0	0	0	0	0		0.000	41	Allyl chloride
19	0	0	0	0	8112	A	3.330	84	Methylene chloride
20	0	0	0	0	0		0.000	53	Acrylonitrile
21	0	0	0	0	0		0.000	96	trans-1,2-Dichloroethene
22	0	0	0	0	0		0.000	63	1,1-Dichloroethane
23	0	0	0	0	0		0.000	43	Vinyl acetate
24	0	0	0	0	0		0.000	77	2,2-Dichloropropane
25	0	0	0	0	0		0.000	96	cis-1,2-Dichloroethene
26	13	11	11	1	7960	bb	4.811	43	2-Butanone
27	0	0	0	0	0		0.000	83	Chloroform
28	0	0	0	0	0		0.000	128	Bromochloromethane
29	0	0	0	0	0		0.000	97	1,1,1-Trichloroethane
30	0	0	0	0	0		0.000	117	Carbon tetrachloride
31	0	0	0	0	0		0.000	75	1,1-Dichloropropene
32	0	0	0	0	0		0.000	78	Benzene
33	0	0	0	0	0		0.000	62	1,2-Dichloroethane
34	0	0	0	0	0		0.000	130	Trichloroethene
35	0	0	0	0	0		0.000	63	1,2-Dichloropropane
36	0	0	0	0	0		0.000	93	Dibromomethane
37	44	43	49	-10	173840	A	6.801	41	Methyl methacrylate
38	0	0	0	0	0		0.000	83	Bromodichloromethane
39	0	0	0	0	0		0.000	75	cis-1,3-Dichloropropene
40	71	24	90	1	360303	bv	8.041	43	4-Methyl-2-pentanone
41	100	77	89	0	229992	bb	8.161	92	Toluene
42	0	0	0	0	0		0.000	75	trans-1,3-Dichloropropene
43	0	0	0	0	0		0.000	97	1,1,2-Trichloroethane
44	0	0	0	0	0		0.000	69	Ethyl methacrylate
45	0	0	0	0	0		0.000	164	Tetrachloroethene
46	0	0	0	0	0		0.000	76	1,3-Dichloropropane
47	0	0	0	0	0		0.000	43	2-Hexanone
48	0	0	0	0	0		0.000	129	Dibromochloromethane
49	0	0	0	0	0		0.000	107	1,2-Dibromoethane
50	0	0	0	0	0		0.000	112	Chlorobenzene

Data Review: YL
Date: 2/5/99

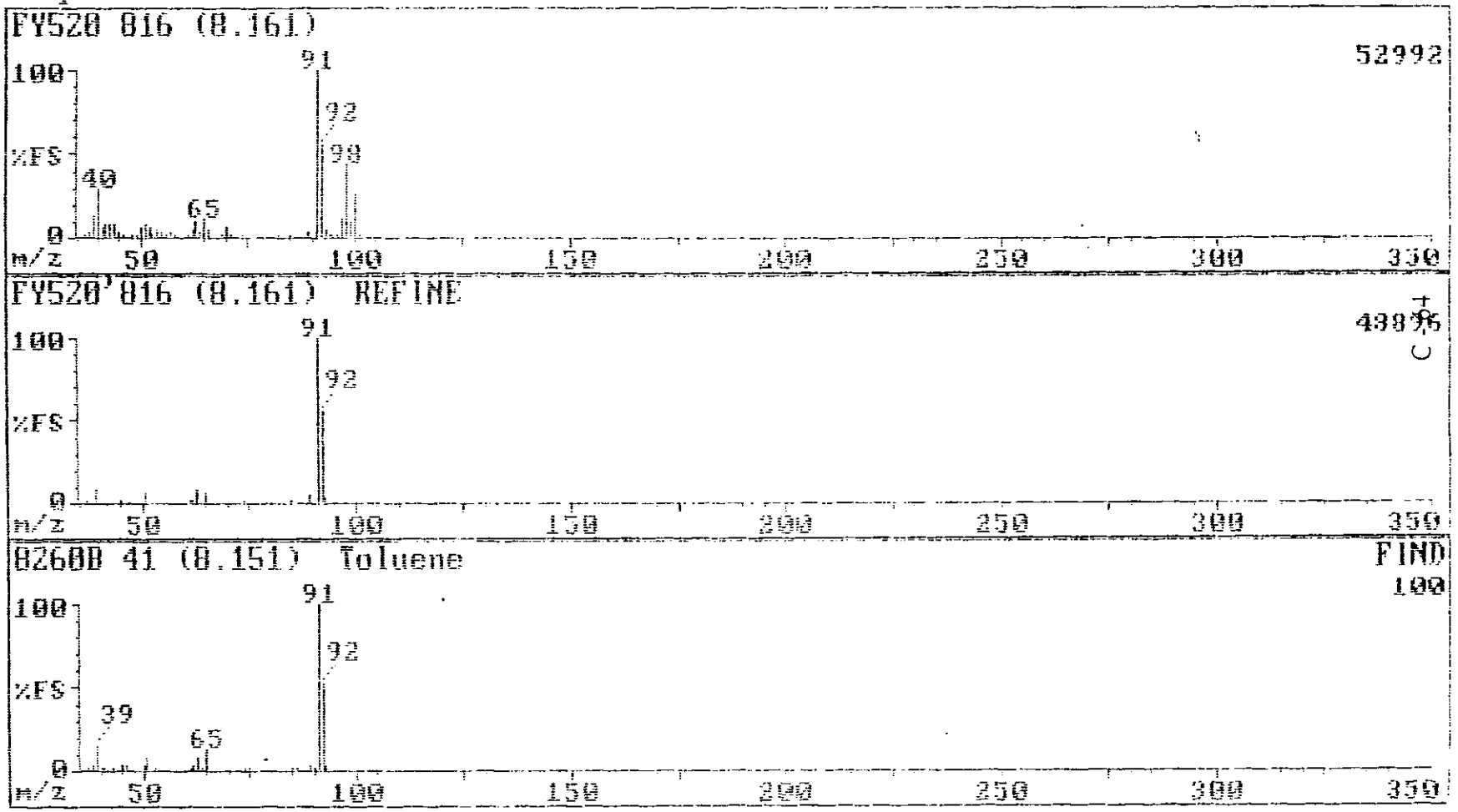
No.	MAT	FOR	REV	Delta	Area	P.Flags	RT	QM	Name
51	0	0	0	0	0		0.000	131	1,1,1,2-Tetrachloroethane
52	44	79	81	24	112968	bb	10.961	106	Ethylbenzene
53	97	79	80	1	112968	bb	10.961	106	m-/p-Xylene
54	89	73	73	1	44416	bb	11.681	106	o-Xylene
55	100	89	92	2	391020	bv	11.751	104	Styrene
56	0	0	0	0	0		0.000	173	Bromoform
57	0	0	0	0	0		0.000	105	Cumene
58	0	0	0	0	0		0.000	83	1,1,2,2-Tetrachloroethane
59	0	0	0	0	0		0.000	156	Bromobenzene
60	41	13	54	0	907396	bv	12.681	75	1,2,3-Trichloropropane
61	50	39	43	1	15668	A	13.331	120	n-Propylbenzene
62	0	0	0	0	0		0.000	75	trans-1,4-Dichloro-2-buten
63	0	0	0	0	0		0.000	126	2-Chlorotoluene
64	0	0	0	0	0		0.000	126	4-Chlorotoluene
65	89	56	90	1	137988	vv	13.831	105	1,3,5-Trimethylbenzene
66	0	0	0	0	0		0.000	119	tert-Butylbenzene
67	97	75	80	0	262900	bv	14.832	105	1,2,4-Trimethylbenzene
68	0	0	0	0	0		0.000	105	sec-Butylbenzene
69	60	45	56	-2	110152	A	15.982	119	p-Cymene
70	0	0	0	0	0		0.000	146	1,3-Dichlorobenzene
71	0	0	0	0	0		0.000	146	1,4-Dichlorobenzene
72	0	0	0	0	0		0.000	91	Benzyl chloride
73	0	0	0	0	0		0.000	91	n-Butylbenzene
74	0	0	0	0	0		0.000	146	1,2-Dichlorobenzene
75	0	0	0	0	0		0.000	75	1,2-Dibromo-3-chloropropan
76	0	0	0	0	0		0.000	180	1,2,4-Trichlorobenzene
77	0	0	0	0	0		0.000	225	Hexachlorobutadiene
78	0	0	0	0	0		0.000	128	Naphthalene
79	0	0	0	0	0		0.000	180	1,2,3-Trichlorobenzene

01-Feb-99 15:20 Intersample Laboratories, Inc. (919) 544-5729
Sample: 8181-04 1 T [illegible] TL1847010 Instrument F



01-Feb-99 15:28 Triangle Laboratories, Inc. (919) 544-5729

Sample: 8181-04-T I 220 17-40 TLI#47818 Instrument F



Trigon Engineering Consultants, Inc.

Project Number: 47818
Sample File: FY513

Method 8260B VOST
Sample ID: 8181-04-TC

Client Project: Michelin
TLI ID: 229-17-4B

Date Received: 01/29/99

Date Analyzed : 02/01/99

Response File: ICALF127

Analyte	Amount ug	FLAG	RT	Det. Limit ug	Quan. Limit ug
Pentafluorobenzene		IS 1	5.37		
Methylene chloride		U		0.001	0.05
1,4-Difluorobenzene		IS 2	6.14		
Toluene	0.004	BJ	8.16		0.05

Surrogate Summary	Amount (ug)	RT	IS Ref	%REC
Dibromofluoromethane	0.289	5.25	1	116
Toluene-d_8	0.258	8.07	2	103

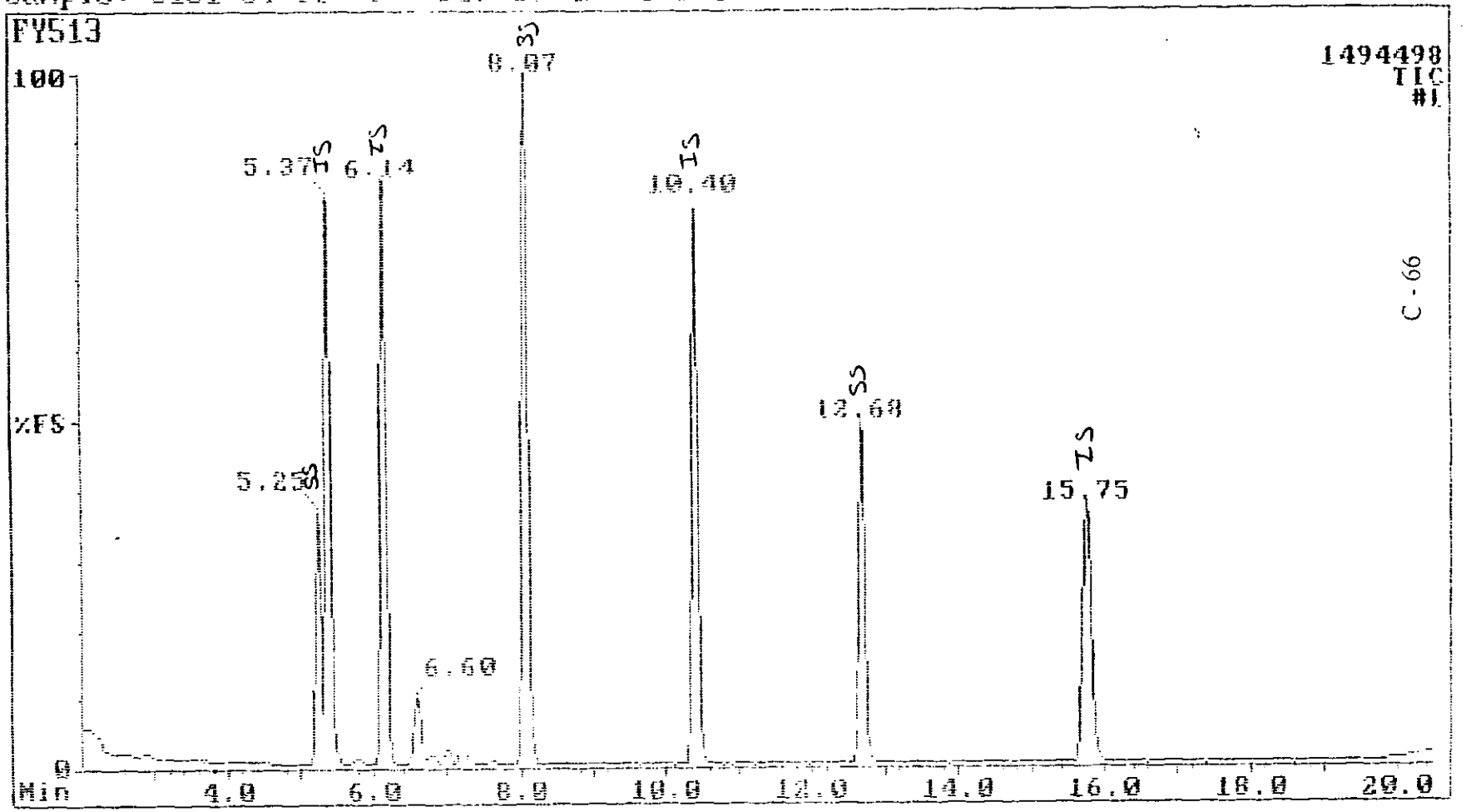
Reviewed by _____ Date 2/5/99

NA- Not Applicable; Det. Limit: Detection Limit; Quan. Limit: Quantitation Limit

IS: Internal Standard; U: Undetected; B: Present In Blank; J: Estimated- Below Quantitation Limit; E: Estimated- Above Calibration Range

Data Review: MC
Date: 2/5/99 66

01-Feb-99 10:40 Triangle Laboratories, Inc. (919) 544-5729
Sample: 0181-01-TC TC 229-17-4D TLIH47810 Instrument F



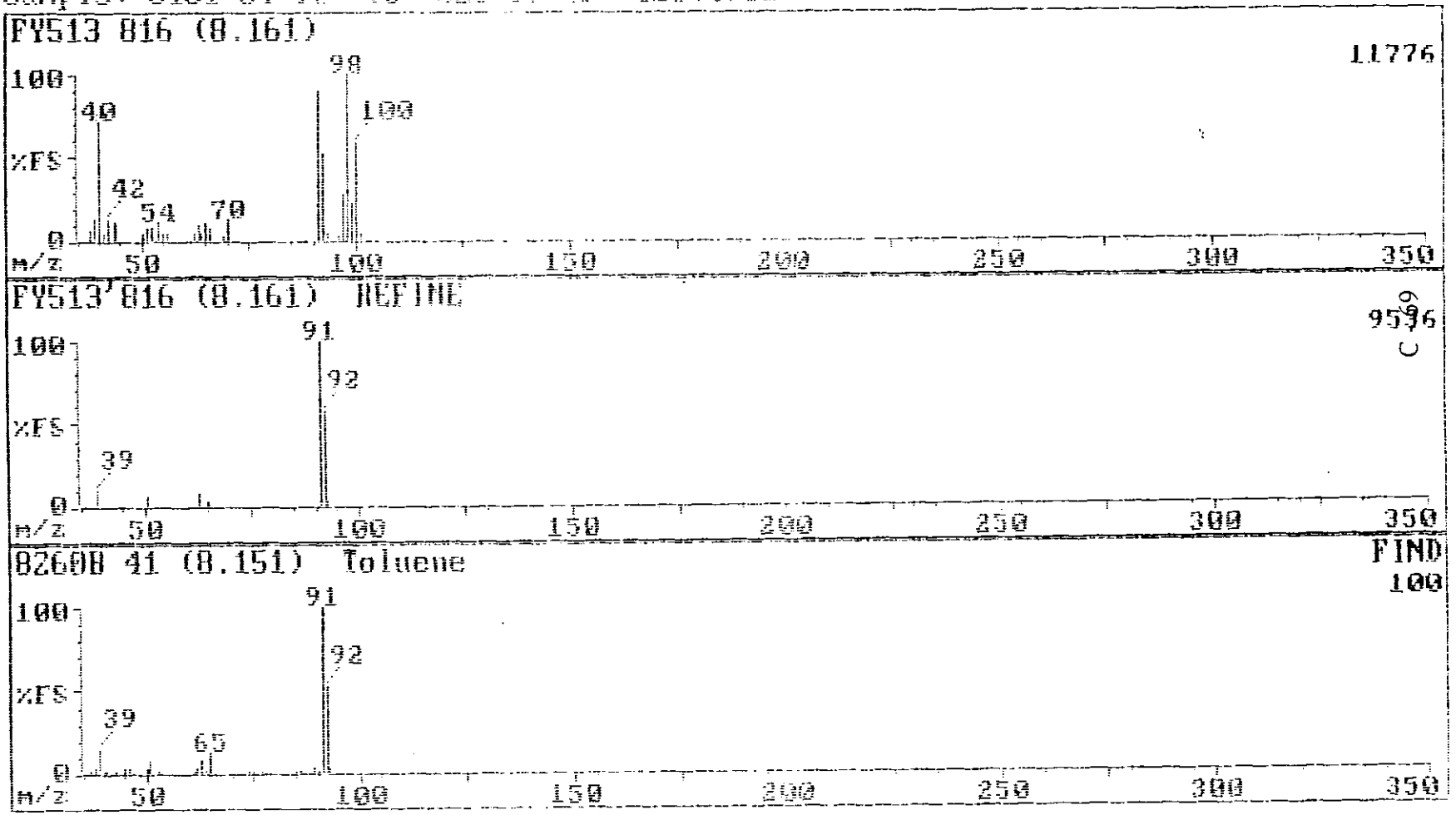
QUAN DB : FY513 LAB-BASE QUAN 01-Feb-99 11:23

No.	MAT	FOR	REV	Delta	Area	P.Flags	RT	QM	Name
1	100	83	99	1	2733163	bv	5.371	168	Pentafluorobenzene
2	100	95	97	0	3592712	bv	6.141	114	1,4-Difluorobenzene
3	100	94	95	-2	2939444	bv	10.401	117	Chlorobenzene-d5
4	100	81	98	0	1122024	bv	15.752	152	1,4-Dichlorobenzene-d4
5	100	94	97	1	1104316	bv	5.251	113	Dibromofluoromethane
6	100	93	98	0	3820268	bv	8.071	98	Toluene-d8
7	100	90	93	-3	1162240	bv	12.681	95	4-Bromofluorobenzene
8	0	0	0	0	0		0.000	85	Dichlorodifluoromethane
9	0	0	0	0	0		0.000	50	Chloromethane
10	0	0	0	0	0		0.000	62	Vinyl Chloride
11	0	0	0	0	0		0.000	94	Bromomethane
12	0	0	0	0	0		0.000	64	Chloroethane
13	0	0	0	0	0		0.000	101	Trichlorofluoromethane
14	0	0	0	0	0		0.000	96	1,1-Dichloroethene
15	0	0	0	0	0		0.000	142	Iodomethane
16	0	0	0	0	0		0.000	76	Carbon disulfide
17	53	12	90	7	20244	bv	2.940	43	Acetone
18	0	0	0	0	0		0.000	41	Allyl chloride
19	0	0	0	0	0		0.000	84	Methylene chloride
20	0	0	0	0	0		0.000	53	Acrylonitrile
21	0	0	0	0	0		0.000	96	trans-1,2-Dichloroethene
22	0	0	0	0	0		0.000	63	1,1-Dichloroethane
23	0	0	0	0	0		0.000	43	Vinyl acetate
24	0	0	0	0	0		0.000	77	2,2-Dichloropropane
25	0	0	0	0	0		0.000	96	cis-1,2-Dichloroethene
26	16	13	13	0	5432	A	4.801	43	2-Butanone
27	0	0	0	0	0		0.000	83	Chloroform
28	0	0	0	0	0		0.000	128	Bromochloromethane
29	0	0	0	0	0		0.000	97	1,1,1-Trichloroethane
30	0	0	0	0	0		0.000	117	Carbon tetrachloride
31	0	0	0	0	0		0.000	75	1,1-Dichloropropene
32	0	0	0	0	0		0.000	78	Benzene
33	0	0	0	0	0		0.000	62	1,2-Dichloroethane
34	0	0	0	0	0		0.000	130	Trichloroethene
35	0	0	0	0	0		0.000	63	1,2-Dichloropropane
36	0	0	0	0	0		0.000	93	Dibromomethane
37	0	0	0	0	0		0.000	41	Methyl methacrylate
38	0	0	0	0	0		0.000	83	Bromodichloromethane
39	0	0	0	0	0		0.000	75	cis-1,3-Dichloropropene
40	38	3	66	5	21432	bb	8.081	43	4-Methyl-2-pentanone
41	79	56	71	0	50224	A	8.161	92	Toluene
42	0	0	0	0	0		0.000	75	trans-1,3-Dichloropropene
43	0	0	0	0	0		0.000	97	1,1,2-Trichloroethane
44	0	0	0	0	0		0.000	69	Ethyl methacrylate
45	0	0	0	0	0		0.000	164	Tetrachloroethene
46	0	0	0	0	0		0.000	76	1,3-Dichloropropane
47	0	0	0	0	0		0.000	43	2-Hexanone
48	0	0	0	0	0		0.000	129	Dibromochloromethane
49	0	0	0	0	0		0.000	107	1,2-Dibromoethane
50	0	0	0	0	0		0.000	112	Chlorobenzene

Data Review: MC
Date: 2/5/99

No.	MAT	FOR	REV	Delta	Area	P.Flags	RT	QM	Name
51	0	0	0	0	0		0.000	131	1,1,1,2-Tetrachloroethane
52	0	0	0	0	0		0.000	106	Ethylbenzene
53	0	0	0	0	0		0.000	106	m-/p-Xylene
54	0	0	0	0	0		0.000	106	o-Xylene
55	0	0	0	0	0		0.000	104	Styrene
56	0	0	0	0	0		0.000	173	Bromoform
57	0	0	0	0	0		0.000	105	Cumene
58	0	0	0	0	0		0.000	83	1,1,2,2-Tetrachloroethane
59	0	0	0	0	0		0.000	156	Bromobenzene
60	39	12	50	0	579540	bv	12.681	75	1,2,3-Trichloropropane
61	0	0	0	0	0		0.000	120	n-Propylbenzene
62	0	0	0	0	0		0.000	75	trans-1,4-Dichloro-2-buten
63	0	0	0	0	0		0.000	126	2-Chlorotoluene
64	0	0	0	0	0		0.000	126	4-Chlorotoluene
65	0	0	0	0	0		0.000	105	1,3,5-Trimethylbenzene
66	0	0	0	0	0		0.000	119	tert-Butylbenzene
67	0	0	0	0	0		0.000	105	1,2,4-Trimethylbenzene
68	0	0	0	0	0		0.000	105	sec-Butylbenzene
69	0	0	0	0	0		0.000	119	p-Cymene
70	0	0	0	0	0		0.000	146	1,3-Dichlorobenzene
71	0	0	0	0	0		0.000	146	1,4-Dichlorobenzene
72	0	0	0	0	0		0.000	91	Benzyl chloride
73	0	0	0	0	0		0.000	91	n-Butylbenzene
74	0	0	0	0	0		0.000	146	1,2-Dichlorobenzene
75	0	0	0	0	0		0.000	75	1,2-Dibromo-3-chloropropan
76	0	0	0	0	0		0.000	180	1,2,4-Trichlorobenzene
77	50	19	63	-1	3896	bb	19.502	225	Hexachlorobutadiene
78	0	0	0	0	0		0.000	128	Naphthalene
79	0	0	0	0	0		0.000	180	1,2,3-Trichlorobenzene

01-Feb-99 10:40 Triangle Laboratories, Inc. (919) 544-5729
Sample: 8181-04-TC TC 229-17-4B TLI#47018 Instrument F



Trigon Engineering Consultants, Inc.

Project Number: 47818
Sample File: FY509

Method 8260B VOST
Sample ID: VOSTBLK020199

Client Project: Michelin | **Date Received: / /** | **Response File: ICALF127**
TLI ID: VOSTBLK020199 | **Date Analyzed : 02/01/99**

Analyte	Amount ug	FLAG	RT	Det. Limit ug	Quan. Limit ug
Pentafluorobenzene		IS 1	5.36		
Methylene chloride		U		0.001	0.05
1,4-Difluorobenzene		IS 2	6.13		
Toluene	0.003	J	8.14		0.05

Surrogate Summary	Amount (ug)	RT	IS Ref	%REC
Dibromofluoromethane	0.288	5.23	1	115
Toluene-d_8	0.263	8.06	2	105

Reviewed by YR Date 2/5/99

NA- Not Applicable; Det. Limit: Detection Limit; Quan. Limit: Quantitation Limit

IS: Internal Standard; U: Undetected; B: Present In Blank; J: Estimated- Below Quantitation Limit; E: Estimated- Above Calibration Range

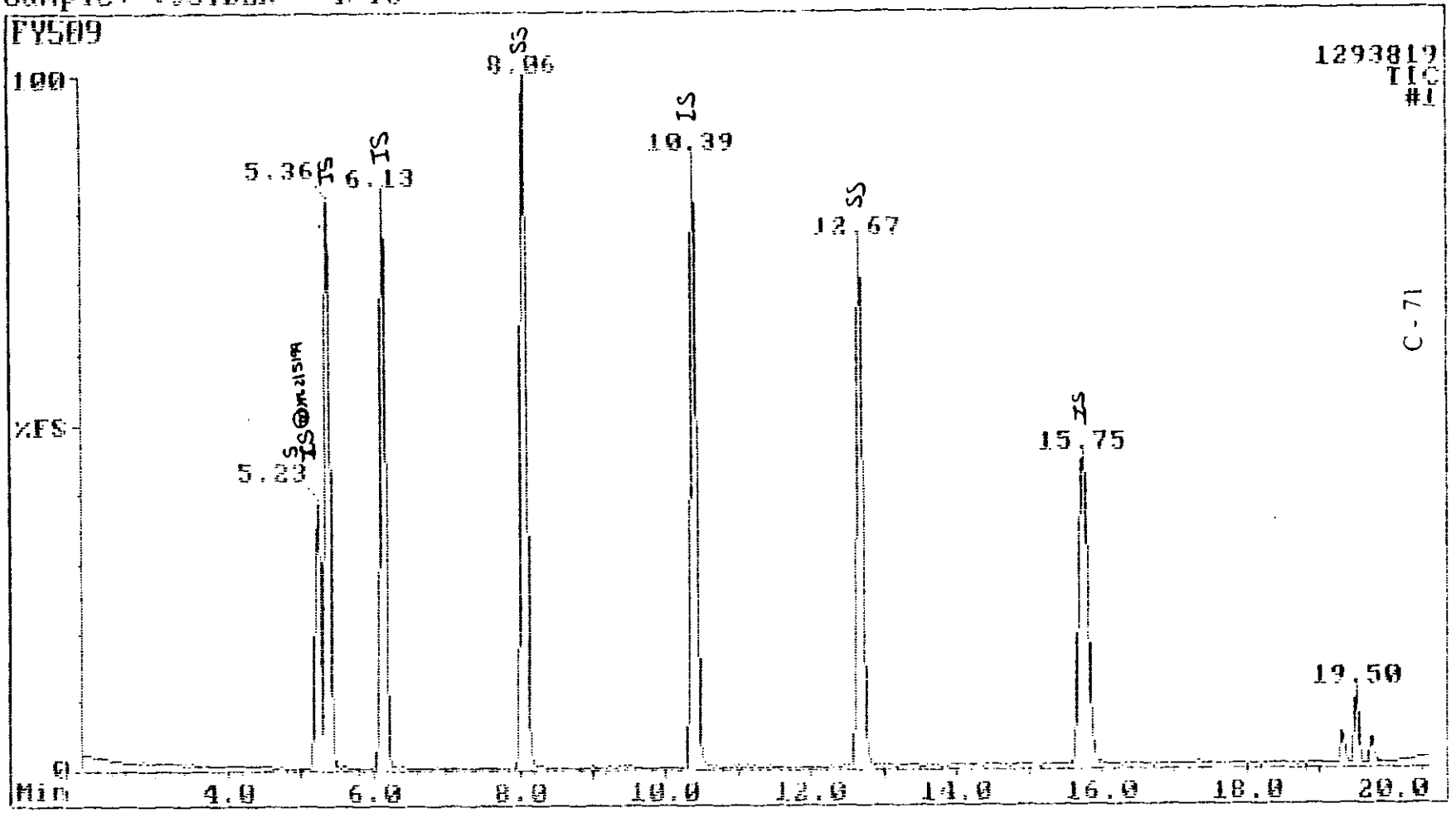
Triangle Laboratories, Inc.
801 Capitola Drive • Durham, North Carolina 27713
Phone: (919) 544-5729 • Fax: (919) 544-5491

Savar v3.8
Printed: 12:19 02/05/1999

Data Review: YR
Date: 2/15/99 71

01-Feb-99 07:34 Triangle Laboratories, Inc. (919) 544-5729

Sample: VOSTBLK T/IC Instrument F



QUAN DB : FY509 LAB-BASE QUAN 01-Feb-99 08:25

No.	MAT	FOR	REV	Delta	Area	P.Flags	RT	QM	Name
1	100	84	98	0	2329148	bb	5.361	168	Pentafluorobenzene
2	100	95	97	0	2956496	bb	6.131	114	1,4-Difluorobenzene
3	100	94	95	-1	2656380	bv	10.391	117	Chlorobenzene-d5
4	100	80	98	1	1157412	bv	15.752	152	1,4-Dichlorobenzene-d4
5	100	95	97	0	935376	bv	5.231	113	Dibromofluoromethane
6	100	93	97	0	3205908	bv	8.061	98	Toluene-d8
7	100	90	93	-2	1529192	bv	12.671	95	4-Bromofluorobenzene
8	0	0	0	0	0		0.000	85	Dichlorodifluoromethane
9	0	0	0	0	0		0.000	50	Chloromethane
10	0	0	0	0	0		0.000	62	Vinyl Chloride
11	0	0	0	0	0		0.000	94	Bromomethane
12	0	0	0	0	0		0.000	64	Chloroethane
13	0	0	0	0	0		0.000	101	Trichlorofluoromethane
14	0	0	0	0	0		0.000	96	1,1-Dichloroethene
15	0	0	0	0	0		0.000	142	Iodomethane
16	0	0	0	0	0		0.000	76	Carbon disulfide
17	0	0	0	0	0		0.000	43	Acetone
18	0	0	0	0	0		0.000	41	Allyl chloride
19	0	0	0	0	0		0.000	84	Methylene chloride
20	0	0	0	0	0		0.000	53	Acrylonitrile
21	0	0	0	0	0		0.000	96	trans-1,2-Dichloroethene
22	0	0	0	0	0		0.000	63	1,1-Dichloroethane
23	0	0	0	0	0		0.000	43	Vinyl acetate
24	0	0	0	0	0		0.000	77	2,2-Dichloropropane
25	0	0	0	0	0		0.000	96	cis-1,2-Dichloroethene
26	0	0	0	0	0		0.000	43	2-Butanone
27	0	0	0	0	0		0.000	83	Chloroform
28	0	0	0	0	0		0.000	128	Bromochloromethane
29	0	0	0	0	0		0.000	97	1,1,1-Trichloroethane
30	0	0	0	0	0		0.000	117	Carbon tetrachloride
31	0	0	0	0	0		0.000	75	1,1-Dichloropropene
32	0	0	0	0	0		0.000	78	Benzene
33	0	0	0	0	0		0.000	62	1,2-Dichloroethane
34	0	0	0	0	0		0.000	130	Trichloroethene
35	0	0	0	0	0		0.000	63	1,2-Dichloropropane
36	0	0	0	0	0		0.000	93	Dibromomethane
37	0	0	0	0	0		0.000	41	Methyl methacrylate
38	0	0	0	0	0		0.000	83	Bromodichloromethane
39	0	0	0	0	0		0.000	75	cis-1,3-Dichloropropene
40	41	3	68	4	14128	bb	8.061	43	4-Methyl-2-pentanone
41	0	0	0	0	24720	A	8.141	92	Toluene
42	0	0	0	0	0		0.000	75	trans-1,3-Dichloropropene
43	0	0	0	0	0		0.000	97	1,1,2-Trichloroethane
44	0	0	0	0	0		0.000	69	Ethyl methacrylate
45	0	0	0	0	0		0.000	164	Tetrachloroethene
46	0	0	0	0	0		0.000	76	1,3-Dichloropropane
47	0	0	0	0	0		0.000	43	2-Hexanone
48	0	0	0	0	0		0.000	129	Dibromochloromethane
49	0	0	0	0	0		0.000	107	1,2-Dibromoethane
50	0	0	0	0	0		0.000	112	Chlorobenzene

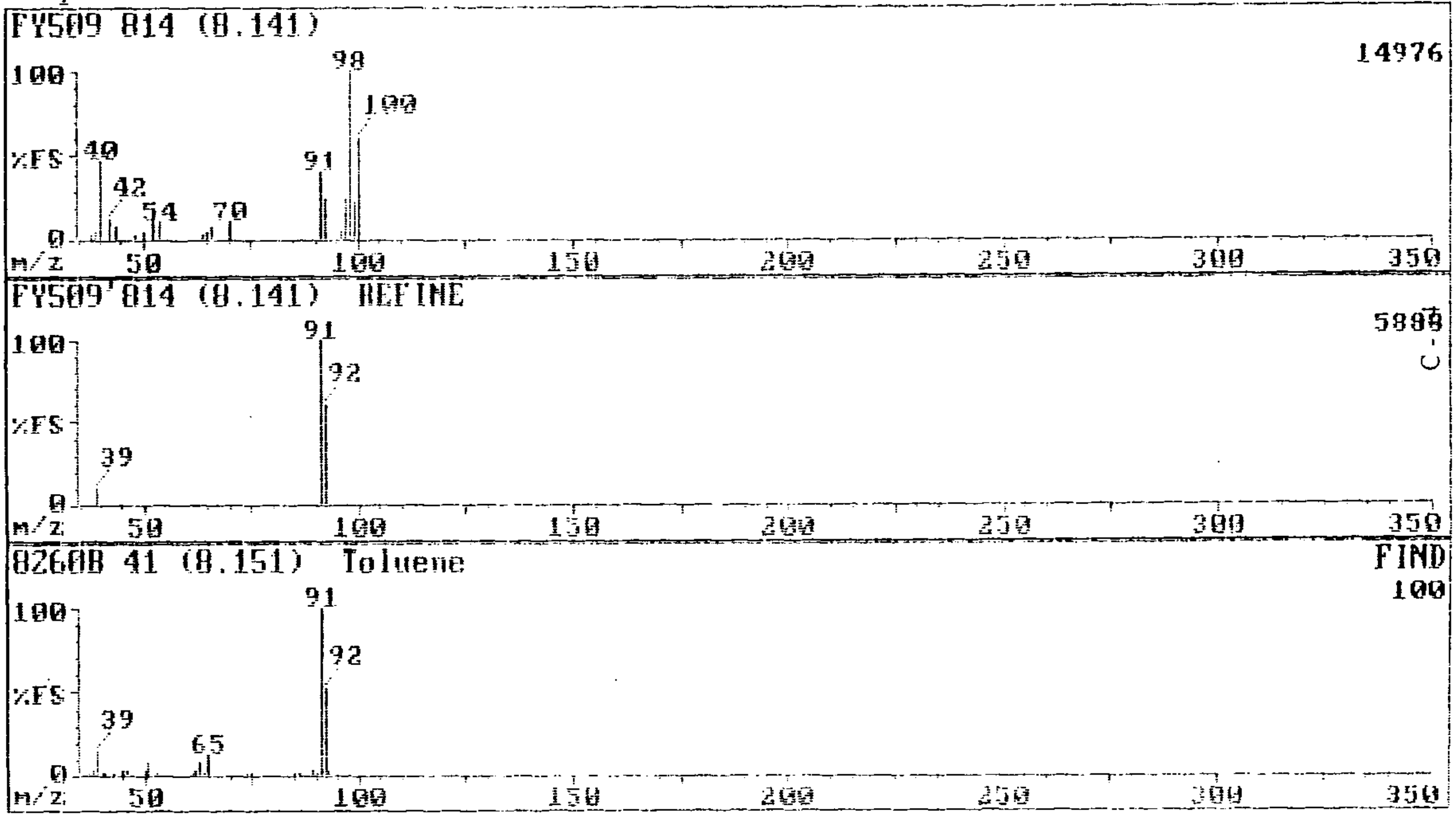
Data Review: YL
Date: 2/5/99

7

No.	MAT	FOR	REV	Delta	Area	P.Flags	RT	QM	Name
51	0	0	0	0	0		0.000	131	1,1,1,2-Tetrachloroethane
52	0	0	0	0	0		0.000	106	Ethylbenzene
53	0	0	0	0	0		0.000	106	m-/p-Xylene
54	0	0	0	0	0		0.000	106	o-Xylene
55	0	0	0	0	0		0.000	104	Styrene
56	0	0	0	0	0		0.000	173	Bromoform
57	0	0	0	0	0		0.000	105	Cumene
58	0	0	0	0	0		0.000	83	1,1,2,2-Tetrachloroethane
59	0	0	0	0	0		0.000	156	Bromobenzene
60	41	13	52	-1	790472	bv	12.671	75	1,2,3-Trichloropropane
61	0	0	0	0	0		0.000	120	n-Propylbenzene
62	0	0	0	0	0		0.000	75	trans-1,4-Dichloro-2-bute
63	0	0	0	0	0		0.000	126	2-Chlorotoluene
64	0	0	0	0	0		0.000	126	4-Chlorotoluene
65	0	0	0	0	0		0.000	105	1,3,5-Trimethylbenzene
66	0	0	0	0	0		0.000	119	tert-Butylbenzene
67	0	0	0	0	0		0.000	105	1,2,4-Trimethylbenzene
68	0	0	0	0	0		0.000	105	sec-Butylbenzene
69	0	0	0	0	0		0.000	119	p-Cymene
70	0	0	0	0	0		0.000	146	1,3-Dichlorobenzene
71	0	0	0	0	0		0.000	146	1,4-Dichlorobenzene
72	0	0	0	0	0		0.000	91	Benzyl chloride
73	54	42	44	0	29784	A	17.332	91	n-Butylbenzene
74	0	0	0	0	0		0.000	146	1,2-Dichlorobenzene
75	0	0	0	0	0		0.000	75	1,2-Dibromo-3-chloropropa
76	100	76	88	0	55880	bb	19.312	180	1,2,4-Trichlorobenzene
77	93	58	94	-1	75708	bb	19.502	225	Hexachlorobutadiene
78	58	40	53	1	25464	bv	19.532	128	Naphthalene
79	94	69	85	-1	52228	bb	19.712	180	1,2,3-Trichlorobenzene

01-Feb-99 07:34 Triangle Laboratories, Inc. (919) 544-5729

Sample: VOSTBLK T/TC Instrument F



TRIANGLE LABS

CALIBRATION DATA

Triangle Laboratories, Inc.
801 Capitola Drive
Durham, NC 27713-4411
919-544-5729

P.O. Box 13485
Research Triangle Park, NC 27709-3485
Fax # 919-544-5491

ICAL File: ICALF127	Date of Analysis :01/27/99	Analyte List: 8260B
RF.10 FY451	RF.25 FY447	RF.50 FY439
RF.75 FY440	RF1.0 FY441	

VOST Calibration.

Analyte	Flag	RF.10	RF.25	RF.50	RF.75	RF1.0	MEAN	%RSD
Pentafluorobenzene	I							
Methylene chloride		0.237	0.224	0.215	0.208	0.207	0.218	5.7
1,4-Difluorobenzene	I							
Toluene	C	0.685	0.770	0.834	0.842	0.862	0.799	9.1
Average %RSD								7.4

Surrogate	Flag	RF.10	RF.25	RF.50	RF.75	RF1.0	Mean	%RSD
Dibromofluoromethane	S	0.374	0.352	0.315	0.358	0.347	0.349	6.3
Toluene-d8	S	0.920	1.022	1.024	1.086	1.091	1.029	6.7

Approved by: _____ Date 02/05/99

*- Fails QC Criteria for %RSD; << - RF less than minimum QC RF; >> - RF greater than maximum QC RF

Triangle Laboratories, Inc.
Continuing Calibration Curve

CCAL File: FY506	Date of Analysis :02/01/99	Analyte List: 8260B
ICAL File: ICALF127		

VOST Calibration.

Analyte	Flag	RF0.25	RFMEAN	%D
Pentafluorobenzene	I			
Methylene chloride		0.198	0.218	9.2
1,4-Difluorobenzene	I			
Toluene	C	0.776	0.799	2.9

Surrogate	Flag	RF0.25	RFMEAN	%D
Dibromofluoromethane	S	0.332	0.349	4.9
Toluene-d8	S	1.071	1.029	-4.1

Approved by: _____ Date 2/5/99

*- Fails QC Criteria for %D; << - Rf less than minimum QC RF; >>- RF greater than maximum QC RF

APPENDIX D

PRODUCTION DOCUMENTATION

AP42 Re-Test for Tire Carcasses Grinding (28 Jan 99)

For Pollutants Methylene Chloride and Toluene

Test Process Information:

	Truck Tire Brandname	Tire Weight Before Grinding (lbs/tire)	Tire Weight After Grinding (lbs/tire)	Tire Weight Ground Off (lbs/tire)
Test #1				
	Goodyear	108.3	95.5	12.8
	Goodyear	105.7	88	17.7
	Firestone	105	95.9	9.1
	Goodyear	109.7	97	12.7
	Michelin	92.8	81.9	10.9
	Michelin	98.5	84	14.5
	Goodyear	93.5	84.2	9.3
	Michelin	95.8	83.2	12.6
			Total Removed	99.6
			Average per Tire	12.5
Test #2				
	Kumho	110.95	103.3	7.65
	Dunlop	113.7	97.85	15.85
	Goodyear	109.4	95.5	13.9
	Yokohama	109.9	100.9	9
	Dunlop	97.85	87.15	10.7
	Goodyear	110	97.2	12.8
	Michelin	101.7	92.9	8.8
	Michelin	93.6	80.7	12.9
			Total Removed	91.6
			Average per Tire	11.5
Between Test	Goodyear	112.45	102.2	10.25
	Kelly	107.3	94.5	12.8
Test #3				
	Michelin	108.8	94.5	14.3
	Michelin	98.9	87.8	11.1
	Hankook	123.5	109.9	13.6
	Michelin	103.6	94	9.6
	Dunlop	105.9	94	11.9
	Bridgeston	104.5	91.3	13.2
	Goodyear	108.6	96.1	12.5
	General	104.9	93.8	11.1
			Total Removed	97.3
			Average per Tire	12.2
		Average Rubber Removed per Test		**96.2**
		Average Rubber Removed per Tire		12.0

APPENDIX E

CALIBRATION DATA

QUALITY ASSURANCE AND EQUIPMENT CALIBRATION PROCEDURES

General. Each item of field or laboratory test equipment purchased or fabricated by Trigon Engineering Consultants is assigned a unique, permanent identification number. New items for which calibration is required are calibrated before initial field use. Equipment whose calibration status may change with use or with time is inspected in the field before testing begins, and again upon return from each field use. When an item of equipment is found to be out of calibration, it is adjusted and recalibrated or retired from service. All equipment is periodically recalibrated in full, regardless of the outcome of these regular inspections.

Calibrations are conducted in accordance with United States Environmental Protection Agency (US EPA) specifications. Trigon follows the calibration procedures outlined in EPA Reference Methods found in the Code of Federal Regulations (Volume 40, Part 60) and those recommended in the Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III (EPA/600/R-94/038c). When the Reference Methods do not detail procedures, Trigon uses methods such as those prescribed by the American Society for Testing and Materials (ASTM).

Data obtained during calibrations are recorded on standardized forms, which are verified for completeness and accuracy by the Quality Assurance Manager. Data reduction and subsequent calculations are performed using Trigon's Air Quality Data System. Calibration calculations are performed by an environmental scientist, independently audited by the Project Manager, and reviewed by the Quality Assurance Manager for verification of data. Copies of calibration data are included in each test or project report.

Inspection and Maintenance. An effective preventative maintenance program is necessary to ensure equipment performance quality prior to, during, and following every test. Each item of equipment returning from the field is inspected before it is returned to storage. During the course of these inspections, items are cleaned, repaired, reconditioned, and recalibrated when necessary.

Each item of equipment transported to the field for a test project is inspected again prior to being packed. Trigon performs these quality assurance checks prior to departure for the project site to detect equipment problems which may occur during periods of storage. Trigon transports adequate back-up equipment to each project so as to avoid any unforeseen circumstances.

Calibration. Source sampling equipment that require calibration include nozzles, pitot tubes, thermometers, flow meters, dry gas meters, and barometers. The following sections detail the calibration procedures followed by Trigon for each item.

Nozzles. Each probe nozzle is uniquely and permanently identified at the time of purchase or fabrication, and it is calibrated before initial field use and prior to each test. The inside diameter of the nozzle is measured to the nearest 0.001 inch using a precision jeweled micrometer. Three measurements are made using different diameters each time. If the difference between the high and the low measurements do not exceed 0.004 inch, the average of the three measurements is used. If the difference exceeds this amount, or when the nozzle becomes nicked, dented, or corroded, the nozzle is reshaped, sharpened, and recalibrated. Regardless of usage, all nozzles are inspected and recalibrated on a yearly basis.

Pitot Tubes. All Trigon Type S pitot tubes have been constructed and calibrated in strict accordance with EPA Reference Method 2, Calibration Procedures 2 and 2a. Trigon Type S pitot tubes C_p coefficients have been determined according Calibration Procedure 2a.. Trigon standard pitot tubes have been assigned a C_p coefficient of 0.99 according to Calibration Procedure 2. Each pitot tube is visually inspected prior to any field use. If the inspection indicates damage, it is recalibrated. Regardless of usage, all pitot tubes are inspected and recalibrated on a yearly basis.

Dry Gas Meter and Orifice. Each metering system receives a full calibration at the time of purchase and annually, thereafter. Post-test calibrations are performed after each source test. If the calibration factor, γ (gamma), deviates by less than five percent from the initial value, the test data are acceptable. If γ deviates by more than five percent, the meter is recalibrated and the meter coefficient (initial or recalibrated) that yields the lowest sample volume for the test runs is used. Standard practice at Trigon is to recalibrate the dry gas meter anytime γ is found to be outside the range of $0.98 \leq \gamma \leq 1.02$.

Barometer. Each field barometer is calibrated to agree within $\pm$ 0.1 inches Hg of a reference mercury barometer. The barometric pressure is corrected for pressure and temperature. Prior to and following each field test the field barometer is verified.

Thermometers. Each new thermometer, pyrometer and thermocouple purchased or fabricated by Trigon is calibrated in strict accordance with US EPA Protocol. Calibration tolerance limits are as follow:

Impinger Temperature Gauge	±1°C or 2°F
Dry Gas Meter Temperature Gauge	±3°C or 5.4°F
Stack Thermocouples	±1.5% of absolute temperature

All thermometers and thermocouples are inspected and calibrated prior to and following each field test. Regardless of usage, all thermometers and thermocouples are inspected and recalibrated on a yearly basis.

Laboratory Equipment. Trigon Engineering Consultants has a written quality assurance document that covers calibration and maintenance of laboratory equipment. This includes calibration of each analytical balance against Class S weights. Calibration of thermometers, barometers, and wet test meters are traceable to NIST. A copy of our quality assurance document may be obtained by written request.

PRETEST - POSTEST CALIBRATION DATA FORM

Client Michelin City/State Duncan, SC

Pretest Date 01/27/99 Calibrator PY Postest Date 01/28/99 Calibrator MY

Reference Thermometer 100.022 Reference Barometer 600.003

	Pretest		Postest	
	Temperature, °F	Ref. Temp., °F	Temperature, °F	Ref. Temp., °F
Omega Red Team DB/WB #100.025				
Omega Green Team DB/WB #100.031	72/72	72	74/74	73 ~~74~~ MY
Omega Blue Team DB/WB #100.017				
Omega Gold Team DB/WB #100.032				
Omega Grev Team DB/WB #100.033				
Omega CEM DB/WB #100.026				
Dry Gas Meter Inlet/Outlet #300.035				
Dry Gas Meter Inlet/Outlet #300.045				
Dry Gas Meter Inlet/Outlet #300.067				
Dry Gas Meter Inlet/Outlet #300.100				
Dry Gas Meter Inlet/Outlet #300.200				
Dry Gas Meter Inlet/Outlet #300.214				
Dry Gas Meter Inlet/Outlet #300.241				
Dry Gas Meter Inlet/Outlet #300.248				
Dry Gas Meter Inlet/Outlet #300.				
Dry Gas Meter Inlet/Outlet #300.				
Umbilical Adaptor # #300.				
Umbilical Adaptor # #300.				
Umbilical Adaptor # #300.				
Umbilical Adaptor # #300.				
Umbilical Adaptor # #300.				
Umbilical Adaptor # #300.				
Probe #200.				
Probe #200.				
Probe #200.				
Probe #200.				
Probe #200.				
Probe #200.				
Pitot #200. 028	72	72	73	73
Pitot #200.				
VOST DGM 400.032	22°C (71.6)	72	23°C	73
VOST DGM 400.030	72	72	—	—
	Field Baro., in. Hg	Ref. Baro., in. Hg	Field Baro., in. Hg	Ref. Baro., in. Hg
Barometer Red Team #600.001				
Barometer Green Team #600.014	29.30	29.320	29.12	29.122
Barometer Blue Team #600.010				
Barometer Gold Team #600.021(D)				
Barometer CEM #600.020(D)				

Were all postest calibrations within the specified EPA Quality Assurance criteria? ☑ Yes ☐ No

TRIGON

Control Console Calibration Form

Console Number: 400.030 Calibrator: PRJ

Calibration Date: 05/25/98 Dry Gas Meter Number: 1054717

Expiration Date: 05/25/99 Bar. Pressure, in. Hg: 29.104

Vacuum, in. Hg	Gas Volume, liters Dry Gas Meter	Meter Temperatures		Ref. Flow liters/min.	Time, minutes	Rotometer Ref. Mark
		Console, °F	Orifice, °F			
19	20.0	74.5	71.5	1.840	10.79	1.85
19	20.0	74.0	71.5	1.840	10.76	1.85
21	10.0	74.5	73.5	1.019	9.75	1.00
21	10.0	75.0	73.5	1.019	9.76	1.00
23	5.0	74.5	73.5	0.447	11.13	0.4
23	5.0	74.5	73.5	0.448	11.12	0.4

DGM Volume DSCM	Ref. Volume DSCM	γ Factor
0.019231	0.019198	0.998
0.019249	0.019144	0.995
0.009615	0.009571	0.995
0.009606	0.009581	0.997
0.004808	0.004793	0.997
0.004808	0.004799	0.998

Average 1.00

Console Dry Gas Meter Volume at STP, Cubic Meters

$$V_{meter(std)} = (0.3858\ ^\circ K/mm\ Hg)\ (V_m)\ \frac{P_{bar}}{T_m} = 0.019231$$

Reference Meter Volume at STP, Cubic Meters

$$V_{orifice(std)} = (0.3858\ ^\circ K/mm\ Hg)\ (V_m)\ \frac{(\text{Flow Rate})(\text{Time})(P_{bar})}{T_{orifice}} = 0.019198$$

Console Dry Gas Meter Correction Factor, γ

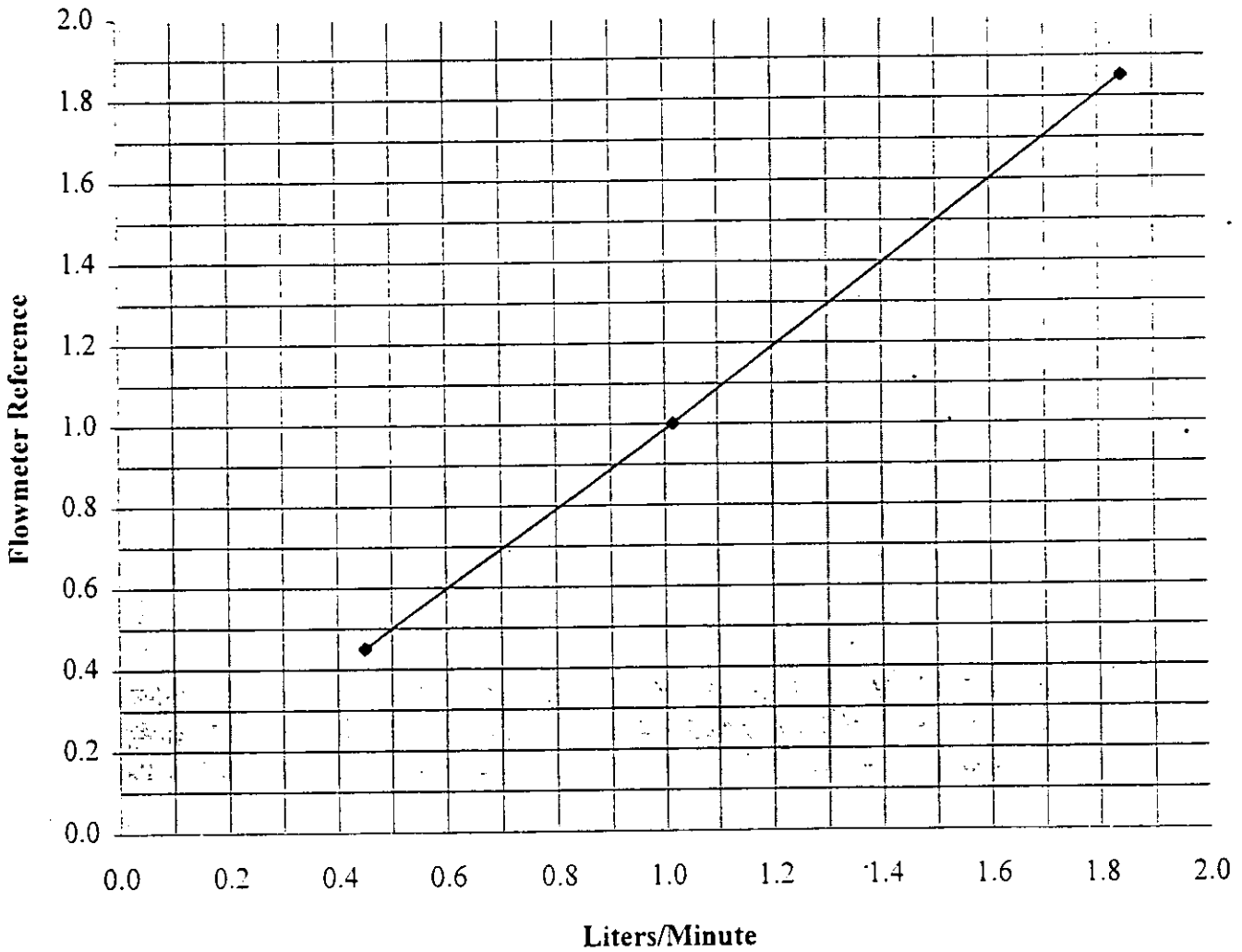
$$\gamma = \frac{V_{orifice(std)}}{V_{meter(std)}} = 0.998$$

GAS SAMPLER FLOWMETER CALIBRATION

Date: 05/25/98
Console Number: 400.030
Barometric Pressure: 29.104 in. Hg

Calibrator: PRJ
Model Number: E1-1Y101-E517
Ambient Temperature: 70 °F

Matheson Flowmeter



Graph Data Points

Flow, liter/min	Flowmeter Reference
0.450	0.45
1.015	1.00
1.843	1.85

Control Console Calibration Form

Console Number: 400.032 Calibrator: PRJ

Calibration Date: 05/19/98 Dry Gas Meter Number: M900561

Expiration Date: 05/19/99 Bar. Pressure, in. Hg: 29.214

Vacuum, in. Hg	Gas Volume, liters Dry Gas Meter	Meter Temperatures		Ref. Flow liters/min.	Time, minutes	Rotometer Ref. Mark
		Console, °C	Orifice, °F			
16	10.0	23.0	71.5	1.019	9.77	88
16	10.0	23.0	69.0	1.021	9.69	88
21	5.0	22.5	70.2	0.447	11.15	42
21	5.0	22.9	71.9	0.447	11.20	42
25	1.5	22.9	72.0	0.166	9.00	20
25	1.5	23.0	72.0	0.166	9.06	20

DGM Volume DSCM	Ref. Volume DSCM	γ Factor
0.009672	0.009663	0.999
0.009672	0.009648	0.998
0.004844	0.004849	1.001
0.004837	0.004856	1.004
0.001451	0.001449	0.998
0.001451	0.001458	1.005

Average 1.00

Console Dry Gas Meter Volume at STP, Cubic Meters

$$V_{meter(std)} = (0.3858\ ^\circ K/mm\ Hg)\ (V_m)\ \frac{P_{bar}}{T_m} = 0.009672$$

Reference Meter Volume at STP, Cubic Meters

$$V_{orifice(std)} = (0.3858\ ^\circ K/mm\ Hg)\ (V_m)\ \frac{(Flow\ Rate)(Time)(P_{bar})}{T_{orifice}} = 0.009663$$

Console Dry Gas Meter Correction Factor, γ

$$\gamma = \frac{V_{orifice(std)}}{V_{meter(std)}} = 0.999$$

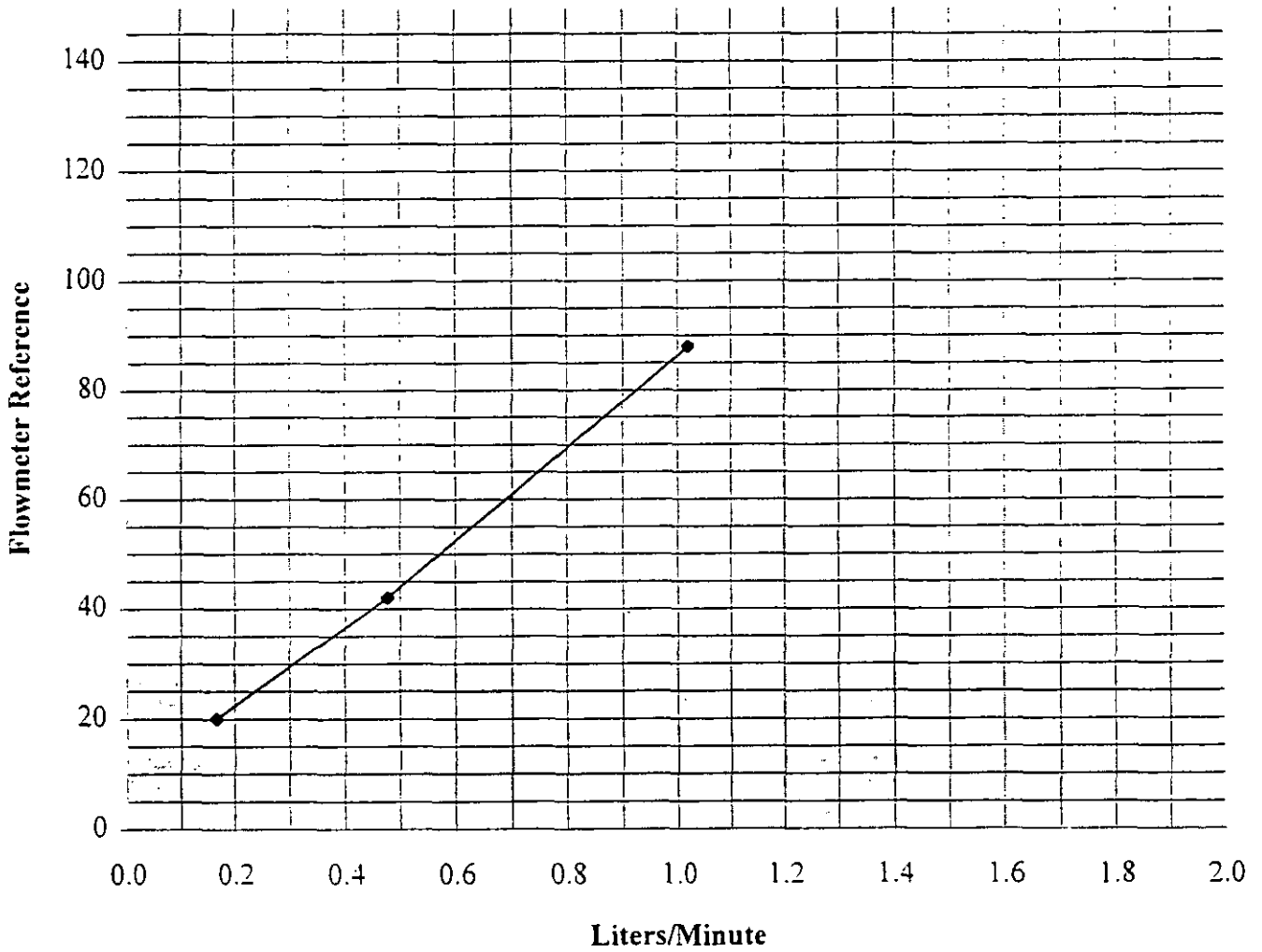
TRIGON

GAS SAMPLER FLOWMETER CALIBRATION

Date: 05/19/98
Console Number: 400.032
Barometric Pressure: 29.214 in. Hg

Calibrator: PRJ
Model Number: E1-1Y101-E517
Ambient Temperature: 70 °F

Matheson Flowmeter



Graph Data Points

Flow, liter/min	Flowmeter Reference
0.166	20
0.477	42
1.020	88

TYPE "S" PITOT TUBE CALIBRATION FORM

Date: 01/04/99
Calibrator: JPM

Specifications:
A.) Pitot tube assembly must be level.
B.) If pitot tube is damaged explain under comments section.
C.) $Z = A \sin \gamma$ (<0.125) and $W = A \sin \theta$ (<0.03125)
D.) α <10° and β <5°

Individual Pitot Tubes

I.D.	Length	α1°	α2°	β1°	β2°	γ°	θ°	A, in.	Z, in.	W, in.	PA, in.	PB, in.	Dt, in.
200.057	1.5'	0.0	0.0	1.0	0.0	0.0	1.0	0.629	0.000	0.01098	0.315	0.314	0.246
200.062	1.5'	1.0	1.0	0.0	0.0	0.0	0.0	0.655	0.000	0.00000	0.328	0.327	0.250
200.019	2'	2.0	1.0	0.0	0.0	0.0	1.0	0.943	0.000	0.01646	0.472	0.471	0.378
200.058	30"	0.0	0.0	2.0	2.0	2.0	0.0	0.916	0.032	0.00000	0.458	0.458	0.377
200.049	3'	0.0	0.0	0.0	0.0	0.0	1.0	0.939	0.000	0.01639	0.470	0.469	0.373
200.028	3'	4.0	5.0	1.0	3.0	1.0	1.5	0.923	0.016	0.02416	0.462	0.461	0.377
200.025	5'	0.0	0.0	0.0	0.5	0.5	0.0	0.818	0.007	0.00000	0.409	0.409	0.377
200.067	5'	1.0	1.0	1.0	0.0	1.0	1.0	0.943	0.016	0.01646	0.472	0.471	0.375
200.044	6'	0.0	0.0	1.0	1.0	1.0	0.0	0.923	0.016	0.00000	0.462	0.461	0.376
200.038	7'	1.0	0.0	0.0	0.0	0.0	0.0	0.879	0.000	0.00000	0.440	0.439	0.376
200.030	7'	2.0	5.0	1.0	2.0	0.0	0.0	0.937	0.000	0.00000	0.469	0.468	0.375
200.055	7'	1.0	1.0	0.0	1.0	1.0	1.0	0.848	0.015	0.01480	0.424	0.424	0.378
200.031	10'	1.0	2.0	2.0	1.0	2.0	1.0	0.942	0.033	0.01644	0.471	0.471	0.376
300.164	And	3.0	3.0	1.0	1.0	1.0	1.0	1.111	0.019	0.01939	0.556	0.555	0.376

Comments: Pitot Tubes Required Only Minor Maintenance
300.164 And = Anderson Probe Extension
200.062 Alc = 4075TF Probe

Individual Type S Pitot Tube Calibration Sheet

Date: 01/04/99 Standard Pitot Tube No: 200.065 Barometric Press., in. Hg: 29.32

Calibrator: TRP $C_{p(std)}$: 0.99 Ambient Temperature °F: 64

Pitot Tube	Velocity Head, Inches of Water						Calibration Coefficients	
ID No./Side	Run 1 Δ pstd	Run 2 Δ pstd	Run 3 Δ pstd	Run 1 Δ pS	Run 2 Δ pS	Run 3 Δ pS	$C_{p(S)}$ Side A/B	Avg. Dev. σ
200.057/A	0.30	0.30	0.29	0.41	0.41	0.40	0.85	0.004
200.057/B	0.29	0.30	0.30	0.40	0.41	0.41	0.85	0.004
200.062/A	0.30	0.29	0.31	0.40	0.39	0.41	0.86	0.003
200.062/B	0.31	0.31	0.29	0.41	0.41	0.39	0.86	0.003
200.019/A	0.31	0.30	0.31	0.42	0.41	0.42	0.85	0.002
200.019/B	0.32	0.32	0.32	0.43	0.43	0.43	0.85	0.004
200.058/A	0.32	0.32	0.33	0.44	0.44	0.45	0.85	0.005
200.058/B	0.32	0.32	0.32	0.43	0.44	0.44	0.85	0.005
200.049/A	0.30	0.31	0.30	0.41	0.42	0.41	0.85	0.002
200.049/B	0.29	0.29	0.29	0.40	0.41	0.41	0.84	0.006
200.028/A	0.30	0.30	0.30	0.43	0.43	0.43	0.83	0.003
200.028/B	0.31	0.30	0.30	0.43	0.42	0.42	0.84	0.002
200.025/A	0.32	0.32	0.32	0.44	0.44	0.44	0.84	0.004
200.025/B	0.32	0.32	0.32	0.44	0.44	0.44	0.84	0.004
200.067/A	0.33	0.33	0.33	0.45	0.45	0.45	0.85	0.002
200.067/B	0.33	0.33	0.33	0.45	0.45	0.45	0.85	0.002
200.044/A	0.30	0.31	0.31	0.43	0.44	0.44	0.83	0.002
200.044/B	0.31	0.31	0.31	0.43	0.43	0.43	0.84	0.001
200.038/A	0.30	0.30	0.30	0.43	0.43	0.43	0.83	0.003
200.038/B	0.32	0.32	0.32	0.44	0.44	0.44	0.84	0.004
200.030/A	0.31	0.31	0.31	0.44	0.44	0.45	0.83	0.003
200.030/B	0.32	0.31	0.31	0.45	0.45	0.45	0.83	0.007
200.055/A	0.29	0.29	0.30	0.40	0.40	0.41	0.84	0.004
200.055/B	0.30	0.31	0.31	0.41	0.42	0.42	0.85	0.002
200.031/A	0.31	0.31	0.31	0.44	0.44	0.44	0.83	0.001
200.031/B	0.31	0.30	0.30	0.44	0.43	0.43	0.83	0.002
300.164/A	0.30	0.30	0.29	0.40	0.40	0.39	0.86	0.004
300.164/B	0.30	0.31	0.30	0.40	0.41	0.40	0.86	0.002

Example Calculations:

$C_{p(S)} = C_{p(std)} ((\Delta p_{std})/(\Delta pS))^{0.5}$ Deviation = $C_{p(S)} - \overline{C_p}$(A or B) *must be* ≤ 0.01

TRIGON

Summary Pitot Tube Calibration Sheet

Date: 01/04/99 Standard Pitot Tube No: 200.065 Barometric Press., in. Hg: 29.32

Calibrator: TRP $C_{p(std)}$: 0.99 Ambient Temperature °F: 64

Standard Pitot Tubes

Pitot Tube ID No./Size	Coefficient Cp(std)
200.029 6.5"	0.99
200.035 12.5"	0.99
200.001 18.5"	0.99
200.018 18.5"	0.99
200.032 18.5"	0.99

Pitot Tube ID No./Size	Coefficient Cp(std)
200.033 18.5"	0.99
200.046 12.5"	0.99
200.048 18.5"	0.99
200.026 48.5"	0.99

Individual Type S Pitot Tubes

Pitot Tube ID No./Size	Coefficient Cp(std)
200.057 1'	0.85
200.062 1'	0.86
200.019 2'	0.85
200.058 30"	0.85
200.049 3'	0.85
200.028 3'	0.84
200.025 5'	0.84
200.067 5'	0.85

Pitot Tube ID No./Size	Coefficient Cp(std)
200.044 6'	0.84
200.038 7'	0.84
200.030 7'	0.83
200.055 7'	0.85
200.031 10'	0.83
300.164 An.	0.86
200.062 Alc.	

Probe Type S Pitot Tubes

Pitot Tube ID No./Size	Coefficient Cp(std)
200.020 2'	0.85
200.021 2'	0.85
200.036 2'	0.86
200.037 2'	0.86
200.063 2'	0.85
200.064 2'	0.86
200.004 3'	0.86
200.005 3'	0.86
200.006 3'	0.86
200.015 3'	0.85
200.016 3'	0.86
200.017 3'	0.85
200.066 3'	0.86
200.297 3'	0.86
200.007 5'	0.87
200.008 5'	0.84
200.009 5'	0.86
200.022 5'	0.86
200.027 5'	0.84
200.034 5'	0.85
200.056 5'	0.86

Pitot Tube ID No./Size	Coefficient Cp(std)
200.061 5'	0.86
200.024 6'	0.86
200.010 7'	0.83
200.011 7'	0.86
200.012 7'	0.86
200.039 7'	0.83
200.040 7'	0.85
200.059 7'	0.82
200.060 7'	0.84
200.041 8'	0.86
200.045 8'	0.85
200.013 10'	0.85
200.014 10'	0.84
200.050 12'	0.85
200.051 12'	0.85
200.052 12'	0.86
200.053 12'	0.84

TRIGON

TEMPERATURE SENSOR CALIBRATION FORM
NIST REFERENCE THERMOMETER TRANSFER CALIBRATION

Tolerance: +/- 1.5% of Absolute Temperature

Date: 01/04/99
Ambient Temperature, Deg. F: 73
Calibrated By: JPM

Barometric Pressure, In. Hg: 29.53
Reference Thermometer Serial No 2890
Reference Thermometer Serial No 2775

Thermocouple ID No.	Reference Point	Source	NIST Reference Thermometer Temperature Degrees F	Transfer Instrument Temperature Degrees F	Temperature Difference Calculation Percent, %
-30 to 120 Deg. F Thermometer Serial Number F96-247					
100.022	1	Water Bath	35	35	0.00
	2	Water Bath	78	78	0.00
	3	Water Bath	117	117	0.00
-5 to 400 Deg. C Thermometer Serial Number U38717					
100.024	1	Water Bath	78	25 Deg. C	0.19
	2	Water Bath	117	47 Deg. C	0.07
	3	Water Bath	200	93 Deg. C	0.09
-120 to 2000 Deg. F Omega HH25 KF Pyrometer Serial Number T-124997 Red Team					
100.025	1	Water Bath	39	39	0.00
	2	Water Bath	79	79	0.00
	3	Water Bath	159	159	0.00
-120 to 2000 Deg. F Omega HH25 KF Pyrometer Serial Number T-151625 Green Team					
100.031	1	Water Bath	39	39	0.00
	2	Water Bath	80	79	0.19
	3	Water Bath	159	158	0.16
-120 to 2000 Deg. F Omega HH25 KF Pyrometer Serial Number T-173773 Blue Team					
100.017	1	Water Bath	39	38	0.20
	2	Water Bath	80	79	0.19
	3	Water Bath	158	157	0.16
-120 to 2000 Deg. F Omega HH25 KF Pyrometer Serial Number T-177429 Gold Team					
100.032	1	Water Bath	37	36	0.20
	2	Water Bath	78	77	0.19
	3	Water Bath	158	158	0.00
-120 to 2000 Deg. F Omega HH25 KF Pyrometer Serial Number T-148889 Grey Team					
100.026	1	Water Bath	37	37	0.00
	2	Water Bath	79	79	0.00
	3	Water Bath	158	158	0.00
-120 to 2000 Deg. F Omega HH25 KF Pyrometer Serial Number T-148841 CEM					
100.027	1	Water Bath	37	36	0.20
	2	Water Bath	79	78	0.19
	3	Water Bath	158	157	0.16

Source = Type of calibration system used.

Temperature Difference Calculation:

$$\frac{\text{(Ref. Temp. Deg. F + 460) - (Test Temp. Deg. F + 460)}}{\text{Ref. Temp. Deg. F + 460}} \times 100 = <1.5\%$$

TEMPERATURE SENSOR CALIBRATION FORM
THERMOCOUPLES

Tolerance: +/- 1.5% of Absolute Temperature

Date: 01/04/99
Ambient Temperature, Deg. F: 73
Calibrated By: BLS

Barometric Pressure, In. Hg: 29.51
Reference Thermometer Serial No 2890
Reference Thermometer Serial No 2775

Thermocouple ID No.	Reference Point	Source	Reference Thermometer Temperature Degrees F	Thermocouple Potentiometer Temperature Degrees F	Temperature Difference Calculation Percent, %
Omega HH-25 KF Dry Bulb - Red Team					
100.025	1	Water Bath	36	36	0.00
	2	Water Bath	84	83	0.18
	3	Water Bath	159	160	-0.16
Omega HH-25 KF Wet Bulb - Red Team					
100.025	1	Water Bath	36	37	-0.20
	2	Water Bath	83	84	-0.18
	3	Water Bath	159	159	0.00
Omega HH-25 KF Dry Bulb - Green Team					
100.031	1	Water Bath	35	34	0.20
	2	Water Bath	82	82	0.00
	3	Water Bath	161	160	0.16
Omega HH-25 KF Wet Bulb - Green Team					
100.031	1	Water Bath	36	37	-0.20
	2	Water Bath	82	82	0.00
	3	Water Bath	159	159	0.00
Omega HH-25 KF Dry Bulb - Blue Team					
100.017	1	Water Bath	34	33	0.20
	2	Water Bath	82	80	0.37
	3	Water Bath	161	159	0.32
Omega HH-25 KF Wet Bulb - Blue Team					
100.017	1	Water Bath	34	33	0.20
	2	Water Bath	79	78	0.19
	3	Water Bath	160	158	0.32
Omega HH-25 KF Dry Bulb - Gold Team					
100.032	1	Water Bath	34	33	0.20
	2	Water Bath	80	79	0.19
	3	Water Bath	160	159	0.16
Omega HH-25 KF Wet Bulb - Gold Team					
100.032	1	Water Bath	36	34	0.40
	2	Water Bath	79	77	0.37
	3	Water Bath	160	158	0.32

Source = Type of calibration system used.

Temperature Difference Calculation:

$$\frac{\text{(Ref. Temp. Deg. F + 460) - (Test Temp. Deg. F + 460)}}{\text{Ref. Temp. Deg. F + 460}} \times 100 = <1.5\%$$

TRIGON

TEMPERATURE SENSOR CALIBRATION FORM
THERMOCOUPLES

Tolerance: +/- 1.5% of Absolute Temperature

Date: 01/04/99
Ambient Temperature, Deg. F: 73
Calibrated By: NRK

Barometric Pressure, In. Hg: 29.51
Reference Thermometer Serial No 2890
Reference Thermometer Serial No 2775

Thermocouple ID No.	Reference Point	Source	Reference Thermometer Temperature Degrees F	Thermocouple Potentiometer Temperature Degrees F	Temperature Difference Calculation Percent, %
DGM Body Bimetallic Thermometer					
400.030	1	Water Bath	34	34	0.00
	2	Water Bath	74	74	0.00
	3	Water Bath	118	118	0.00
DGM Body Thermocouple					
400.032	1	Water Bath	34	34	0.00
	2	Water Bath	74	74	0.00
	3	Water Bath	118	118	0.00
DGM Inlet					
400.050	1	Water Bath	35	34	0.20
	2	Water Bath	74	74	0.00
	3	Water Bath	114	114	0.00
DGM Outlet					
400.050	1	Water Bath	35	35	0.00
	2	Water Bath	74	74	0.00
	3	Water Bath	114	114	0.00

Source = Type of calibration system used.

Temperature Difference Calculation:

$$\frac{\text{(Ref. Temp. Deg. F + 460) - (Test Temp. Deg. F + 460)}}{\text{Ref. Temp. Deg. F + 460}} \times 100 = <1.5\%$$

TRIGON

TEMPERATURE SENSOR CALIBRATION FORM
THERMOCOUPLES

Tolerance: +/- 1.5% of Absolute Temperature

Date: 01/04/99
Ambient Temperature, Deg. F: 73
Calibrated By: NRK

Barometric Pressure, In. Hg: 29.51
Reference Thermometer Serial No 2890
Reference Thermometer Serial No 2775

Thermocouple ID No.	Reference Point	Source	Reference Thermometer Temperature Degrees F	Thermocouple Potentiometer Temperature Degrees F	Temperature Difference Calculation Percent, %
2' Pitot Tube					
200.019	1	Water Bath	62	61	0.19
	2	Water Bath	183	184	-0.16
	3	Oil Bath	377	376	0.12
30" Pitot Tube					
200.058	1	Water Bath	62	61	0.19
	2	Water Bath	183	183	0.00
	3	Oil Bath	377	376	0.12
3' Pitot Tube					
200.049	1	Water Bath	60	60	0.00
	2	Water Bath	204	204	0.00
	3	Oil Bath	384	384	0.00
3' Pitot Tube					
200.028	1	Water Bath	60	60	0.00
	2	Water Bath	208	209	-0.15
	3	Oil Bath	384	384	0.00
5' Pitot Tube Inconel					
200.025	1	Water Bath	64	64	0.00
	2	Water Bath	210	210	0.00
	3	Oil Bath	337	338	-0.13
	4	Muffle Furnace	521	522	-0.10
	5	Muffle Furnace	823	823	0.00
	6	Muffle Furnace	1100	1101	-0.06
5' Pitot Tube					
200.067	1	Water Bath	64	64	0.00
	2	Water Bath	210	210	0.00
	3	Oil Bath	352	352	0.00
6' Pitot Tube					
200.044	1	Water Bath	61	61	0.00
	2	Water Bath	208	208	0.00
	3	Oil Bath	381	381	0.00

Source = Type of calibration system used.

Temperature Difference Calculation:

$$\frac{\text{(Ref. Temp. Deg. F + 460) - (Test Temp. Deg. F + 460)}}{\text{Ref. Temp. Deg. F + 460}} \times 100 = <1.5\%$$

TRIGON

453

NATIONAL WEATHER SERVICE TYPE MERCURIAL BAROMETERS

Usable up to 900 metres (3,000 feet)

The National Weather Service type barometer is PRINCO's highest grade mercurial barometer. It is used by weather services and airports the world over. The glass tube has a uniform inside diameter of 7 mm for constant capillary depression throughout the length of the scale. Scales are set at the factory by comparison with a barometer certified by the National Bureau of Standards, and read the local pressure without the necessity of correcting for capillary depression. The vernier can be smoothly and precisely set by means of a rack and pinion drive, controlled by a knurled adjusting knob. White plastic backgrounds on the mounting panel facilitate observation of the Fortin type cistern and mercury column. The vernier has a sighting edge, front and rear, to avoid parallax. A suspension bracket and an adjustable ring clamp for the cistern hold the barometer firmly in the vertical position on the mounting panel. A dual scale Celsius/Fahrenheit thermometer with a −25 to 50 °C/−10 to 120 °F range indicates the proper temperature to be used for temperature corrections. An instruction booklet with information for understanding and proper use of the barometer is supplied with each instrument. Complete correction tables for temperature and gravity are included.

This barometer is accurate to ±0.3 mb, 0.2 mm, or 0.01 inch of mercury when carefully set and read, and after temperature and gravity corrections have been applied. For greatest accuracy a Certificate of Calibration may be obtained and the correction contained therein also applied. Each National Weather Service barometer has a serial number.

The rugged construction of the National Weather Service type barometer is such that it can be shipped safely by United Parcel Service or express. The kidskin bag, in the Fortin type reservoir, dampens mercury column oscillations during shipment. The lower part of the glass tube is narrowed down to minimize mercury weight, and is protected by foam cushions, thus offering added resistance to damage during shipment. The cistern may be opened in the field for cleaning of the cistern glass and cistern mercury. The barometer contains approximately 680 grams (1.5 pounds) of mercury total. It is shipped completely assembled, filled with mercury and ready to use. Mounting panel dimensions are 19 x 76 x 1072 mm (3/4 x 3 x 42 inches). The shipping weight is 5 kg (11 pounds) and box dimensions are 235 x 250 x 1197 mm (9 x 10 x 47 inches).

Catalog Number	Scales
→ 453	inch and millimetre
453BI	inch and millibar
453MB	millibar and millimetre

No. F107

CERTIFICATE OF ACCURACY

AMERICAN METER COMPANY

THIS IS TO CERTIFY *that the* 5 cft *Bell Prover No.* 3785 *manufactured by the American Meter Company has been calibrated with either an immersion type cubic foot bottle or with a portable cubic foot standard and was found to be correct within 0.15%. The calibrating standard that was used has been certified and sealed by the National Bureau of Standards at Washington, D.C.*

In accordance with the procedure outlined in National Bureau of Standards Handbook 117 1975, the prover was tested for leaks and adjusted so that the variation in pressure of the air within the bell did not exceed 1/10 inch water column when the bell descended its entire travel.

Air was used in the calibrating operation and the temperature of the air, sealant in the prover and sealant in the standard held constant.

Temperature of air 74.0 F

Temperature of Sealant 74.5 F

By Mark J. Wilson
Engineer

AMERICAN METER COMPANY

Date June 10, 1993

EVER READY THERMOMETER CO., INC.
228 LACKAWANNA AVENUE
WEST PATTERSON, NJ 07424
(973) 812-7474

R E P O R T O F C A L I B R A T I O N

LIQUID-IN-GLASS-THERMOMETER

CALIBRATED BY EVER READY THERMOMETER CO. FOR:
TRIGON ENGINEERING

MARKED: ERTCO CAT 1002-3FC S/N-2890
RANGE: +30 TO +124 DEGREES F IN 0.2 DEGREE GRADUATIONS.

THERMOMETER READING	CORRECTION (ITS-90)**
32.00 F	0.00 F
40.00	-0.06
60.00	-0.06
100.00	0.00
120.00	-0.06

** ALL TEMPERATURES IN THIS REPORT ARE BASED ON THE INTERNATIONAL TEMPERATURE SCALE OF 1990 (ITS-90) PUBLISHED IN THE METROLGIA 27, NO. 1, 3/10/90.

THIS THERMOMETER WAS CALIBRATED AGAINST A STANDARD CALIBRATED AT THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST) FORMERLY THE NATIONAL BUREAU OF STANDARDS (NBS) IN ACCORDANCE WITH ASTM METHOD E 77, AND NBS MONOGRAPH 174.

FOR A DISCUSSION OF ACCURACIES ATTAINABLE WITH SUCH THERMOMETERS SEE NBS MONOGRAPH 250-23.

IF NO SIGN IS GIVEN ON THE CORRECTION, THE TRUE TEMPERATURE IS HIGHER THAN THE INDICATED TEMPERATURE; IF THE SIGN GIVEN IS NEGATIVE, THE TRUE TEMPERATURE IS LOWER THAN THE INDICATED TEMPERATURE. TO USE THE CORRECTIONS PROPERLY, REFERENCE SHOULD BE MADE TO THE NOTES GIVEN BELOW.

THE THERMOMETER WAS TESTED IN A LARGE, CLOSED-TOP, ELECTRICALLY HEATED, LIQUID BATH, BEING "IMMERSED" 76MM. THE TEMPERATURE OF THE ROOM WAS ABOUT 25 DEGREES C (77 DEGREES F). IF THE THERMOMETER IS USED UNDER CONDITIONS WHICH WOULD CAUSE THE AVERAGE TEMPERATURE OF THE EMERGENT LIQUID COLUMN TO DIFFER MARKEDLY FROM THAT PREVAILING IN THE TEST, APPRECIABLE DIFFERENCES IN THE INDICATIONS OF THE THERMOMETER WOULD RESULT.

CONTINUED

TEST NUMBER: 159395
DATE: 06/09/98
STANDARD SERIAL NO. 128239
NIST IDENTIFICATION NO. 88024

R E P O R T O F C A L I B R A T I O N

LIQUID-IN-GLASS-THERMOMETER

THE TABULATED CORRECTIONS APPLY PROVIDED THE ICE-POINT READING, TAKEN AFTER EXPOSURE FOR NOT LESS THAN 3 DAYS TO A TEMPERATURE OF ABOUT 20 DEGREES C (70 DEGREES F) IS 32.00 DEGREES F. IF THE ICE-POINT READING IS FOUND TO BE HIGHER (OR LOWER) THAN STATED, ALL OTHER READINGS WILL BE HIGHER (OR LOWER) TO THE SAME EXTENT. IF THE THERMOMETER IS USED AT A GIVEN TEMPERATURE SHORTLY AFTER BEING HEATED TO A HIGHER TEMPERATURE. AN ERROR OF 0.01 DEGREES OR LESS, FOR EACH 10 DEGREE DIFFERENCE BETWEEN THE TWO TEMPERATURES, MAY BE INTRODUCED. THE TABULATED CORRECTIONS APPLY IF THE THERMOMETER IS USED IN THE UPRIGHT POSITION; IF USED IN A HORIZONTAL POSITION, THE INDICATIONS MAY BE A FEW HUNDREDTHS OF A DEGREE HIGHER.

TEST NUMBER: 159395
DATE: 06/09/98
STANDARD SERIAL NO. 128239
NIST IDENTIFICATION NO. 88024

Charles Tang-Nian
QUALITY CONTROL MANAGER

Ever Ready Thermometer Co., Inc.
228 Lackawanna Avenue
West Paterson, NJ 07424
973-812-7474 FAX 973-812-7475 http://www.ertco.com

Thermometer Calibration Report

This is to certify that the instrument described below has been examined and tested in our calibration laboratory using accuracately ontrolled constant temperature equipment; using NIST calibrated primary reference thermometers, in accordance with our ISO/EC Guide _5 Calibration Procedure 01, which is based in part on ASTM E-77-92, "Standard Test Method For Calibration And Verification Of Liquid In Glass Thermometers" and NIST Special Publication 250-23, "Liquid In Glass Thermometer Calibration Services". This calibration meets 'ıe requirements of ISO/EC Guide 25, ANSI/NCSL Z540-1-1994, the ISO 9000/QS 9000 Series OF Quality Standards, and MIL STD 5662A (ISO 10012-1).

Customer Information

RIGON ENGINEERING CONSULTANTS
_200 HARRIS TECHNOLOGY BLVD.
CHARLOTTE, NC 28269-

ttention:

Purchase Order:

nstrument Description

Serial Number:	2775	Inscription:	ERTCO	Date Completed:	11/11/1998	Immersion:	76 mm
roduct Number:	612-3FC	Scale Range:	0 TO 300 F	Scale Divisions:	2 F		

Results of Physical Examination

'his instrument has been examined under a microscope for strains in the glass, if any, were judged to be minimal and of no detriment to tne functionality of the instrument.

'he capillary of this thermometer has been examined under magnification and no foreign material, moisture, or other evidence of _ontamination were discovered. No discernible capillary irregularities were noted.

'' has been determined that the instrument is in good working order and is therefore suitable for calibration.

Calibration Results

Test Temperature	Reading Of This Instrument	Correction	Emergent Column Temperature	Standard Uncertainty
32.0 F	32.6 F	-0.6 F	NA	.02
100.0 F	101.6 F	-1.6 F	NA	.08
200.0 F	201.4 F	-1.4 F	NA	.08
300.0 F	301.0 F	-1.0 F	NA	.14

The above readings were made under magnification and resolved to the nearest 0.01 F. The uncertainties of our calibration system are as follows: From -121 to -49F, +/- .24F; From -40 to <32F, +/-.12F; At 32F, +/- .02F; From >32F to 212F, +/- .08F; From >212 to 392F, +/- .14F; From >392 to 572F, +/- .26F; From 572 to 752F, +/- .8F. The estimated uncertainties quoted above were determined in accordance with the guidelines given in NIST Publication IR 5341 and ıke into account the type of thermometer tested, the precision with which its reading can be resolved, and the degree of confidence one can have in its ındications under similar conditions of usage.

For further discussion of accuracies attainable with such thermometers, see NIST Special Publication 250-23 and NIST Publication IR 5341.

.aboratory Environmental Conditions: Temperature 23C +/- 2C (73F +/- 2F). Relative Humidity - Between 30% and 60%. All temperatures ın this report are based on the International Temperature Scale of 1990 (ITS-90).

"IMPORTANT NOTE: The readings and corrections noted above apply for the condition of immersion indicated provided that the ice ıoint reading, taken after exposure for not fewer than three days to a temperature of about 22 Degrees Celcius (73F), is 0.00C (32F). If ıne ice point reading is found to be higher (or lower) than stated, all other readings will be higher (lower) by the same amount.

The calibration performed and documented by this report of test is a full scale calibration and no limitations of use are imposed on this ınstrument.

Traceability Information

The NIST Primary Reference Thermometers and Transfer Standards used in this test are given below:

Test Point: 32: F NIST Reference Themometer Standard 128239 Transfer Standard Serial # 172

Test Point: 100: F NIST Reference Themometer Standard 128239 Transfer Standard Serial # 172

Test Point: 200: F NIST Reference Themometer Standard 128239 Transfer Standard Serial # 174

Test Point: 300: F NIST Reference Themometer Standard 48511 Transfer Standard Serial # 174

This Calibration is directly traceable to NIST.

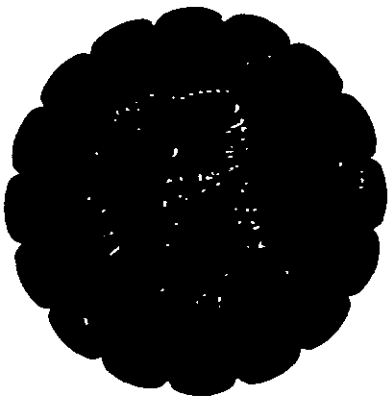
If additional information regarding this calibration is required, please contact this laboratory.

C. Thomas

Clifton Thomas

Quality Control Manager

Batch Number: 160753



DWYER INSTRUMENTS, INC.

1505 COBB INDUSTRIAL DRIVE
MARIETTA, GEORGIA 30066

September 10, 1990

Attention: Tony Blanton

Referenece : Purchase Order No. ED1022

CALIBRATION CERTIFICATION

This is to certify that the flowmeters, Catalog Nos. RMA-21 and RMA-25 have been built and tested to conform to an accuracy of ± 4% of full scale as specified in Dwyer's published data.

DWYER INSTRUMENTS, INC.

James H. Milton

JHM/bb

Enc: Page 9, Bulletin F-41

SOUTHEASTERN SALES OFFICE • PHONE 404-427-9406 • FAX 404-427-7985

SPECIFICATIONS		
Meter Body, Bezel and Tube	Polycarbonate	
Wetted Metal Parts	Stainless Steel (except for optional brass valves)	
Floats	St. Steel, Blk. Glass, Alum., K Monel	
Float Stops	Polycarbonate	
Pipe Connections	Model RMA, 1/8"; Model RMB, 1/4"; Model RMC, 1/2" NPT	
"O" Rings	Neoprene and Buna N	
Fittings	Stainless Steel brazed to Stainless Steel backbone plate	
Rivets	Stainless Steel, set into slots	
Scale	Brushed Aluminum – Clear Epoxy Coated	
Knobs	ABS Plastic	
Pressure Rating	RMA 100 P.S.I., RMB 70 P.S.I., RMC 35 P.S.I. max	
Temperature Rating	To 130° F. maximum	
Accuracy	Model RMA, 4%; Model RMB, 3%. Model RMC, 2% of full scale	
OPTIONS AND ACCESSORIES		CODE
Metering Valve	Brass	BV
	Stainless Steel	SSV
Top Mounted Valve	Stainless Steel – available only on RMA for air (vacuum applications)	TMV
Pointer Flag	Polycarbonate	PF

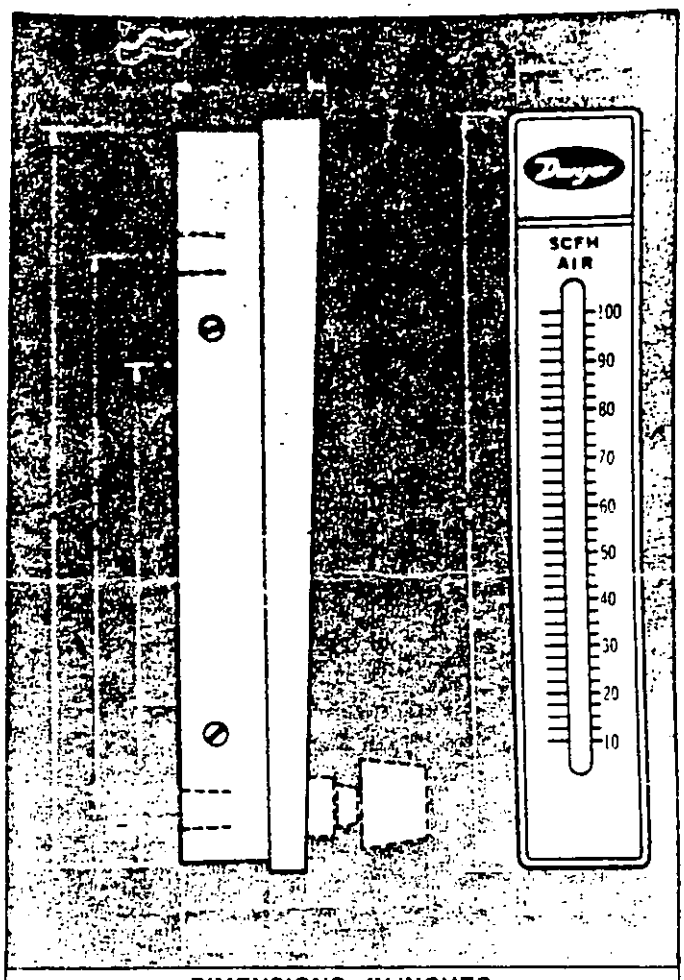
Series RM RATE-MASTER® Models and Ranges

Model RMA – 2" Scale		Model RMB – 5" Scale		Model RMC – 10" Scale	
Range SCFH Air	Ordering No.	Range SCFH Air	Ordering No.	Range SCFH Air	Ordering No.
.05-.5	1	.5-5	49	5-50	101
.1-1	2	1-10	50	10-100	102
2-2	3	2-20	51	20-200	103
5-5	4	5-50	52	40-400	104
1-10	5	10-100	53	60-600	105
2-20	6	20-200	54	100-1000	106
5-50	7	40-400	55	120-1200	107
10-100	8	50-500	56	180-1800	108
15-150	9	60-600	57	SCFM Air	
20-200	10	Gal. Water per hour		1-10	121
CC Air/min.				2-20	122
5-50	151*	1-12	82	3-30	123
5-100	150*	1-20	83	Gal. Water per hour	
30-240	11	4-40	84		
50-500	12	10-100	85	2-20	134
100-1000	13			8-90	135
200-2500	14			Gal. Water per min.	
LPM Air					
.5-5	26			1-1	141
1-10	21			.2-2.2	142
2-25	22			.3-3.6	143
5-50	23			8-7	144
5-70	24			1.2-10	145
10-100	25				
CC Water/min.					
5-50	32				
10-110	33				
20-300	34				
Gal. Water/hr.					
1-11	42				
2-24	43				
4-34	44				
5-50	45				

*Accuracy - 5%

CAUTION

Dwyer Rate-Master® flowmeters are designed to provide satisfactory long term service when used with air, water, or other compatible media. Refer to factory for information on questionable gases or liquids. Caustic solutions, anti-freeze (ethylene glycol) and aromatic solvents should definitely not be used



DIMENSIONS – IN INCHES

	Model RMA	Model RMB	Model RMC
A	4 9/16	8 1/2	15 1/8
B	3 1/8 NPT Conn.	6 7/16 1/4 NPT Conn.	12 1/4 1/2 NPT Conn.
C	1 5/8 10-32 Thds.	3 13/16 1/4-20 Thds.	8 3/4 3/8-24 Thds.
D	3/8	5/8	1
E	1 1/16	1 7/8	2 3/4
F	1 3/16	1 3/4	2 1/4
G	3/4	1	1 7/16
H	1	1 7/16	1 31/32
I (OPEN)	1 3/8	1 13/16 (BV or SSV MODELS ONLY)	2 1/2
J	3/4	1 1/4	2
K	4 1/4	8 3/4	15 3/8
L	1	1 1/2	2 1/4

How To Order

1. Select model desired by letter designation. RMA, RMB, or RMC.
2. Specify range desired by adding the order number after a dash following the letter designation. Example RMA-6.
3. If additional features are required, and available, add the option designation to the basic model code – e.g.: BV for Brass Valve, SSV for Stainless Steel Valve, and TMV for Top Mounted Valve. For example, RMA-6-SSV is the 2" scale flowmeter range No. 6 with a stainless steel valve.
4. Add accessories as desired.

NATIONAL SPECIALTY GASES
630 UNITED DRIVE
DURHAM, NC
27713
(919)544-3772

CERTIFICATE OF ANALYSIS * EPA PROTOCOL MIXTURES

REFERENCE #:	88-48274	CYLINDER #:	LL-4770	CYL. PRESSURE:	2000 PSIG	P.O. #:	994195
EXP. DATE:	7-9-99	LAST ANALYSIS DATE:	7/9/96	CUSTOMER:	CHARLOTTE, NC NATIONAL WELDERS		

METHOD: ANALYZED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS-SEPTEMBER 1993:G-1 THIS STANDARD SHOULD NOT BE USED WHEN ITS GAS PRESSURE IS BELOW 1.0 MEGAPASCALS (150 PSIG).

COMPONENT: PROPANE

STANDARD

SRM #: 2643A
CYL. #: SX 20245
CONC: 99.1 PPM

INSTRUMENT: ROSEMOUNT THC
MODEL #: 400A
SERIAL #: 2000335
LAST CAL.: 7/6/96

MEAN CONC.: 85.1 PPM +/- 0.68 PPM

REPLICATE CONC.

DATE: 7/9/96

85.1 PPM
85.2 PPM
85.1 PPM

BALANCE GAS: NITROGEN

REPLICATE DATA						REPLICATE DATA						REPLICATE DATA					
DATE: 7/9/96																	
Z	0	R	99.1	C	85.1												
R	99.0	Z	0	C	85.1												
Z	0	C	85.1	R	99.1												

Z= ZERO C CANDIDATE R= REFERENCE

ANALYST: Kevin D. Rogers APPROVED BY: Tracy A. Savage

THIS REPORT STATES ACCURATELY THE RESULTS OF THE INVESTIGATION MADE UPON THE MATERIAL SUBMITTED TO THE ANALYTICAL LABORATORY. EVERY EFFORT HAS BEEN MADE TO DETERMINE OBJECTIVELY THE INFORMATION REQUESTED. HOWEVER, IN CONNECTION WITH THIS REPORT, NATIONAL SPECIALTY GASES SHALL HAVE NO LIABILITY IN EXCESS OF ITS ESTABLISHED CHARGE FOR THE SERVICE.
ASSAYED AT NATIONAL SPECIALTY GASES, 630 UNITED DRIVE, DURHAM, NC 27713. (919)544-3772

NATIONAL SPECIALTY GASES
630 UNITED DRIVE
DURHAM, NC
27713
(919)544-3772

CERTIFICATE OF ANALYSIS * EPA PROTOCOL MIXTURES

REFERENCE #:	88-48360	CYLINDER #:	LL10419	CYL. PRESSURE:	2000 PSIG	P.O. #:	1018289
EXP. DATE:	7/15/99	LAST ANALYSIS DATE:	7/15/96	CUSTOMER:	NATIONAL WELDERS CHARLOTTE,NC		

METHOD: ANALYZED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS-SEPTEMBER 1993:G-1 THIS STANDARD SHOULD NOT BE USED WHEN ITS GAS PRESSURE IS BELOW 1.0 MEGAPASCALS (150 PSIG).

COMPONENT: PROPANE

STANDARD

SRM #: 1667B
CYL. #: CLM 5293
CONC.: 47.3 PPM

INSTRUMENT: ROSEMOUNT THC
MODEL #: 400A
SERIAL #: 2000335
LAST CAL.: 7/6/96

MEAN CONC.: 50.0 PPM +/- 0.40 PPM

REPLICATE CONC.

DATE: 7/15/96

50.0 PPM
49.9 PPM
50.0 PPM

BALANCE GAS: NITROGEN

REPLICATE DATA	REPLICATE DATA	REPLICATE DATA
DATE: 7/15/96		
Z 0 R 90.2 C 95.3		
R 90.1 Z 0 C 95.1		
Z 0 C 95.3 R 90.2		

Z= ZERO C=CANDIDATE R=REFERENCE

ANALYST: Mark Ingram APPROVED BY: Tracy A. Stevens

THIS REPORT STATED ACCURATELY THE RESULTS OF THE INVESTIGATION MADE UPON THE MATERIAL SUBMITTED TO THE ANALYTICAL LABORATORY. EVERY EFFORT HAS BEEN MADE TO DETERMINE OBJECTIVELY THE INFORMATION REQUESTED; HOWEVER, IN CONNECTION WITH THIS REPORT, NATIONAL SPECIALTY GASES SHALL HAVE NO LIABILITY IN EXCESS OF ITS ESTABLISHED CHARGE FOR THE SERVICE. ASSAYED AT: NATIONAL SPECIALTY GASES, 630 UNITED DRIVE, DURHAM, NC 27713. (919)544-3772

NATIONAL SPECIALTY GASES
630 UNITED DRIVE
DURHAM, NC
27713
(919)544-3772

CERTIFICATE OF ANALYSIS * EPA PROTOCOL MIXTURES

REFERENCE #	88-60301	CYLINDER #	LL 37064	CYL. PRESSURE	2000 PSIG	P.O. #	1913162
EXP. DATE	10/20/01	LAST ANALYSIS DATE	10/20/98	CUSTOMER	NATIONAL WELDERS CHARLOTTE, NC		

METHOD ANALYZED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS-SEPTEMBER 1997 G-1 THIS STANDARD SHOULD NOT BE USED WHEN ITS GAS PRESSURE IS BELOW 1.0 MEGAPASCALS (150 PSIG)

COMPONENT: PROPANE

STANDARD

SRM #: 1667B
CYL. #: CAL 11023
CONC: 49.6 PPM

INSTRUMENT: ROSEMOUNT THC
MODEL #: 400A
SERIAL #: 2000335
LAST CAL.: 10/13/98

MEAN CONC.: 30.1 PPM +/- 0.24 PPM

REPLICATE CONC.

DATE: 10/20/98

30.1 PPM
30.1 PPM
30.1 PPM

BALANCE GAS: NITROGEN

REPLICATE DATA						REPLICATE DATA						REPLICATE DATA					
DATE:	10/20/98																
Z	0	R	49.6	C	30.1												
R	49.6	Z	0	C	30.1												
Z	0	C	30.1	R	49.6												

Z= ZERO C=CANDIDATE R=REFERENCE

ANALYST: Tiesha Fronts APPROVED BY: Richard Sykes

THIS REPORT STATED ACCURATELY THE RESULTS OF THE INVESTIGATION MADE UPON THE MATERIAL SUBMITTED TO THE ANALYTICAL LABORATORY EVERY EFFORT HAS BEEN MADE TO DETERMINE OBJECTIVELY THE INFORMATION REQUESTED. HOWEVER, IN CONNECTION WITH THIS REPORT, NATIONAL SPECIALTY GASES SHALL HAVE NO LIABILITY IN EXCESS OF ITS ESTABLISHED CHARGE FOR THE SERVICE. ASSAYED AT: NATIONAL SPECIALTY GASES, 630 UNITED DRIVE, DURHAM, NC 27713 (919)544-3772

APPENDIX F

METHOD 25A DATA REDUCTION

TRIGON ENGINEERING CONSULTANTS

EPA METHOD 25A
Uncorrected Data Acquisition Values for Total Gaseous Organics

Michelin North America, Inc
Duncan, South Carolina
Tire Buffer Exhaust Stack

28-Jan-99

Run No. 1		*Run No. 2*		*Run No. 3*	
TIME	Outlet (ppmw)	TIME	Outlet (ppmw)	TIME	Outlet (ppmw)
840	3.9	950	3.1	1105	8.0
841	3.9	951	3.0	1106	7.4
842	3.8	952	2.6	1107	6.8
843	4.4	953	2.6	1108	6.4
844	4.1	954	5.7	1109	6.4
845	3.7	955	6.0	1110	4.9
846	8.4	956	4.0	1111	4.4
847	12.1	957	4.5	1112	8.9
848	11.4	958	4.2	1113	11.3
849	9.9	959	5.0	1114	5.7
850	5.3	1000	5.2	1115	4.9
851	5.2	1001	5.6	1116	4.3
852	5.0	1002	5.4	1117	3.9
853	4.3	1003	3.9	1118	3.7
854	4.2	1004	3.6	1119	3.9
855	5.9	1005	9.6	1120	4.7
856	7.3	1006	8.6	1121	4.7
857	6.9	1007	6.8	1122	4.3
858	6.8	1008	6.2	1123	4.6
859	5.0	1009	6.8	1124	4.2
900	4.7	1010	6.7	1125	3.9
901	11.0	1011	4.9	1126	3.6
902	9.5	1012	4.4	1127	3.5
903	8.3	1013	4.6	1128	3.8
904	7.1	1014	5.6	1129	3.4
905	5.3	1015	5.5	1130	3.1
906	4.8	1016	5.8	1131	3.2
907	4.5	1017	5.3	1132	4.3
908	5.2	1018	6.5	1133	4.0
909	4.9	1019	5.1	1134	4.3
910	4.9	1020	5.1	1135	4.4
911	4.9	1021	5.8	1136	5.0
912	4.8	1022	5.7	1137	5.1
913	4.8	1023	6.3	1138	4.2
914	4.4	1024	5.9	1139	3.8
915	4.1	1025	6.6	1140	6.0
916	4.0	1026	6.5	1141	6.6
917	4.0	1027	7.5	1142	6.4
918	3.9	1028	7.4	1143	6.2
919	3.8	1029	8.1	1144	4.8
920	3.6	1030	8.9	1145	4.5
921	3.6	1031	8.5	1146	4.8
922	5.1	1032	8.6	1147	6.7
923	5.4	1033	7.0	1148	6.7
924	5.4	1034	6.4	1149	6.4
925	7.5	1035	6.3	1150	5.9
926	7.7	1036	5.8	1151	5.1
927	5.0	1037	5.7	1152	4.6
928	4.6	1038	5.6	1153	8.1
929	4.3	1039	5.5	1154	8.3
930	7.6	1040	5.1	1155	7.3
931	7.2	1041	8.1	1156	7.3
932	6.9	1042	11.2	1157	5.8
933	6.2	1043	12.0	1158	6.0
934	5.0	1044	11.6	1159	6.3
935	4.7	1045	9.6	1200	7.5
936	5.5	1046	8.3	1201	6.8
937	5.5	1047	7.2	1202	8.6
938	6.6	1048	7.7	1203	10.0
939	5.2	1049	7.5	1204	6.0
AVERAGE	5.7	AVERAGE	6.3	AVERAGE	5.6

All ppm values are reported as propane.

Trigon Services

- Geotechnical Engineering
- Construction Materials Engineering/Testing
- Roof Engineering/Inspection
- Forensic Engineering
- Environmental Audits/Site Assessments
- Environmental Drilling
- Groundwater Studies/Remediation
- Stormwater Permitting
- Water Treatment Design
- Mechanical Engineering
- Waste Minimization Studies
- Air Permitting
- Atmospheric Computer Dispersion Modeling
- Stack Testing
- Indoor Air Monitoring

OFFICE LOCATIONS

Greensboro	Raleigh	Charlotte	Greenville
North Carolina	North Carolina	North Carolina	South Carolina
336-668-0093	919-755-5011	704-598-1049	864-297-3557