Note: This is a reference cited in *AP 42, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources.* AP42 is located on the EPA web site at www.epa.gov/ttn/chief/ap42/

The file name refers to the reference number, the AP42 chapter and section. The file name "ref02_c01s02.pdf" would mean the reference is from AP42 chapter 1 section 2. The reference may be from a previous version of the section and no longer cited. The primary source should always be checked.

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF ENVIRONMENTAL QUALITY
Bureau of Technical Services
CN 411
Trenton, N.J. 08625-0411
(609) 530-4041

March 18, 1992

MEMORANDUM

TO: Mike Papp, Regional Enforcement Officer
Northern Regional Enforcement Office

FROM: Edward Choromanski, Chief
Bureau of Technical Services

SUBJECT: Tri-County Asphalt Corporation - Rockaway, New Jersey
Stack Emissions Test Program
APC Plant 25009
NJ Stack No. 001
P/CT No. 93317 (Log No. 90-4886)

Stack emission tests were conducted on December 11, 1991 at the above referenced facility. The purpose of these tests was to quantify the emissions of Carbon Monoxide (CO) and Total Hydrocarbons (THC) being emitted to the atmosphere from the Batch Mix Asphalt Plant. The test results are them compared to the allowable permit limits. In addition, stack emission tests for Nitrogen Oxides (NO_x) were also conducted. These tests were for informational purposes only.

Len Sobolewski reviewed the submitted stack test results. His review indicated that the emissions of Carbon Monoxide and Total Hydrocarbons (as methane) were within the allowable permit limits, for all test runs.

In addition NO_x emissions tests were conducted for information purposes. Based on the average NO_x concentration of 35 ppm, the permit volumetric flow rate of 45,000 ACFM, average percent moisture of 19 and a stack temperature of 240°F, the NO_x emission rate is calculated as 6.96 lbs/hr. Based on 2,000 hours of operation of this source, a annual NO_x emission rate of 6.96 tons/year is calculated.

The stack test results should be accepted as determining compliance with the permit limits for CO and THC. No enforcement action should be taken on the NO_x data. NO_x emission limits are currently under negotiation with the New Jersey Asphalt Pavement Association.

c Milton Polakovic
Louis Mikolajczyk
Len Sobolewski

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State of New Jersey
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DIVISION OF ENVIRONMENTAL QUALITY
Bureau of Technical Services
CN 411
Trenton, N.J. 08625-0411
(609) 530-4041

March 10. 1992

MEMORANDUM

TO: Ed Choromanski

FROM: Len Sobolewski

SUBJECT: Tri-County Asphalt Corporation
311 West Main St.
Rockaway, NJ
APC ID No. 25009
NJ Stack No. 001
P/CT No. 093317
Log No. 01-90-4886

Emission stack tests were conducted on the Plant #3 (NJ Stack No. 001) at the above subject facility on December 11, 1991. The purpose of the testing project was to demonstrate compliance/non-compliance with the total hydrocarbons and the carbon monoxide parts per million (ppm) corrected to 7% oxygen as required by the Permit/Certificate.

The results of the aforementioned stack emission testing project utilizing the raw field data and laboratory analysis submitted to the Bureau of Technical Services for review and evaluation is as follows:

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THE PLANT #3
TEST RESULTS

CONTAMINANT	RUN NO 1	RUN NO 2	RUN NO 3	ALLOWABLE
Nitrogen Oxides (as NO_2)				
(ppm wet)	29	29	26	-----
(ppm dry)	36	36	32	-----
(ppm @ 7% O_2)	79	80	80	-----
Total Hydrocarbons (as propane)				
(ppm wet)	23	39	23	-----
(ppm dry)	28	49	27	-----
(ppm @ 7% O_2)	63	109	69	-----
Total Hydrocarbons (as methane)				
(ppm wet)	8.36	14.19	8.37	-----
(ppm dry)	10.19	17.83	9.82	-----
(ppm @ 7% O_2)	22.92	39.65	25.10	250
Carbon Monoxide				
(ppm wet)	162	137	127	-----
(ppm dry)	199	172	154	-----
(ppm @ 7% O_2)	439	385	389	500

THE PLANT #3
PRODUCTION RATES

Run	Time	Tons/Hour
1	1024-1124	125.75
2	1200-1300	118.0
3	1331-1431	145.5

The Permit/Certificate lists a maximum asphalt production rate at 5,000 lbs/batch 1/60 hrs/batch.

The Technical Services calculations of the raw field data and the reported results of the laboratory analysis submitted indicated substantially the same test results as reported by Air Recon, Division of Recon Systems Inc.

The results of the test project indicate that the total hydrocarbons (as propane) and the carbon monoxide emission rates from the Plant #3 were within the ppm allowable emission standards required by the Permit/Certificate during all test runs.

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF ENVIRONMENTAL QUALITY
Bureau of Technical Services
CN 411
Trenton, N.J. 08625-0411
(609) 530-4041

March 19, 1992

Mr. Edwin M. Gately
Environmental/Safety Compliance Supervisor
Tri County Asphalt Corporation
R.D. #3, Box 561
Lake Hopatcong, New Jersey 07849

RE: Compliance Stack Emission Test Results
Tri County Asphalt Corporation
APC Plant ID No. 25009
NJ Stack No. 001
P/CT No. 93317 (Permit Log No. 90-4886)

Dear Mr. Gately:

This Bureau has completed the review of the stack emission test report dated February 3, 1992 prepared by Air Recon for the compliance tests conducted on the above referenced source operation. The stack tests were conducted and the test report was submitted in accordance to the conditions of approval of the permit application.

Our review of the stack test results has indicated the following.

The test results indicated compliance with the emission standards stated in the permit application and/or permit approval conditions. We will notify the appropriate regional enforcement office of the status of this project.

A summary of the test results are being forwarded to the local regional enforcement office for final disposition. If you have any questions regarding our determination of the test results, please call me.

Sincerely,

Edward M. Choromanski, CPM
Chief
Bureau of Technical Services

c Mike Papp - NRO

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State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF ENVIRONMENTAL QUALITY
Bureau of Technical Services
CN 411
Trenton, N.J. 08625-0411
(609) 530-4041

March 20, 1992

MEMORANDUM

TO: Mike Papp, Regional Enforcement Officer
Northern Regional Enforcement Office

FROM: Edward Choromanski, Chief
Bureau of Technical Services

SUBJECT: Tri-County Asphalt Corporation - Rockaway, New Jersey
Stack Emissions Test Program
APC Plant 25009
NJ Stack No. 001
P/CT No. 93317 (Log No. 90-4886)

AMENDED REPORT

Stack emission tests were conducted on December 11, 1991 at the above referenced facility. The purpose of these tests was to quantify the emissions of Carbon Monoxide (CO) and Total Hydrocarbons (THC) being emitted to the atmosphere from the Batch Mix Asphalt Plant. The test results are them compared to the allowable permit limits. In addition, stack emission tests for Nitrogen Oxides (NO_x) were also conducted. These tests were for informational purposes only.

Len Sobolewski reviewed the submitted stack test results. His review indicated that the emissions of Carbon Monoxide and Total Hydrocarbons (as methane) were within the allowable permit limits, for all test runs.

In addition NO_x emissions tests were conducted for information purposes. Based on the average NO_x concentration of 35 ppm, the permit volumetric flow rate of 45,000 ACFM, average percent moisture of 19 and a stack temperature of 240°F, the NO_x emission rate is calculated as 6.96 lbs/hr. Based on 2,000 hours of operation of this source, a annual NO_x emission rate of 6.96 tons/year is calculated.

The stack test results should be accepted as determining compliance with the permit limits for CO and THC. No enforcement action should be taken on the NO_x data. NO_x emission limits are currently under negotiation with the New Jersey Asphalt Pavement Association.

c Milton Polakovic
Louis Mikolajczyk
Len Sobolewski

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DIVISION OF ENVIRONMENTAL QUALITY
Bureau of Technical Services
CN 411
Trenton, N.J. 08625-0411
(609) 530-4041

March 20, 1992

MEMORANDUM

TO: Ed Choromanski

FROM: Len Sobolewski

SUBJECT: Tri-County Asphalt Corporation
311 West Main St.
Rockaway, NJ
APC ID No. 25009
NJ Stack No. 001
P/CT No. 093317
Log No. 01-90-4886

AMENDED REPORT

Emission stack tests were conducted on the Plant #3 (NJ Stack No. 001) at the above subject facility on December 11, 1991. The purpose of the testing project was to demonstrate compliance/non-compliance with the total hydrocarbons and the carbon monoxide parts per million (ppm) corrected to 7% oxygen as required by the Permit/Certificate.

The results of the aforementioned stack emission testing project utilizing the raw field data and laboratory analysis submitted to the Bureau of Technical Services for review and evaluation is as follows:

THE PLANT #3
TEST RESULTS

CONTAMINANT	RUN NO 1	RUN NO 2	RUN NO 3	ALLOWABLE
Nitrogen Oxides (as NO_2)				
(ppm wet)	29	29	26	-----
(ppm dry)	36	36	32	-----
(ppm @ 7% O_2)	79	80	80	-----
Total Hydrocarbons (as propane)				
(ppm wet)	23	39	23	-----
(ppm dry)	28	49	27	-----
(ppm @ 7% O_2)	63	109	69	-----
Total Hydrocarbons (as methane)				
(ppm wet)	25.08	42.57	25.11	-----
(ppm dry)	30.57	53.49	29.46	-----
(ppm @ 7% O_2)	68.76	118.95	75.30	250
Carbon Monoxide				
(ppm wet)	162	137	127	-----
(ppm dry)	199	172	154	-----
(ppm @ 7% O_2)	439	385	389	500

THE PLANT #3
PRODUCTION RATES

Run	Time	Tons/Hour
1	1024-1124	125.75
2	1200-1300	118.0
3	1331-1431	145.5

The Permit/Certificate lists a maximum asphalt production rate at 5,000 lbs/batch 1/60 hrs/batch.

The Technical Services calculations of the raw field data and the reported results of the laboratory analysis submitted indicated substantially the same test results as reported by Air Recon, Division of Recon Systems Inc.

The results of the test project indicate that the total hydrocarbons (as methane) and the carbon monoxide emission rates from the Plant #3 were within the ppm allowable emission standards required by the Permit/Certificate during all test runs.

Recon
Division of
RECON SYSTEMS, Inc.

5 Johnson Drive, P.O. Box 130
Raritan, NJ 08869-0130
(908) 526-1000
FAX (908) 526-7887

Connecticut (203) 293-1212
Massachusetts (508) 752-4217
New Hampshire (603) 431-7500
Pennsylvania (215) 433-5511

COMPLIANCE
STACK SAMPLING REPORT

For

TRI-COUNTY ASPHALT CORPORATION
R.D. 3, PO Box 561
Lake Hopatcong, NJ 07849
Attn: Edwin M. Gately

Source Tested:

BAGHOUSE OUTLET STACK (Plant 3)
Rockaway Asphalt facility
311 West Main Street
Rockaway, NJ 07866

Prepared by

Thomas J. Weber, VEC
Chemical Engineer

In Fulfillment of Purchase Order No. A-05043

RECON Project No. 6088A

Test Date: December 11, 1991

Report Date: January 24, 1992

ST-2

Recon
Division of
RECON SYSTEMS, Inc.
Raritan, NJ 08869-0130

COMPLIANCE
STACK SAMPLING REPORT FOR

TRI-COUNTY ASPHALT CORPORATION

on

BAGHOUSE OUTLET STACK (Plant 3)
ROCKAWAY ASPHALT FACILITY
311 West Main Street
Rockaway, NJ 07866

INTRODUCTION

The above-referenced source was sampled for nitrogen oxide (NO_x as NO_2), total hydrocarbon (as propane), carbon monoxide, carbon dioxide and oxygen emissions on December 11, 1991. This report contains the following information.

	PAGE
SUMMARY	2
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APPENDICES

I - NJDEPE APPROVED PROTOCOL AND AIR PERMIT
II - ORIGINAL DATA AND CALCULATION SHEETS
III - CEM STRIP CHART RECORDINGS
IV - REAL-TIME DATA SUMMARY SHEET
V - EMISSIONS CALCULATIONS TABLE

SUMMARY

The following results were obtained:

Run	1	2	3
Date	12/11/91	----------	----------
Time	1024-1124	1200-1300	1331-1431

Emissions Data

Nitrogen Oxides (as NO_2)			
ppmv (wet)	29	29	26
ppmv (dry)	36	36	32
ppmv @ 7% O_2 (dry)	79	80	80

Total Hydrocarbons (as Propane)			
ppmv (wet)	23	39	23
ppmv (dry)	28	49	27
ppmv @ 7% O_2 (dry)	63	108	69

Carbon Monoxide			
ppmv (wet)	162	137	127
ppmv (dry)	199	172	154
ppmv @ 7% O_2 (dry)	439	385	389

Any remaining sample from this project will be retained for sixty days from the date of this report unless directed otherwise.

Recon
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RECON SYSTEMS, Inc.
Raritan, NJ 08869-0130

PERSONNEL AND CERTIFICATIONS

FIELD SAMPLING ON THIS PROJECT WAS PERFORMED BY:

Thomas F. Mattei
Thomas J. Weber
George H. Wagner II

CALCULATIONS AND REPORT PREPARATION WERE PERFORMED BY:

Thomas J. Weber

THE TESTING WAS OBSERVED BY:

Richelle Burkeen	NJDEPE
Jeff Meyer	NJDEPE
Edwin M. Gately	TRI-COUNTY ASPHALT CORPORATION

THIS REPORT IS SUBMITTED BY:

Thomas J. Weber

Thomas J. Weber, VEC
Chemical Engineer

APPROVED BY:

George H. Wagner II
Manager
Real Time Stack/Air Testing

RECON PERSONNEL CERTIFICATION

I CERTIFY THAT, TO THE BEST OF MY KNOWLEDGE AND ABILITY, THE WORK ON THIS PROJECT WAS REPORTED TRULY, ACCURATELY AND COMPLETELY.

FIELD SUPERVISOR: Thomas J. Weber

PROJECT MANAGER: Thomas J. Weber

AirRECON VICE PRESIDENT: Frank Kwolek

PROFESSIONAL ENGINEER OR CERTIFIED INDUSTRIAL HYGIENIST CERTIFICATION

I CERTIFY THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION DEVELOPED OR ACQUIRED BY RECON PERSONNEL IN THIS REPORT AND, TO THE BEST OF MY KNOWLEDGE, THIS INFORMATION IS TRUE, ACCURATE AND COMPLETE.

Richard F. Toro

RICHARD F. TORO, CIH
CIH #4340

TJW/prh (ST-2/6071)

FACILITY-OWNER CERTIFICATION

I CERTIFY UNDER PENALTY OF LAW THAT THE INFORMATION PROVIDED IN THIS DOCUMENT IS TRUE, ACCURATE, AND COMPLETE.

I AM AWARE THAT THERE ARE SIGNIFICANT CIVIL AND CRIMINAL PENALTIES, INCLUDING FINES OR IMPRISONMENT OR BOTH FOR SUBMITTING FALSE, INACCURATE OR INCOMPLETE INFORMATION.

I AM THE HIGHEST RANKING INDIVIDUAL WITH DIRECT KNOWLEDGE AND OVERALL RESPONSIBILITY FOR THE INFORMATION CONTAINED IN THIS REPORT.

Edwin M Gately
NAME

1-31-92
DATE

Environ/Safety Compl. Supor
TITLE

Ed. M Gately
SIGNATURE

SHOULD THIS REPORT INDICATE A VIOLATION HAS OR MAY HAVE OCCURRED OF ANY PROVISION OR CONDITION OF A PERMIT OR CERTIFICATE OR ANY APPLICABLE LAW, REGULATION, OR RULE:

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED IN THIS APPLICATION AND ALL ATTACHED DOCUMENTS AND; BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THAT THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT CIVIL AND CRIMINAL PENALTIES, INCLUDING THE POSSIBILITY OF FINES OR IMPRISONMENT OR BOTH, FOR SUBMITTING FALSE, INACCURATE OR INCOMPLETE INFORMATION.

I AM A PRINCIPAL EXECUTIVE OFFICER OF AT LEAST THE LEVEL OF VICE PRESIDENT OF THIS CORPORATION.

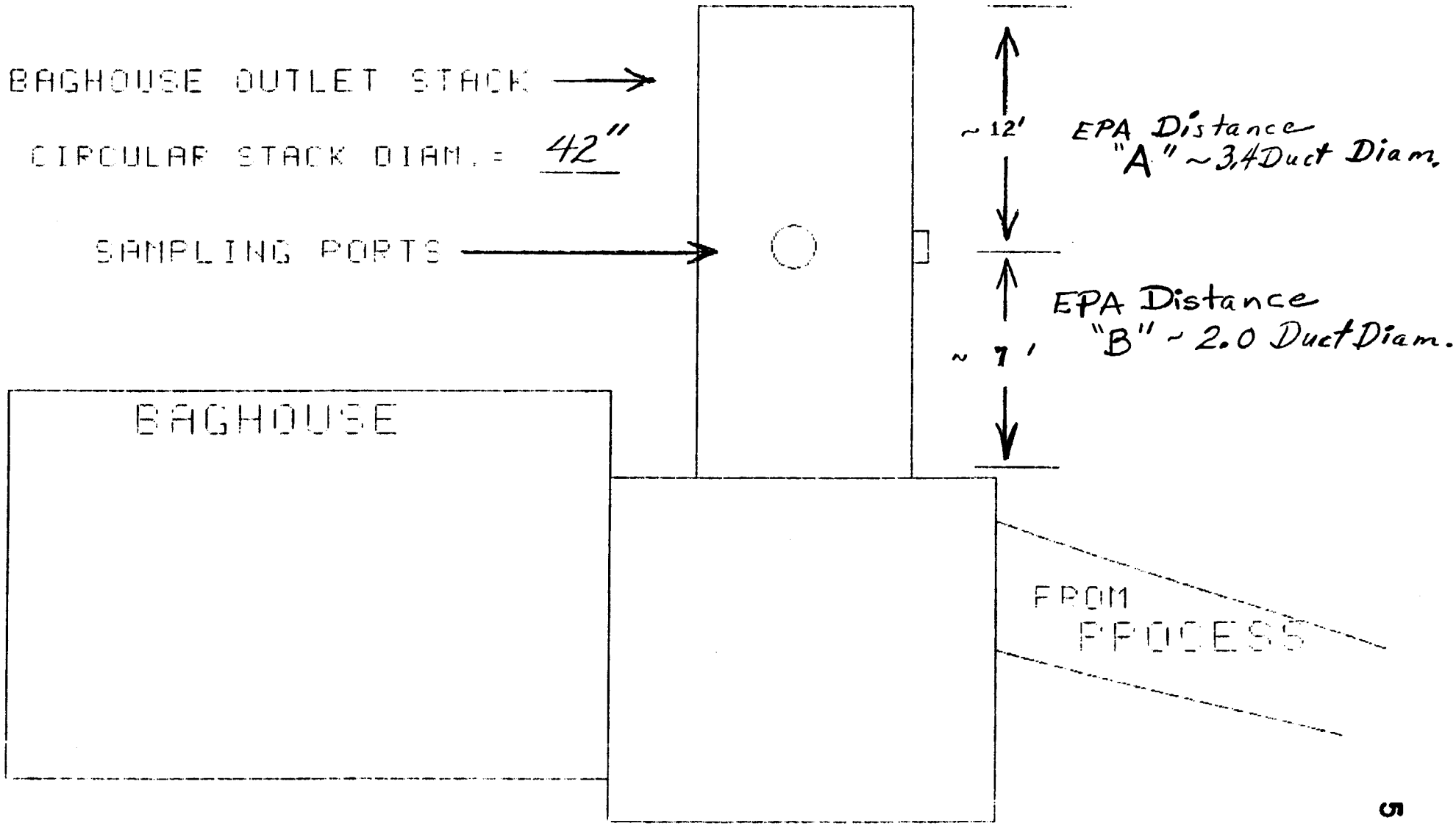
JACK SHOFF
NAME

1/31/92
DATE

CHIEF OPERATING OFFICER
TITLE

Jack Shoff
SIGNATURE

TRI-COUNTY ASPHALT CORP.
ROCKAWAY ASPHALT PLANT
BAGHOUSE STACK-PLANT 3



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Raritan, NJ 08869-0130

VELOCITY AND FLOW RATE DATA

Run	1	2	3
Date	12/11/91	----------	----------
Time	1024-1124	1200-1300	1331-1431
Stack Diameter (in)	42	----------	----------
Stack Cross Section (sq ft)	9.62	----------	----------
Barometric Pressure ("Hg)	30.13	30.13	30.14
Moisture (% vol)	18.8	20.3	17.8

Standard Conditions are 70°F, 29.92 "Hg.

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STACK GAS COMPOSITION

Run	1	2	3
Date	12/11/91	----------	----------
Time	1024-1124	1200-1300	1331-1431

% By Volume
(Dry Basis)

REAL-TIME ANALYZER

CO_2	3.7	3.8	3.6
O_2	14.6	14.7	15.4
N_2 (By Difference)	81.7	81.5	81.0

NITROGEN OXIDE EMISSIONS

Run	1	2	3
Date	12/11/91	----------	----------
Time	1024-1124	1200-1300	1331-1431

Sampling Data

No. of Sampling Points	1	1	1
Sampling Time (min)	60	60	60

Emissions Data

Nitrogen Oxides (as NO_2)			
ppmv (wet)	29	29	26
ppmv (dry)	36	36	32
ppmv @ 7% O_2 (dry)	79	80	80

HYDROCARBON EMISSIONS

Run	1	2	3
Date	12/11/91	----------	----------
Time	1024-1124	1200-1300	1331-1431

Sampling Data

No. of Sampling Points	1	1	1
Sampling Time (min)	60	60	60

Emissions Data

Total Hydrocarbons (as Propane)			
ppmv (wet)	23	39	23
ppmv (dry)	28	49	27
ppmv @ 7% O_2 (dry)	63	109	69

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Raritan, NJ 08869-0130

CARBON MONOXIDE EMISSIONS

Run	1	2	3
Date	12/11/91	----------	----------
Time	1024-1124	1200-1300	1331-1431

Sampling Data

No. of Sampling Points	1	1	1
Sampling Time (min)	60	60	60

Emissions Data

Carbon Monoxide

ppmv (wet)	162	137	127
ppmv (dry)	199	172	154
ppmv @ 7% O_2 (dry)	439	385	389

PROCESS INFORMATION

The following process information was supplied to AirRECON personnel by Edwin M. Gately of TRI-COUNTY ASPHALT.

DATA ON FACILITY BEING STACK TESTED

COMPANY NAME Tri County Asphalt Corp. COMPANY REP. Edwin M Gately PHONE (201) 663-1800
LOCATION OF FACILITY 311 W. Main St. Rockaway ORIGINAL START-UP DATE _____ DESIGNED CAPACITY _____
OEM _____ MODEL NO. _____ TYPE _____ AC TYPE _____

1 Time (24 HR) NOTE: check small box in column when moisture sample is taken	2 Fuel Use # Fuel Oil / Nat. Gas ✓ / Propane / Coal / other	3 Burner Setting	4 Blower Pressure	5 Production Rate Mix Aggregate TPH TONS PER	5 Production Rate RAP TPH	6 Asphalt Cement %	7 Mix Temp. °F	8 Exhaust Gas Temp. °F	9 Venturi Scrubber / ✓ Baghouse Pressure Drop in w.g.	9 Water Pressure psi	AC 20		
1015 STARTUP	1774.4	370		130 TPH		5.8	—	—	—				
1025.	1774.5	357		125.75		4.4	313	240	4.6				
1035	1774.7	335				4.4	330	220.	4.0				
1055	1775.0	374				4.4	325	220	3.4				
1110	1775.3	356.				4.4	325	220	2.8				
1112	CO is up.					4.4							
1117	1775.4	333				5.5		230	4.0				
1125	1775.6	341		125.75		4.4		230	4.0				
Round 1205	1776.2	332		118.0		4.4		230	5.1				
1225	1776.6	337				5.5		250	4.0				
1240	1776.8	338				5.5	320	250	3.8				
1255	1777.0	326				4.4		260	3.6				
13:50 Noon	1777.7	320				4.4		240	4.4				
1345	1777.9	346				5.5	315	220	5.2				
1400	1778.1	341		145.5		4.4	310	230	6.0				
1415	1778.4	338				4.4		240	5.4				
1430	1778.6	327				4.4		250	5.1				

ALLOWABLE EMISSIONS

The following allowable emissions are based on our understanding of the applicable regulatory rules and regulations. Since we are not always privy to the situation, these should not be accepted without confirmation from relevant sources.

Particulate	Reference	Allowable
Federal Regulations		
State Regulations		
State Permit		
Sulfur Dioxide		
Federal Regulations		
State Regulations		
State Permit		
Sulfur Trioxide and Sulfuric Acid		
Federal Regulations		
State Regulations		
State Permit		
Nitrogen Oxides		
Federal Regulations		
State Regulations		
State Permit		
Hydrocarbon (VOS, VOC)		
Federal Regulations		
State Regulations		
State Permit		
Other: _____		
Federal Regulations		
State Regulations		
State Permit		

X We do not have sufficient information to determine allowable emissions.

SELECTED NOMENCLATURE

Time	= military time
min	= minutes
^{o}F	= degrees Fahrenheit
^{o}C	= degrees Centigrade
$"H_2O$	= inches water (pressure or vacuum)
"Hg	= inches mercury (pressure or vacuum)
mm Hg	= millimeters of mercury (pressure or vacuum)
psig	= pounds of pressure per square inch-gage
sq ft	= square feet
in	= inches
micron	= 10^{-6} meters
ft/sec	= feet per second
ft/min	= feet per minute
acfm	= cubic feet per minute of total gas flow at flowing conditions
scfm	= cubic feet per minute of total gas flow at 70°F, 29.92"Hg
lb/hr	= pounds per hour
BTU/hr	= British thermal units per hour
%	= volume per cent when referred to gases and water vapor
%	= weight percent for solids, liquids
% vol	= volume per cent
% wgt	= weight percent
ppmv	= volumes of gaseous contaminants per million volumes of total gas
grains	= grams x 15.4
ug	= micrograms = 10^{-6} grams
mg	= milligrams = 10^{-3} grams
grains/dscf	= grains of pollutants per cubic foot of dry stack gas at 70°F, 29.92 "hg
gr/dscf	= grains/dscf
ug/m^3	= micrograms of pollutants per cubic meter of total stack gas at 25°C, 760 mm Hg
mg/l	= milligrams/liter of liquid = ppm by weight if specific gravity of liquid = 1.0
C	= elemental carbon
CO_2	= carbon dioxide
cfu/m^3	= colony forming units per cubic meter of air
f/mm^2	= density of fibers per square millimeter on an air filter
f/cc	= concentration of fibers per cubic centimeter in air
H	= elemental hydrogen
H_2	= molecular hydrogen
H_2O	= water
N	= elemental nitrogen
N_2	= molecular nitrogen
NO_x	= $NO + NO_2$ = nitric oxide plus nitrogen dioxide reported as equivalent nitrogen dioxide
S	= elemental sulfur
SO_2	= sulfur dioxide
SO_3	= sulfur trioxide
SO_4	= sulfate
H_2SO_4	= sulfuric acid
H_2S	= hydrogen sulfide
Cl	= elemental chlorine or chloride
HCl	= hydrogen chloride
F	= elemental fluorine or fluoride
CH_4	= methane
O	= elemental oxygen
O_2	= molecular oxygen
A	= argon
<	= less than; represents the minimum detectability limits
≤	= equal to or less than
ND	= none detected

Front half (dry catch particulate) = particulate matter collected in/on nozzle, probe, cyclone, flask heated hose, and filter of EPA sampling train

Back Half (wet catch particulate) = material collected in impingers after filter of EPA sampling train

Organic wet catch = residue after low temperature (70°F) evaporation of ether/chloroform used to extract soluble materials from the wet catch

Aqueous wet catch = residue after high temperature (220°F) evaporation of water left after ether/chloroform extraction

Combustibles = volatiles = loss on heating @ 550°C after drying @ 100°C

Ash = residue after heating @550°C

SAMPLE CALCULATIONS

RECON SYSTEMS, INC.
5 Johnson Drive P.O. Box 130
RARITAN, NEW JERSEY 08869-0130
(908) 526-1000 FAX (908) 526-7886

JOB 6088A, B
SHEET NO 1 OF 1
CALCULATED BY TJ Weber DATE 1/14/92
CHECKED BY DATE
SCALE

SAMPLE CALCULATIONS:

1) ppmv, dry ≡ Parts per million by volume, dry:
(for NO_x, CO, THC)

$$ppmv, dry = \frac{ppmv, wet}{\left(\frac{100 - \%\ Moisture, (B_{ws})}{100}\right)}$$

e.g. ppmv, wet NO_x = 29.1 ; % Moisture = 18.8

$$ppmv, dry = \frac{29.1}{\left(\frac{100 - 18.8}{100}\right)}$$

$$ppmv, dry = 29.1 / .812$$

$$ppmv, dry = 35.8$$

2). Corrected ppmv, dry to Seven percent oxygen, dry:
(7% O_2)

$$C_{adj} = C_{meas} \times \frac{(13.9)}{(20.9 - \%\ O_2)}$$

where;
C_{adj} = Pollutant concentration corrected to 7% O_2, dry.
C_{meas} = Pollutant " measured, ppmv, dry.
13.9 = 20.9 − 7.0 % O_2, the defined O_2 correction value, %.
% O_2 = measured O_2 concentration, dry basis, %.

e.g.
ppmv, dry (CO) = 199.3 ; % O_2 = 14.6 %

$$C_{adj} = 199.3 \times \frac{13.9}{(20.9 - 14.6)}$$

$$C_{adj} = 199.3 \times 2.206$$

$$C_{adj} = 439.7 \text{ ppmv, dry CO @ 7\% } O_2$$

CALIBRATION DATA

AirRecon
Division of
RECON SYSTEMS, Inc.

5 Johnson Drive, P.O. Box 130
Raritan, NJ 08869-0130
(908) 526-1000
FAX (908) 526-7887

18

METERING SYSTEM CALIBRATION DATA SHEET
FOR CALIBRTION AFTER USE

SYSTEM ID NO: 1 DATE: 12/9/91 BY MU

FIELD METER S/N: 592191 STD. MTR. S/N: 716691

INTERMEDIATE DELTA H 0.2 INCHES H_2O, MAX. VACUUM 2 INCHES Hg

BAROMETRIC PRESSURE 29.87 INCHES Hg = Pb

LEAK CHECK 0.001 CFM @ 26 INCHES Hg and PRESSURE CHECK ok

RUN NO.		STD DRY GAS METER V_{ms} ft^3	FIELD DRY GAS METER V_{fs} ft^3	STD METER t_s °F	FIELD METER IN t_i °F	FIELD METER OUT t_o °F	FIELD METER AVG t_f °F	TIME θ MIN	DGM CALIB FACTOR Y NO UNITS
	F	973.576	962.882						
	I	968.005	957.025	64	76	69	72.5	21	0.97
1	D	5.571	5.857						
	F	979.129	968.774						
	I	973.576	962.882	65	85	78	81.5	21	0.97
2	D	5.553	5.892						
	F	984.703	974.737						
	I	979.129	968.774	66	90	83	86.5	21	0.97
3	D	5.574	5.963						

* FINAL, INITIAL & DIFFERENCE VOLUMES

AVG. 0.97 **

**IF THE VALUE HAS CHANGED MORE THAN FIVE PERCENT FROM PREVIOUS VALUES REFER TO U.S. EPA METHOD 5, PARAGRAPH 5.3.2.

ok

$$Y = \frac{V_m P_b (t_f + 460)}{V_f \left(P_b + \frac{\text{DELTA H}}{13.6}\right)(t_m + 460)}$$

29.88

(SEE US EPA METHOD 5, PARAGRAPH 5.3 & 7.1)

L-32 AFTER (2.2.90) (AND ADD TO M-137)

Scott Specialty Gases, Inc.

2330 HAMILTON BOULEVARD, SOUTH PLAINFIELD, NJ 07080-010/10/90
PHONE: 201-754-7700 FAX:201-754-7303

RECON
ROUTE 202

PROJECT #: 07-07813
PO #: 6761

THREE BRIDGES NJ 08887-0000
ATT:RECEIVING DEPT

CYLINDER #: ALM009729

ANALYTICAL ACCURACY: +/- 2%

COMPONENT	REQUESTED CONCENTRATION		ANALYSIS 1 (MOLES)	U/M
OXYGEN	6.0	PCT	6.00	PCT
NITROGEN	BALANCE	GAS		N/A

DATE OF ANALYSIS:10/08/90

ANALYST: Addison Williams
ADDISON WILLIAMS

APPROVED BY: _____
ADELA SY

20

MG Industries
®Gas Products

1399 NEW FORD MILL RD.
MORRISVILLE, PA 19067
(800)638-6360

ANALYTICAL REPORT – PRODUCT CERTIFICATION

TO:

MG Industries - Linden
Intra-Company Transfer
901 W Edgar Road
Linden , NJ 07036

DATE: 07/29/91

P.O. NO.

ORDER NO. 700147-002

REF. # CSM-073

CYLINDER NO.	CONSTITUENTS CONCENTRATION:	NOMINAL	ACTUAL
	CERTIFIED MIXTURE		
CC-104054	Oxygen	15.0 %	15.5 %
	Nitrogen	Balance	Balance

Carlos Serrano Marquez ANALYST

MG 23301/A 3/89

MG Industries
®Gas Products

1399 NEW FORD MILL RD.
MORRISVILLE, PA 19067
(800)638-6360

21

ANALYTICAL REPORT – PRODUCT CERTIFICATION

TO:

MG Industries - Linden
Intra-Company Transfer
901 W. Edgar Road
Linden NJ 07036

DATE: 05/08/91

P.O. NO.

ORDER NO. 616998-003

REF. # WCP-190

CYLINDER NO.	CONSTITUENTS CONCENTRATION:	NOMINAL	ACTUAL
	CERTIFIED MIXTURE		
CC-[illegible]331	Oxygen	20.8 %	20.8 %
	Nitrogen	Balance	Balance

ANALYST

Walter C. Preller

MG 23301/A 3/89

Scott Specialty Gases, Inc.

Shipped From: 2330 HAMILTON BOULEVARD SOUTH PLAINFIELD NJ 07080-0000
Phone: 908-754-7700 Fax: 908-754-7303

CERTIFICATE OF ANALYSIS

RECON SYSTEMS
TOM WEBER OR TOM MATTE
P O BOX 317
5 JOHNSON DRIVE
RARITAN NJ 08869-0317

PROJECT #: 07-12980
PO#: 8919
ITEM #: 07023411 4AL
DATE: 11/19/91

CYLINDER #: ALM019039 ANALYTICAL ACCURACY: +/- 2%

COMPONENT	REQUESTED GAS CONC MOLES		ANALYSIS (MOLES)	
PROPANE	25.	PPM	25.9	PPM
AIR		BAL		BAL

AIR/HC FREE

ANALYST: ADELA SY

APPROVED BY: JOHN O'SHEA

Scott Specialty Gases, Inc.

Shipped From: 2330 HAMILTON BOULEVARD SOUTH PLAINFIELD NJ 07080-0000
Phone: 908-754-7700 Fax: 908-754-7303

CERTIFICATE OF ANALYSIS

RECON SYSTEMS
TOM WEBER OR TOM MATTE
P O BOX 317
5 JOHNSON DRIVE
RARITAN NJ 08869-0317

PROJECT #: 07-12980
PO#: 8919
ITEM #: 07023411 4AL
DATE: 11/19/91

CYLINDER #: ALM026334 ANALYTICAL ACCURACY: +/- 2%

COMPONENT	REQUESTED GAS CONC MOLES		ANALYSIS (MOLES)	
PROPANE	50.	PPM	52.0	PPM
AIR		BAL		BAL

AIR/HC FREE

ANALYST: ADELA SY

APPROVED BY: JOHN O'SHEA

Scott Specialty Gases, Inc.

Shipped From: 2330 HAMILTON BOULEVARD SOUTH PLAINFIELD NJ 07080-0000
Phone: 908-754-7700 Fax: 908-754-7303

CERTIFICATE OF ANALYSIS

RECON SYSTEMS
TOM WEBER OR TOM MATTE
P O BOX 317
5 JOHNSON DRIVE
RARITAN NJ 08869-0317

PROJECT #: 07-12980
PO#: 8919
ITEM #: 07023411 4AL
DATE: 11/19/91

CYLINDER #: ALM026236 ANALYTICAL ACCURACY: +/- 2%

COMPONENT	REQUESTED GAS CONC MOLES		ANALYSIS (MOLES)	
PROPANE	80.	PPM	82.1	PPM
AIR		BAL		BAL

AIR/HC FREE

ANALYST: ADELA SY

APPROVED BY: JOHN O'SHEA

Scott Specialty Gases, Inc.

2300 HAMILTON BOULEVARD, SOUTH PLAINFIELD, NJ 07080-0 3/01/91
PHONE: 201-754-7700 FAX:201-754-7301

RECON SYSTEME
P O BOX 317
5 JOHNSON DRIVE
RARITAN NJ 08869-0000
PICK UP 24 EMPTIES

PROJECT #: 07-09461
PO #: 7391

CYLINDER #: AAL19278

ANALYTICAL ACCURACY: +/- 2%

COMPONENT	REQUESTED CONCENTRATION		ANALYSIS 1 (MOLES)	U/M
RBON MONOXIDE	180.0	PPM	183.	PPM
TROGEN	BALANCE			N/A

DATE OF ANALYSIS: 2/26/91

ANALYST: D. Dudics
DONALD DUDICS

APPROVED BY: Adela Sy
ADELA SY

Scott Specialty Gases, Inc.

2t

2330 HAMILTON BOULEVARD, SOUTH PLAINFIELD, NJ 07080-010/10/90
PHONE: 201-754-7700 FAX:201-754-7303

RECON
ROUTE 202

PROJECT #: 07-07813
PO #: 6761

THREE BRIDGES NJ 08887-0000
ATT:RECEIVING DEPT

CYLINDER #: ALM008131

ANALYTICAL ACCURACY: +/- 2%

COMPONENT	REQUESTED CONCENTRATION		ANALYSIS 1 (MOLES)	U/M
ARBON DIOXIDE	11.0	PCT	11.0	PCT
ITROGEN	BALANCE	GAS		N/A

DATE OF ANALYSIS:10/08/90

ANALYST: Addison Williams
ADDISON WILLIAMS

APPROVED BY: _____
ADELA SY

RECEIVED

Scott Specialty Gases, Inc.

RECEIVED
3 1 1991

2330 HAMILTON BOULEVARD, SOUTH PLAINFIELD, NJ 07080-0 ~~7/25/91~~
PHONE: 201-754-7700 FAX:201-754-7303

RECON SYSTEMS
P O BOX 317
5 JOHNSON DRIVE
RARITAN NJ 08869-0000
attn: Tom Weber

PROJECT #: 07-11252
PO #: 8169

CYLINDER #: 1L1462

ANALYTICAL ACCURACY: +/- 1%

COMPONENT	REQUESTED CONCENTRATION		ANALYSIS 1 (MOLES)	U/M
CARBON DIOXIDE	18.0	PCT	17.8	PCT
NITROGEN	BALANCE			N/A

DATE OF ANALYSIS: 7/16/91

ANALYST: ADELA SY

APPROVED BY: DONALD DUDICS

28 W

Scott Specialty Gases, Inc.

PHONE: [illegible]
FAX: [illegible]
[illegible] PLAINFIELD NJ [illegible]

RECON SYSTEMS INC.
PO BOX 460
ROUTE 202 NORTH
THREE BRIDGES NJ 08887-0[illegible]
ATT:RECEIVING DEPT

PROJECT #: [illegible]
PO #: [illegible]

CYLINDER #: AL[illegible]

ANALYTICAL ACCURACY: +/- 2%

COMPONENT	REQUESTED CONCENTRATION		ANALYSIS (MOLES)	
NITRIC OXIDE	20.0	PPM	19.1	PPM
NITROGEN - OXYGEN FREE	BALANCE GAS			N/A

NOTES: NO = 19.1 PPM

DATE OF ANALYSIS: 8/15/90

ANALYST: DONALD DUDICS

APPROVED BY: ADDISON WILLIAMS

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[illegible] - 6

Scott Specialty Gases, Inc.

2

2330 HAMILTON BOULEVARD, SOUTH PLAINFIELD, NJ 07080-0 5/24/91
PHONE: 201-754-7700 FAX:201-754-7303

RECON SYSTEMS
P O BOX 317
5 JOHNSON DRIVE
RARITAN NJ 08869-0000

PROJECT #: 07-10582
PO #: 7848

CYLINDER #: ALM015705 ANALYTICAL ACCURACY: +/- 2%

COMPONENT	REQUESTED CONCENTRATION		ANALYSIS 1 (MOLES)	U/M
IT IC OXIDE	95.0	PPM	96.2	PPM
IT..OGEN - OXYGEN FREE	BALANCE			N/A

DATE OF ANALYSIS: 5/14/91

ANALYST: JOHN O'SHEA

APPROVED BY: ADELA SY

APPENDIX I

NJDEPE APPROVED PROTOCOL & AIR PERMIT

AirRecon
Division of
RECON SYSTEMS, Inc.

5 Johnson Drive, P.O. Box 130
Raritan, NJ 08869-0130
(908) 526-1000
FAX (908) 526-7887

Connecticut (203) 293-1212
Massachusetts (508) 752-4217
New Hampshire (603) 431-7500
Pennsylvania (215) 433-5511

GENERIC COMPLIANCE STACK TEST PROTOCOL FOR EVALUATION OF

CARBON MONOXIDE, NITROGEN OXIDES, TOTAL HYDROCARBON (AS CH_4) EMISSIONS

FOR

ANY HOT MIX ASPHALT PLANT

Prepared by

Thomas J. Weber, VEC (ext. 533)
Chemical Engineer

Thomas P. Brown, REM (ext. 532)
Senior Environmental Specialist

Submitted to

NEW JERSEY DEPARTMENT OF
ENVIRONMENTAL PROTECTION & ENERGY
Division of Environmental Quality
Bureau of Technical Services
380 Scotch Road, CN 411
Trenton, New Jersey 08625-0411

AirRECON Reference No. 91-335A

September 26, 1991

(NAPA/PRT18)

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APPENDICES

I - PERMIT INFORMATION
II - SUPPLEMENTARY INFORMATION ON INDIVIDUAL AirRECON MONITORS
III - COMPLIANCE TEST PRODUCTION DATA FORM

1.0 INTRODUCTION

In an agreement between the New Jersey Department of Environmental Protection & Energy (DEPE) and the NEW JERSEY ASPHALT PAVEMENT ASSOCIATION (NJAPA), each asphalt plant must be tested to prove compliance with the established gaseous emission limits for carbon monoxide (CO), total hydrocarbons (as methane), and nitrogen oxides.

As part of that agreement, a generic protocol is required by the DEP. AirRECON has developed this generic protocol, addressing the requirements specified by Mr. Edward Choromanski of the DEP's Division of Environmental Quality, Bureau of Technical Services.

The test program will entail triplicate, one-hour, compliance test runs to be performed for the determination of the above-mentioned parameters, and volume percent oxygen (O_2).

RECON would be responsible for performing all onsite emission sampling for the above, as well as the submittal of a final report that details all of the results, and the sampling and analytical methods employed.

1.1 PERMIT INFORMATION

A copy of the generic protocol requirements are in Appendix I.

1.2 PLANT SAFETY REQUIREMENTS

Level D protection, such as a hard hat and safety shoes, glasses & gloves, etc. is required.

2.0 PROCESS INFORMATION

Process information will be plant-dependant. Generally speaking, several thousand pounds of asphalt mixes are produced per batch. The number of batches produced is based on product demand. Every effort will be made to perform the tests on a clear day, which is instrumental in high product demand.

The process will be operated at maximum permit conditions (±5%). The number of batches and approximate weight per batch will be recorded for each test run. This process information and the operating parameters listed on the permit will be completed on an emission test production data form by plant personnel. The form will be included in the final test report.

3.0 SAMPLE LOCATIONS

As per the criteria of 40 CFR 60, Appendix A, Reference Method 1, the selected measurement site must be

- Located in a stack or duct whose diameter is at least 12 inches;
- Shown not to have swirling or cyclonic flow;
- At least two duct diameters downstream and one-half diameters upstream from any flow disturbance (such as a bend, contraction, expansion,), or from a visible flame.

For a rectangular cross section, an equivalent diameter (D_e) will be calculated from equation 3.1 to determine the upstream and downstream disturbances.

Equation 3.1 $D_e = 2 \times L \times W / (L + W)$
where; L = Length and W = Width.

If possible, the sampling location will be located where there is positive pressure in the duct. The sampling location for each plant will be approved by letter prior to performing the tests.

3.1 ACCESSIBILITY OF SAMPLING LOCATIONS

It is the responsibility of the client to have all sampling ports and extensions installed, opened (where applicable) and ready for testing.

4.0 COMPLIANCE TEST METHODOLOGIES

4.1 SUMMARY

The proposed emission test program will be performed for the determination of the following parameters utilizing the test methods specified in Table 1. Three (3) one-hour, compliance emissions tests will be conducted on the outlet.

All proposed test methods conform to 40 CFR 60, Appendix A test procedures or those of the DEPE. Oxygen and carbon dioxide will be measured during each of the three tests.

TABLE 1

PARAMETER	TEST METHODOLOGY
Total hydrocarbons (as methane)	NJAC 7:27B-3.7: "Procedures for the Direct Measurement of Volatile Organic Substances Using a Flame Ionization Detector."
Nitrogen oxides (NO_x)	US EPA Reference Method 7E, "Determination of Nitrogen Oxides Emissions from Stationary Sources." (Instrumental Analyzer Procedure)
Carbon monoxide	US EPA Reference Method 10, "Determination of Carbon Monoxide Emissions from Stationary Sources."

Oxygen	US EPA Reference Method 3A, "Determination of Oxygen and Carbon Dioxide Concentrations In Emissions from Stationary Sources."

The onsite instrumentation utilized in the performance of US EPA Methods 7E and 10 as well as New Jersey Air Test Method 3 will include the following:

Total hydrocarbons (as methane)	JUM Engineering Model VE-7 Flame Ionization Detector or Ratfishe Model RS 55 Flame Ionization Detector
Nitrogen oxides (NOx)	Thermo Electron Model 10AR Chemiluminescent NO_x Analyzer
Carbon monoxide	Thermo Electron Model 48 Gas Filter Correlation CO Analyzer

Total hydrocarbons, NO_x, CO, and O_2 are sampled and calculated with the following additional information:

Location of the Sampling Points Within the Stack: USEPA Reference Method (RM) 1 will be utilized.

Moisture Content Of Flue Gas: A gas sample is extracted from the stack at a constant rate.

Moisture is removed from the sample stream, condensed via four Greenburg-Smith impingers, and is determined gravimetrically. The reference method utilized is US EPA Method 4. The percent moisture determined in a one-hour test will be used for all three tests.

4.2 REAL-TIME SAMPLING SYSTEM

RECON'S real time monitoring system (RTMS) consists of a sampling interface system (SIS) and instrument control panel, which has numerous continuous emission monitors. All monitors conform to the design and performance criteria outlined in the 40 CFR 60, Appendix A. Supplementary information on the monitors used during the test program is in Appendix II.

The sampling interface system consists of the following components:

- Heated sampling line
- Stainless steel probe
- Particulate filter
- Three-way valve
- Calibration gas line
- PEL-4 conditioner box
- Heated distribution box

The SIS allows for extracting and transporting filtered stack gases to the individual instruments while maintaining the temperature well above the dew point of the gases. In this instance, THC, NOx, CO and O_2 will be continuously monitored. All instrument output signals are recorded by a Molytek Model 3702 data logger at a rate of at least one data point per minute and are conveyed to an FT-70 Panasonic or equivalent computer, where the data are stored.

A Rustrak Ranger II data logger may be employed to collect pollutant concentrations in lieu of the computer.

Each monitor will be calibrated before and after each test with three appropriate certified master gases. These gases will be approximately 20% to 30% of span, 50% to 60% of span, and 80% to 90% of span for each instrument. High purity nitrogen gas will be used to zero the CO, NO_x and O_2 monitors. Hydrocarbon-free air is used to zero the THC analyzer.

Instrument response time and calibration-error tests will be performed for each instrument.
The sampling system will be leak-checked at the beginning and end of each day.

4.3 TOTAL HYDROCARBON (AS METHANE) EMISSIONS MEASURING EQUIPMENT

Total hydrocarbon (as methane) emissions is determined using New Jersey Air Test Method Three, section 3.7, entitled "Procedures for the Direct Measurement of Volatile Organic Substances using a Flame Ionization Detector, a Photo-ionization Detector, or a Non-Dispersive Infrared Analyzer." This method is applicable to the determination of the concentration and mass emission rate of a known volatile organic substance (VOS) or a mixture of known VOS in defined proportions.

AirRECON will use an FID for quantification of total hydrocarbons as methane in the gas stream. A representative sample is introduced to a calibrated FID via the sample transport system described in Section 4.2 above under conditions which prevent condensation of the effluent gas and which remove particulate matter.

The flame ionization detector uses a well controlled flame to combust the hydrocarbons within the gas stream. Hydrocarbons are actually ionized by the flame, and the detector (typically a thin platinum wire) measures this ionization energy of the carbon-hydrogen bonds that are broken. The detector's response is directly related to the number of carbon atoms contained in each organic molecule of the sample. Output from the detector is electronically converted into a concentration based on the compound(s) used to calibrate the FID. In this instance, the FID will be calibrated with three, certified master calibration gases of known concentrations of methane. All of the methane gases used will be appropriate to the range during the test. Concentrations of total hydrocarbons, including methane, will be determined for each test.

This total hydrocarbon analyzer will conform to performance specifications listed in section 4.7, which meets 40 CFR 60, Appendix A criteria. The range of the FID will be zero to one thousand parts per million by volume.

4.4 NITROGEN OXIDES (NOx) MEASURING EQUIPMENT

A Thermo Electron Model 10 AR Nitrogen Oxides (NO_x) Analyzer will be employed to measure NO_x concentrations during the testing.

Principle of Operation: The chemiluminescent reaction of nitric oxide (NO) and ozone (O_3) provide the basis behind this group of instruments. Specifically,

$$NO + O_3 \Longrightarrow NO_2 + O_2 + h\nu$$

Light emission results when electronically excited NO_2 molecules revert to their ground state.

To measure NO concentrations, the gas sample to be analyzed is blended with O_3 in a reaction chamber. The resulting chemiluminescence is monitored through an optical filter by a highly sensitive photomultiplier tube, which is positioned at one end of the chamber. The filter/photomultiplier combination responds to light in a narrow-wavelength band unique to the above reaction. Thus, there is no interference. The output from the photomultiplier tube is linearly proportional to the NO concentration.

To measure NO_x concentrations, (i.e., NO plus NO_2), the sample gas flow is diverted through an NO_2-to-NO thermal converter. The chemiluminescent response in the reaction chamber to the convertor effluent is linearly proportional to the NO_x concentration entering the converter.

NO_2-to-NO Converter: To measure NO_x, as was stated, the NO_2 is first converted to NO. This conversion is accomplished by passing the sample gas through a thermally insulated, resistance-heated, stainless steel coil.

With the application of heat, NO_2 molecules from the sample are reduced to NO molecules. A 650 C environment is recommended for the conversion.

The TECO NO_x analyzer range will be set at 1.5 to 2.5 times the emission limitation.

4.5 CARBON MONOXIDE MEASURING EQUIPMENT

Carbon monoxide concentrations will be determined by infrared (IR) spectroscopy employing US EPA Reference Method 10. A representative sample of stack gas is directed to the CO analyzer via the sample transport system described previously. The sample enters the analyzer and is passed through a measurement cell.

While the sample is in the cell, an IR source located at the focal point of a concave mirror shines a beam through the measurement cell and through a parallel reference cell. A chopper disc rotates to send the IR beams alternately through the sample and reference measurement cells.

The radiant beams, after passing through the two cells, are reflected by a second mirror onto two photo detectors with spectral filters. The detectors convert optical energy from the radiant beams into electrical signals. The signals from the reference cell are compared to signals from the sample cell.

Any absorption of the IR beam in the sample cell by CO in the sample causes a proportional difference in the signals from the sample and reference cell beams. This difference is converted electronically into an output signal that is linearly proportional to the concentration of CO in the sample.

The CO analyzer will conform to performance specifications listed in Section 4.7, which meets 40 CFR 60, Appendix A criteria. The range of the CO analyzer will be zero to one thousand parts per million by volume.

4.6 OXYGEN MEASURING EQUIPMENT

Real-time analysis for oxygen will be performed on a Infrared Industries model 2200 electrochemical O_2 analyzer. Values will be displayed in volume percent.

The sensor contains an anode, electrolyte, and an air cathode, to which the diffusion of oxygen is severely restricted by a barrier. At the air cathode, oxygen is reduced to hydroxyl ions, while an oxidation reaction occurs at the metal anode. Current is proportional to the rate of consumption of oxygen. The range of operation for this analyzer is zero to twenty-five percent by volume.

4.7 PERFORMANCE STANDARDS FOR CONTINUOUS EMISSION MONITORS (REAL-TIME ANALYZERS)

The specific instrument type and model number were identified in Section 4.1 and shall conform to the following criteria outlined in 40 CFR 60, Appendix A, US EPA RM 6C:

- Analyzer calibration error: ± 2% of the span for zero, low-range, mid-range, and high-range calibration gases.
- Zero drift: ± 3% of the span over the period of each run.
- Calibration drift: ± 3% of the span over the period of each run.
- Sampling system bias: ± 5% of the span for the zero, low-range, mid-range and high-range calibration gases.

Prior to the start of testing, these four aforementioned performance tests will be conducted. A synopsis of each is described below.

The analyzer calibration error test consists of introducing zero gas (less than 0.25 percent of the span), mid-range calibration gas (between 50 and 60 percent of the span) and high-range calibration gas (between 80 and 90 percent of the span) to the measuring system and recording the analyzers' response. All calibration gases utilized during the CEMS conformance tests will be certified master standards.

The error check will be considered invalid if the gas concentration displayed by the analyzers exceeds ± two percent of the span for any calibration gases.

The sampling system bias check is performed by introducing a zero and either a mid-level or high-level calibration gas to the CEMS (at the calibration valve located at the sample probe outlet) and recording the analyzers' response. The gases are introduced until a stable response is achieved then, the other gas is introduced.

The measuring system response time will be determined by observing the times required to achieve stable response for both the zero and higher-level gases. The sampling system bias check will be considered invalid if the difference between the gas concentrations displayed by the measurement system for the analyzer calibration error check exceeds five percent. It will also be considered invalid if the sampling system bias check exceeds five percent of the span for either the zero or higher-level calibration gases.

After the system performance tests are completed, the testing will begin. Immediately preceding and following each test run, a zero and calibration drift test will be performed in the exact manner as the sampling system bias check was performed (see above).

5.0 QUALITY ASSURANCE PROCEDURES

This section describes quality assurance procedures used to ensure the accuracy and quality of the data acquired. Calibration will be performed as per 40 CFR 60, Appendix A, Reference Methods 1-6C.

5.1 CALIBRATION DATA

All pretest calibration data for sampling and analytical equipment will be made available onsite at the time of the first test to any NJDEP representatives. Copies of all pre-test and post-test calibration data will be included in the final report.

5.2 CALIBRATION PROCEDURES FOR INSTRUMENT ANALYZERS

Quality assurance for the Continuous Emission Monitors requires that prior to measurement of concentrations and once for each test run, that the sampling and analyzer system be calibrated at four points. All calibrations are performed by introducing calibration gas into the sampling system near the sampling probe and comparing the measurement system response of the gas to the actual value of the calibration gases. All gases will be certified master calibration gases traceable to NBS reference materials. The calibration procedure is described below.

After achieving proper operating condition, a zero gas (nitrogen or hydrocarbon-free air) is passed through the system and into the instrument, and it is adjusted into agreement with the zero gas. A low level span gas is then introduced into the instrument, and if necessary, an adjustment is made to equal the span gas concentration.

At this point, the high level and middle level span gases are then passed through the instrument to check linearity. Without adjustment between spans, values displayed by the instrument must agree within 5% of full scale with all span gases before analysis may begin. Furthermore, a system response time test will be conducted to determine the time required for the system to have a 95% response to a sample of known value.

6.0 FINAL REPORT

6.1 REPORTING OF RESULTS

The test report will be certified by a New Jersey licensed professional engineer or a certified industrial hygienist. It will be submitted, by the plant, to the Bureau of Technical Services within thirty days after completion of the testing. All test results will be reported in a manner consistent with the requirements of NJDEP and the US EPA.

Pollutant concentrations for THC, NO_x, (if applicable) and CO will be reported in parts per million by volume on a wet basis (ppmvw), parts per million by volume on a dry basis (ppmvd), and ppmvd corrected to seven percent oxygen. Oxygen will be reported in terms of volume percent.

6.2 INFORMATION INCLUDED IN THE FINAL TEST REPORT

AirRECON's final test report for this project will include the following:

- Original field data sheets
- Observations and notes
- A summary
- An emissions section for each parameter
- A personnel and certifications summary
- Calibration data for all sampling equipment used
- Sampling location diagrams
- Gas composition data
- Process information

- A copy of an originally approved test protocol
- Manufacturer's calibration gas certificates
- Copies of the real-time strip-chart recordings.

A completed copy of the proposed compliance test production data form (as shown in Appendix II) will also be included with the final report. The report will be issued in triplicate.

Submitted by:

Thomas P. Brown

Thomas P. Brown, REM
Chemical Engineer

Approved by:

George H. Wagner II
Manager
Real-Time Stack/Testing

TPB/prh
(PRT#18/NAPA)

APPENDIX I

PERMIT INFORMATION

August 14, 1991

AUG 20 1991

To: Emission Testing Consultants

Regarding: Generic Testing Protocol for Hot Mix Asphalt Plant Compliance Testing

From: Generic Protocol Task Group
The New Jersey Asphalt Pavement Association

The New Jersey Department of Environmental Protection, Division of Environmental Quality has defined new gaseous emission limits for Asphalt Plants. Each plant in New Jersey must be tested by June 1, 1991 to confirm compliance with those limits. The New Jersey Asphalt Pavement Association has met with Mr. Ed Choromanski, Chief Bureau of Technical Services, to streamline protocol requirements for that testing. We write to you on behalf of the Association Members to define the testing requirements and to ask for your quotation.

Emission Testing Consultants will be able to develop and submit to The Supervisor/Technical Review, Bureau of Technical Services a generic protocol for the compliance testing of any asphalt plant. Plant owners will then be able to inform Technical Services in writing that their plant will be tested by a Consultant whose pre-approved protocol is on file. The generic protocol eliminates the need to have protocols submitted and approved for each plant tested. Time is of the essence since all plants must sign on to a generic protocol or have their own protocol approved by October 15, 1991. An additional benefit to the generic testing program is advanced scheduling with Technical Services will not be required. Consultants must give only seven days notice of which plant they will test next.

NJAPA's goal is to reduce the testing cost for our members. We expect that the generic protocol defined here and the single sampling port at ground level will translate into lower costs. There are also the economies of scale, NJAPA represents over 60 asphalt plants of the 94 plants in New Jersey. Most plants remain to be tested. We would like your quotation to test our member's plants. Your quotation should be broken down into two components: (1) Lump Sum to mobilize and report results, (2) Per day cost to perform the compliance testing. Please give with your quotation the minimum number of plants required to obtain the quoted testing rate. Your quotation will be made available to our members, they would contract with you individually.

RECEIVED
AUG 20 1991

We invite you to submit a protocol to Mr. Choromanski's attention as soon as possible. Our members must chose consultants from those with approved protocol's. If you have testing protocols already approved in New Jersey it should be a simple matter for you to modify them as described here. Please keep Cliff Heath informed as to your progress. Cliff is President of our Association and can be reached at (609) 655-2030.

We look forward to hearing from you. Feel free to call me at (609) 641-2781 with any questions or problems.

Respectfully,

Robert E. Frank

Robert E. Frank
Chairman, Generic Protocol Task Group
New Jersey Asphalt Pavement Association

REF/h

cc: Mr. Ed Choromanski

Generic Protocol Requirements

A. Compounds To Be Tested For

1. Oxygen, USEPA method 3A

2. Carbon Monoxide, by USEPA method 10, calibration range 0-1,000 ppm

3. Total Hydrocarbons (Expressed as Methane) by New Jersey Method 3 (Modified EPA method 25A), calibration range 0-500 ppm.

   a. Moisture determination can be done by EPA method 4. A single sample drawn over one hour and the results used for the 3 hours of compliance testing.

4. Nitrogen Oxides (optional but recommended) USEPA method 7E

B. Sampling

1. Emission limits are in units of concentration (Parts per Million) therefore volumentric determination is not required. Sampling can be done from a single point preferably where pressure is positive. Sampling location must be approved by letter for each plant testing.

2. Three one hour sampling runs are required. Calibration must be checked between each hour of data in accordance with EPA test methods. Master Gases are acceptable for calibration.

3. Protocol must include all six items from Technical Service Sampling Methods (see attached)

C. Reporting

1. A Standard report form with results added at test site will be acceptable. Results require Professional Engineer or Certified Industrial Hygienist Certification.

2. CO and THC (as Methane) results are to be reported in units of parts per million dry volume, and parts per million dry volume corrected to seven percent oxygen.

3. Oxygen concentration must be reported in unit of percent.

4. Sampling methods to be utilized as part of the testing program.

   a. Summary of each method to be utilized including any deviations from the reference methods. Simply listing the methods is not acceptable.

   b. Description and/or labeled diagram of each sampling train.

   c. Description of each train's operation and parameters to be recorded and monitored during the test run.

   d. Description of the leak check procedures for each train, including continuous monitors.

   e. Description of sample volumes and detection limits where applicable. Include justifications.

   f. Calibration procedures for all pertinent sampling equipment, including but not limited to:

      Dry Gas Meter
      Office Meter
      S-Type Pitot Tubes
      Temperature Sensors
      Nozzles
      Rotameters
      Continuous Monitors
      Span Gas Certifications

VE 1-045
7/8

NEW JERSEY STATE DEPARTMENT OF ENVIRONMENTAL PROTECTION

5

DIVISION OF ENVIRONMENTAL QUALITY
AIR POLLUTION CONTROL PERMIT PROGRAM
BUREAU OF NEW SOURCE REVIEW
CN 027
TRENTON, NEW JERSEY 08625

Date: 8/24/90

TRI COUNTY ASPHALT CORPORATION
EDWIN M. GATLY
RD 3 BOX 561
LAKE HOPATCONG , NJ, 07849-0000

Plant Location: BYRAM TWP.
County: SUSSEX
Applicant's Designation of Stack:004
Application Log #: 01903158
Approval Date: 8/21/90
Permit/Certificate #: 093317

This letter is to advise you that an alteration to a Permit to Construct, Install, or Alter Control Apparatus or Equipment and Certificate to Operate Control Apparatus or Equipment has been approved under the authority of chapter 106, P.L. 1967 (N.J.S.A. 26:2C-9.2) by the Bureau of New Source Review as referenced above.

The correspondence that you sent will be added to the appropriate stack file. The information is incorporated into the application and constitutes an ENFORCEABLE PERMIT CONDITION. Unless revised herein, all previous conditions of approval continue to apply.

If you have any questions regarding this document, please write to the Bureau of New Source Review at the above address. Questions regarding Certificates to Operate should be directed to the Regional Office.

Approved by: Louis Metokaj
Chief

C: File
Regional Office

REGIONAL OFFICES

METROPOLITAN REGIONAL ENFORCEMENT

N.J. Department of Environmental Protection
Division of Environmental Quality
Bureau of Enforcement Operations
2 Babcock Place
West Orange, New Jersey 07052
(201) 669-3935

Covers Counties of: **Bergen, Essex, Hudson & Union**

CENTRAL REGIONAL ENFORCEMENT

N.J. Department of Environmental Protection
Division of Environmental Quality
Bureau of Enforcement Operations
Twin Rivers Professional Bldg.
East Windsor, New Jersey 08520
(609) 426-0796

Covers Counties of: **Burlington, Mercer, Middlesex, Monmouth & Ocean**

NORTHERN REGIONAL ENFORCEMENT

N.J. Department of Environmental Protection
Division of Environmental Quality
Bureau of Enforcement Operations
1259 Route 46
Parsippany-Troy Hills, N.J. 07054
(201) 299-7700

Covers Counties of: **Hunterdon, Morris, Somerset, Sussex, Passaic & Warren**

SOUTHERN REGIONAL ENFORCEMENT

N.J. Department of Environmental Protection
Division of Environmental Quality
Bureau of Enforcement Operations
The Paint Works Corporate Center
20 East Clementon Road/3rd Floor
Gibbsboro, N.J. 08026
(609) 346-8071

Covers Counties of: **Atlantic, Camden, Cape May, Cumberland, Salem & Gloucester**

CERTIFICATE STATUS CODES:

- 01 - Temporary Operating Certificate
- 05 - Five Year Operating Certificate
- 51 - Conditional — Temporary (See Condition Checked)
- 52 - Stack Test Required
- 55 - Five Year Conditional (See Condition Checked)

CONDITIONS THAT WILL APPLY:

_____ The owner/operator shall not construct, install, use or cause to be used this equipment in a manner which will result in odors being detectable by sense of smell in any area, except for those areas over which the owner or operator has exclusive use or occupancy.

_____ No visible emissions, exclusive of condensed water vapor

_____ No person shall cause, suffer, allow or permit particles to be emitted from this stack or chimney into the outdoor air, the shade or appearance of which is greater than 10% opacity, exclusive of visible condensed water vapor.

X Special conditions (see attached)

NOTE:

_____ **If this item is checked this Operating Certificate is not approved for start up.**

Supplemental Conditions for CO and THC
Attachment to Certificate Number 093317
Log Number 1-90-3158
Approval Date 8/21/90

The following conditions replace any previous emission limits on conditions concerning carbon monoxide (CO) and total hydrocarbon (THC) emissions for the asphalt mix dryer stack operating certificate referenced above.

1. **EMISSION LIMITS, ASPHALT MIX DRYER STACK**

Emissions from the stack, averaged over any 60 minute period, shall not exceed any of the concentration limits in Table 1, measured in parts per million by volume, dry basis, corrected to 7 percent oxygen (ppmvd at 7% O_2). Compliance shall be determined by the use of New Jersey Air Test Method 3 for THC (N.J.A.C. 7:27B) and USEPA Reference Method 10 (40 CFR Part 60, Appendix A), for CO or by Continuous Emission Monitors and Recorders (CEM & R's) approved by the Department.

TABLE 1

EMISSION LIMITS WITH CONTROL

POLLUTANT	6/15/90 TO 6/15/91	AFTER 6/15/91
Carbon Monoxide (CO) PPMVD AT 7% O_2	1000	500
Total Hydrocarbon (THC) PPMVD AT 7% O_2	250	250

2. **TESTING REQUIREMENTS**

a. If this approval includes authorization to use Reclaimed Asphalt Pavement (RAP), conduct stack tests prior to October 31, 1990, unless extended in writing by chief, Bureau of Technical Service.

b. If RAP is not used, conduct stack tests by October 31, 1991.

c. Test for carbon monoxide, oxygen, and total hydrocarbons.

d. Sixty days prior to the conduct of the required tests, the Company shall submit for approval a detailed description of the sampling port locations, sampling equipment, sampling and analytical procedures and operating conditions for such tests to:

Chief
Bureau of Technical Services
NJDEP
CN 411
Trenton, New Jersey 08625

e. Company shall contact the Bureau of Technical Services at (609)530-4041 to schedule a mutually acceptable test date.

f. Company shall submit two copies of the test results to the Chief, Bureau of Technical Services, within 30 days of the completion of testing. The test results must be certified by a New Jersey licensed professional engineer.

g. The Department may accept other recent test (after June 1, 1988) results as fulfilling these testing requirements if approved by the Chief Bureau of Technical Services.

h. The Department may require additional testing for carbon monoxide, total hydrocarbons, and other pollutants as a condition of renewal of the 5 year operating certificate. If there has been recent testing (within 30 months) of the renewal date, the Chief, Bureau of Technical Services may approve those tests to satisfy all, or part of, the 5 year renewal test requirement.

3. <u>Conditions for use of Reclaimed Asphalt Pavements (RAP)</u>
(if applicable)

a. The Company must conduct stack tests prior to October 31, 1990, unless extended by the Chief, Bureau of Technical Services, with and without RAP, in accordance with Condition Number 2.

b. The maximum THC concentration with RAP shall not exceed 250 ppmvd at 7% O_2 for any 60 minute period.

c. A maximum of 25 ppmvd at 7% O_2 THC increase is allowed between the average of 3 one hour tests without RAP and the average of 3 one hour tests with RAP, unless each one hour test with RAP is less than 125 ppmvd at 7% O_2.

d. The company may test at various RAP [illegible] in the feed material as defined in the operating conditions in an approval test protocol (see Condition 2d). The maximum amount of RAP processed during the complying stack tests shall set the maximum RAP charging rate for the facility.

e. Based on the results of testing RAP in drum mix plants, the Department may prohibit or otherwise limit the charging of RAP to the drum if it is shown that the exposure of the RAP to the flame or high temperatures generally causes THC emissions which exceed the above limits.

4. <u>Continuous Emission Monitors and Recorders (CEM & R's)</u>

a. Continuous emission monitors for oxygen and carbon monoxide shall be installed by June 15, 1993. These monitors must meet the minimum performance specifications outlined in 40 CFR Part 60 Appendix B and any other performance requirement specified by the Department.

b. Details on the continuous monitor, recording devices, calibration, monitoring and operating procedures, and monitor performance specifications tests shall be submitted by 6/15/92 to the Chief, Bureau of Technical Services for review and approval.

c. The Department may require installation and operation of a continuous emission monitor for total hydrocarbons (THC) if testing indicates control of carbon monoxide within the required limit does not result in control of THC within the required limit.

d. As an alternative to the stack testing requirement in Condition Number 2 for units which do not use RAP, the company may install Continuous Emission Monitors & Recorders (CEM & R's) for carbon monoxide and oxygen prior to October 31, 1991 provided a CEM & R equipment protocol is approved by 6/15/[illegible].

e. Quarterly excess emission reports on the CEMS data must be submitted in the attached form to the Regional Enforcement Office after June 15, 1993, or October 31, 1991 if condition 4(d) is applicable.

5. **Pollution Prevention By Use Of Good Operating Practices for Air Pollution Control** (GOPAPC)

a. Adjust burner systems at least annually to insure optimum fuel atomization and fuel/air mixing. The fuel system should have a maximum fuel rate setting and restriction to prevent fuel rate in excess of that required for the maximum air flow rate for the dryer. Combustion air, including atomizing, primary and secondary air should be adjusted to provide proper fuel atomization and good mixing for maximum combustion efficiency over the operating range of the fuel firing rate.

b. Examine the flights in the dryer at least annually to determine whether flame quenching by the aggregate is occurring. If so, replace or modify with appropriate flights for the combustion zone.

c. Review the existing procedure of loading the dryer from the aggregate and sand piles:

(1) Provide cover to prevent high water content due to rain: or

(2) Remove sand and aggregate from piles at a sufficient height above the base to avoid charging wet mix to the dryer.

d. For drum mix asphalt plants:

(1) Adjust the location of the asphalt injection to ensure that the asphalt is not being injected near the flame zone or otherwise subjected to high temperatures. High temperatures, in this regard, can be defined as greater than the minimum flash point of the asphalt, which is 450°F for Grade-AC-20.

(2) Adjust the flight design and arrangement for the purpose of providing a full aggregate curtain in the dryer, after the combustion zone but prior to the asphalt injection point. This will serve to increase the heat exchange from the hot gases to the aggregate and thus reduce the temperature of the gases around the area of the asphalt injection.

e. If necessary to meet the emission limits in the above condition, by June 15, 1991, replace the burner system to provide:

(1) Better atomization of the fuel over the entire fuel firing rate range;

(2) Better mixing of air and fuel for improved combustion efficiency;

(3) Automatic combustion air control based on the fuel firing rate; and

(4) Reduction of excess air to the optimum level to minimize emissions.

f. Consider further alterations of the flight arrangement to reduce the dryer exit temperature by increasing heat transfer to the aggregate.

g. Consider recirculation of exit dryer gases and energy recovery to preheat the combustion air and aggregate prior to the dryer feed.

h. Continue to evaluate and implement reasonable good operating practices to minimize CO and THC emissions, with a goal of 250 ppmvd and 125 ppmvd, respectively, at 7% O_2.

6. Reporting

a. To evaluate the progress made by each asphalt plant in implementing the above listed measures and any other measures taken to achieve the emission limits, the company must submit a quarterly report to the Chief Engineer, Air Quality Engineering, and the Regional Enforcement Officer. The report should include the following:

(1) Summary of THC and CO emission levels being achieved by the plant.

(2) Company progress in implementing Good Operating Practices over last quarter.

(3) Company plans to implement Good Operating Practices over the next quarter.

(4) Company progress toward meeting emission limits and other requirements of these operating conditions.

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Each report shall be submitted within 30 days of the end of each quarter. The first quarter of each year begins January 1 of that year. The first report is due by January 31, 1991.

b. After July 1, 1994, the company may request that the Regional Enforcement Officer decrease the frequency of reporting, based upon the emission levels achieved and the operating history of the plant.

The Chief Engineer
Air Quality Engineering
CN 027
Trenton, New Jersey 08625

The Regional Enforcement Officer
1259 Route 46
Parsippany-Troy Hill, N.J. 07054

==== Stack Flowrate Calculator === AirRECON, Raritan, NJ. ====

"TOMFLOW3"

COMPANY NAME: TRI-COUNTY ASPHALT CO.
SAMPLE LOCATION: ROCKAWAY, NJ
UNIT: BAGHOUSE OUTLET; PLANT 3

RUN No: 1
DATE: DEC. 11, 1991
TIME: 10:24-11:24

FIELD DATA SHEET

POINT	PRE-TEST TRAVERSE STATIC "H2O ==> 0.0 DELTA P	TEMP	SQRT(P)	METER TEMPS IN	OUT	POST-TEST TRAVERSE STATIC "H2O ==> 0.0 DELTA P	TEMP	SQRT(P)
1	0.0		0.00	49	54	0.0		0.00
2			0.00	60	55			0.00
3			0.00	63	56			0.00
4			0.00	67	59			0.00
5			0.00	67	59			0.00
6			0.00	68	60			0.00
7			0.00	68	60			0.00
8			0.00	69	61			0.00
9			0.00	70	62			0.00
10			0.00	71	62			0.00
11			0.00	73	63			0.00
12			0.00	73	63			0.00
13			0.00					0.00
14			0.00					0.00
15			0.00					0.00
16			0.00					0.00
17			0.00					0.00
18			0.00					0.00
19			0.00					0.00
20			0.00					0.00
21			0.00					0.00
22			0.00					0.00
23			0.00					0.00
24			0.00					0.00
25			0.00					0.00
AVG.	0.0	ERR	0.00		63	0.000	ERR	0.00

INPUT DATA		OUTPUT DATA	
BARO.PRES.("HG)	30.13	METER VOL.(STD-FT3)	37.78
METER VOL.(FT3)	38.078	WATER VAPOR (FT3)	8.741
IMP.CATCH (GRAMS)	185.3	PERCENT MOISTURE	18.79
METER CORRECTION F	0.97	MOL.WT (DRY-#/#MOLE)	29.17
DELTA H ("H2O)	1.00	MOL.WT(WET #/#MOLE)	27.07
PITOT TUBE F		AVG. STACK PRES("HG)	30.13
STACK AREA(FT2)		STACK VELOCITIES:	
PERCENT OXYGEN	14.59	PRE-TEST (FT/SEC)	
PERCENT CO2	3.67	POST-TEST (FT/SEC)	
PERCENT CO	0.00	AVERAGE (FT/SEC)	
PERCENT NITROGEN	81.74	AVG. STD.(FT/SEC)	
		STACK FLOWRATE:	
		AVG. ACTUAL (ACFM)	
		STD. AVERAGE (SCFM)	
		DRY STD. AVG. (DSCFM)	

Tri County Plant 3

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HYDROCARBON SAMPLING DATA

SAMPLE LOCATION Baghouse RUN NO. 2 DATE 12/11/91

TIME	ROTOMETER SETTING	GAS METER TEMPERATURE	VACCUM "HG	SAMPLE RATE L/M

PRE-LEAK CHECK _____ POST-LEAK CHECK _____

MOISTURE SAMPLING DATA

ΔH VAC

TIME	METER READING	INLET METER TEMPERATURE	OUTLET METER TEMPERATURE	SAMPLE RATE L/M
1206	13.682	54	56	1.0
1205		58	61	
1210		60	60	
1215		68	60	
1220		72	62	
1225		72	63	
1230		73	64	
1235		73	64	
1240		74	65	
1245		74	66	
1250		74	66	
1255		75	67	
1300	48.452			

5

PRE-LEAK CHECK 0.000 @ 8" POST-LEAK CHECK 0.003 ft³/min @ 8 "Hg

RAC BOX NO 1 DELTA H @ 1.74 DELTA H SETTING 1.0

PUMP CALIBRATION FLOW RATE	CALIBRATION INSTRUMENT	FYRITE
FLOW RATE LITERS/MIN ROTAMETER SETTING	____ SOAP FILM BURET ____ DRY GAS METER ____ OTHER _____	% OXYGEN % CARBON DIOXIDE

Tri County Plant 3

MOISTURE DETERMINATION

SAMPLE LOCATION Baghouse RUN NO. 2 DATE 12/11/91

		GRAMS		GRAMS
IMPINGER 1	FINAL WEIGHT	660.1	IMPINGER 1	136.7
	INITIAL WEIGHT	523.4		
	INCREASE			
IMPINGER 2	FINAL WEIGHT	644.0	IMPINGER 2	29.6
	INITIAL WEIGHT	614.4		
	INCREASE			
IMPINGER 3	FINAL WEIGHT	493.3	IMPINGER 3	4.7
	INITIAL WEIGHT	488.6		
	INCREASE			
SILICA GEL	FINAL WEIGHT	641.2	SILICA GEL	14.6
	INITIAL WEIGHT	626.6		
	INCREASE			

TOTAL MASS OF WATER CAUGHT 185.6 GRAMS

CALCULATIONS

VELOCITY (ACTUAL) IN STACK $= 85.48\ (C_p) \sqrt{\frac{T_s + 460}{P_s\ (MW)}} \sqrt{\text{DELTA P}} = 85.48\ (\quad)\ \sqrt{\frac{(\quad)}{(\quad)(\quad)}}\ \sqrt{\text{DELTA P}}$

$V_s = (\quad)\ \sqrt{\quad}\ \sqrt{\text{DELTA P}} = (\quad)(\quad)\ \sqrt{\text{DELTA P}}$

$V_s = (\quad)\ \sqrt{\text{DELTA P}} = (\quad)(\quad) =$ _____ FT/SEC

$ACFM = (V_s)\ (60)(CSA) = (\quad)\ (60)\ (\quad) =$ _____

VELOCITY @ Stp V_s - std $= V_s\ (17.65) \left(\frac{P_s}{T_s + 460}\right) = \frac{(\quad)\ (17.65)\ (\quad)}{(\quad)} =$ _____ FT/SEC

$SCFM = (V_s - std)\ (CSA)\ (60) = (\quad)\ (\quad)\ (60) =$ _____

$BSCFM = \left(\frac{100 - \%H_2O}{100}\right) (SCFM) = (\quad)\ (\quad -) =$ _____

CORRECTING ROTOMETERE VOLUME TO DRY STANDARD CONDITIONS

EQUATION: $V_{STD} = V_m \times \frac{P_m}{T_m} \times \frac{T_{STD}}{P_{STD}}$

WHERE:

V_M	=	SAMPLE RATE OF ROTOMETER
T_{STD}	=	70°F = 460°F = 530°F
P_{STD}	=	29.92"HG
P_M	=	BAROMETRIC PRESSURE DURING SAMPLING ("HG)
Tm	=	TEMPERATURE OF GAS STREAM (+460°F)
V_{STD}	=	$\times \frac{(\quad)}{(\quad)} \times \frac{(530)}{(29.92)} =$ _____
CF	=	V_{STD} L/MIN) $(3.53 \times 10^{-2}$ CF/L) (60 MIN/1 HR) = ( ) (3.53×10^{-2}) (60)
	=	CFH

==== Stack Flowrate Calculator === AirRECON, Raritan, NJ. ====

"TOMFLOW3"

COMPANY NAME: TRI-COUNTY ASPHALT CO. RUN No: 2

SAMPLE LOCATION: ROCKAWAY, NJ DATE: DEC. 11, 1991

UNIT: BAGHOUSE OUTLET; PLANT 3 TIME: 12:00-13:00

FIELD DATA SHEET

POINT	PRE-TEST TRAVERSE STATIC "H2O ==> 0.0 DELTA P	TEMP	SQRT(P)	METER TEMPS IN	OUT	POST-TEST TRAVERSE STATIC "H2O ==> 0.0 DELTA P	TEMP	SQRT(P)
1	0.0		0.00	54	56	0.0		0.00
2			0.00	58	61			0.00
3			0.00	60	60			0.00
4			0.00	68	60			0.00
5			0.00	72	62			0.00
6			0.00	72	63			0.00
7			0.00	73	64			0.00
8			0.00	73	64			0.00
9			0.00	74	65			0.00
10			0.00	74	66			0.00
11			0.00	74	66			0.00
12			0.00	75	67			0.00
13			0.00					0.00
14			0.00					0.00
15			0.00					0.00
16			0.00					0.00
17			0.00					0.00
18			0.00					0.00
19			0.00					0.00
20			0.00					0.00
21			0.00					0.00
22			0.00					0.00
23			0.00					0.00
24			0.00					0.00
25			0.00					0.00
AVG.	0.0	ERR	0.00		66	0.000	ERR	0.00

INPUT DATA

BARO.PRES.("HG)	30.13
METER VOL.(FT3)	34.770
IMP.CATCH (GRAMS)	185.6
METER CORRECTION F	0.97
DELTA H ("H2O)	1.00
PITOT TUBE F	
STACK AREA(FT2)	
PERCENT OXYGEN	14.68
PERCENT CO2	3.77
PERCENT CO	0.00
PERCENT NITROGEN	81.55

OUTPUT DATA

METER VOL.(STD-FT3)	34.31
WATER VAPOR (FT3)	8.755
PERCENT MOISTURE	20.33
MOL.WT (DRY-#/#MOLE)	29.19
MOL.WT(WET #/#MOLE)	26.92
AVG. STACK PRES("HG)	30.13
STACK VELOCITIES:	
PRE-TEST (FT/SEC)	
POST-TEST (FT/SEC)	
AVERAGE (FT/SEC)	
AVG. STD.(FT/SEC)	
STACK FLOWRATE:	
AVG. ACTUAL (ACFM)	
STD. AVERAGE (SCFM)	
DRY STD. AVG. (DSCFM)	

Tri County Plants

HYDROCARBON SAMPLING DATA

SAMPLE LOCATION Baghouse RUN NO. 3 DATE 12/11/91 '7C

TIME	ROTOMETER SETTING	GAS METER TEMPERATURE	VACCUM "HG	SAMPLE RATE L/M

PRE-LEAK CHECK _____ POST-LEAK CHECK _____

MOISTURE SAMPLING DATA

AH VAC

TIME	METER READING	INLET METER TEMPERATURE	OUTLET METER TEMPERATURE	SAMPLE RATE L/M
1331	48.890	~~86~~ 67	65	1.0
1336		70	66	
1341		73	67	
1346		76	67	
1351		76	67	
1356		75	67	
1401		75	67	
1406		75	67	
1411		74	67	
1416		74	67	
1421		73	67	
1426		73	67	
1431	86.075			

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PRE-LEAK CHECK 0.010 @ 8" POST-LEAK CHECK ~~0.~~002 ft³/min @ 7" Hg

RAC BOX NO 1 DELTA H @ 1.74 DELTA H SETTING 1.0

PUMP CALIBRATION FLOW RATE		CALIBRATION INSTRUMENT	FYRITE
FLOW RATE LITERS/MIN	ROTAMETER SETTING	____ SOAP FILM BURET ____ DRY GAS METER ____ OTHER _____	% OXYGEN % CARBON DIOXIDE

TRI COUNTY Plant 3

MOISTURE DETERMINATION

SAMPLE LOCATION Baghouse RUN NO. 3 DATE 12/11/91

		GRAMS		GRAMS
IMPINGER 1	FINAL WEIGHT	703.2	IMPINGER 1	83.0
	INITIAL WEIGHT	620.2		
	INCREASE			
IMPINGER 2	FINAL WEIGHT	663.3	IMPINGER 2	55.5
	INITIAL WEIGHT	607.8		
	INCREASE			
IMPINGER 3	FINAL WEIGHT	465.7	IMPINGER 3	11.5
	INITIAL WEIGHT	454.2		
	INCREASE			
SILICA GEL	FINAL WEIGHT	749.5	SILICA GEL	17.5
	INITIAL WEIGHT	732.0		
	INCREASE			

TOTAL MASS OF WATER CAUGHT 167.5 GRAMS

CALCULATIONS

VELOCITY (ACTUAL) IN STACK $= 85.48\ (C_p) \sqrt{\frac{T_s + 460}{P_s\ (MW)}} \sqrt{\text{DELTA P}} = 85.48\ (\quad)\ \sqrt{\frac{(\quad)}{(\quad)(\quad)}}\ \sqrt{\text{DELTA P}}$

$V_s = (\quad)\ \sqrt{\quad}\ \sqrt{\text{DELTA P}} = (\quad)(\quad)\ \sqrt{\text{DELTA P}}$

$V_s = (\quad)\ \sqrt{\text{DELTA P}} = (\quad)(\quad) =$ _____ FT/SEC

$ACFM = (V_s)\ (60)(CSA) = (\quad)\ (60)\ (\quad) =$ _____

VELOCITY @ Stp $V_s - std = V_s\ (17.65)\left(\frac{P_s}{T_s + 460}\right) = \frac{(\quad)\ (17.65)\ (\quad)}{(\quad)} =$ _____ FT/SEC

$SCFM = (V_s - std)\ (CSA)\ (60) = (\quad)\ (\quad)\ (60) =$ _____

$DSCFM = \left(\frac{100 - \%H_2O}{100}\right)(SCFM) = (\quad)\ (\quad.) =$ _____

CORRECTING ROTOMETERE VOLUME TO DRY STANDARD CONDITIONS

EQUATION: $V_{STD} = V_m \times \frac{P_m}{T_m} \times \frac{T_{STD}}{P_{STD}}$

WHERE:

V_m = SAMPLE RATE OF ROTOMETER

T_{STD} = 70°F = 460°F = 530°F

P_{STD} = 29.92"HG

P_m = BAROMETRIC PRESSURE DURING SAMPLING ("HG)

Tm = TEMPERATURE OF GAS STREAM (+460°F)

V_{STD} = $\times \frac{(\quad)}{(\quad)} \times \frac{(530)}{(29.92)} =$ _____

CF = V_{STD} L/MIN) $(3.53 \times 10^{-2}$ CF/L) (60 MIN/1 HR) = $(\quad)\ (3.53 \times 10^{-2})\ (60)$

= CFH

==== Stack Flowrate Calculator === AirRECON, Raritan, NJ. ====

"TOMFLOW3"

COMPANY NAME: TRI-COUNTY ASPHALT CO. RUN No: 3
SAMPLE LOCATION: ROCKAWAY, NJ DATE: DEC. 11, 1991
UNIT: BAGHOUSE OUTLET; PLANT 3 TIME: 13:31-14:31

FIELD DATA SHEET

POINT	PRE-TEST TRAVERSE STATIC "H2O ==> 0.0 DELTA P	TEMP	SQRT(P)	METER TEMPS IN	OUT	POST-TEST TRAVERSE STATIC "H2O ==> 0.0 DELTA P	TEMP	SQRT(P)
1	0.0		0.00	62	65	0.0		0.00
2			0.00	70	66			0.00
3			0.00	73	67			0.00
4			0.00	76	67			0.00
5			0.00	76	67			0.00
6			0.00	75	67			0.00
7			0.00	75	67			0.00
8			0.00	75	67			0.00
9			0.00	74	67			0.00
10			0.00	74	67			0.00
11			0.00	73	67			0.00
12			0.00	73	67			0.00
13			0.00					0.00
14			0.00					0.00
15			0.00					0.00
16			0.00					0.00
17			0.00					0.00
18			0.00					0.00
19			0.00					0.00
20			0.00					0.00
21			0.00					0.00
22			0.00					0.00
23			0.00					0.00
24			0.00					0.00
25			0.00					0.00
AVG.	0.0	ERR	0.00		70	0.000	ERR	0.00

INPUT DATA		OUTPUT DATA	
BARO.PRES.("HG)	30.14	METER VOL.(STD-FT3)	36.42
METER VOL.(FT3)	37.185	WATER VAPOR (FT3)	7.901
IMP.CATCH (GRAMS)	167.5	PERCENT MOISTURE	17.83
METER CORRECTION F	0.97	MOL.WT (DRY-#/#MOLE)	29.19
DELTA H ("H2O)	1.00	MOL.WT(WET #/#MOLE)	27.19
PITOT TUBE F		AVG. STACK PRES("HG)	30.14
STACK AREA(FT2)		STACK VELOCITIES:	
PERCENT OXYGEN	15.39	PRE-TEST (FT/SEC)	
PERCENT CO2	3.57	POST-TEST (FT/SEC)	
PERCENT CO	0.00	AVERAGE (FT/SEC)	
PERCENT NITROGEN	81.04	AVG. STD.(FT/SEC)	
		STACK FLOWRATE:	
		AVG. ACTUAL (ACFM)	
		STD. AVERAGE (SCFM)	
		DRY STD. AVG. (DSCFM)	

APPENDIX III

CEM STRIP CHART RECORDINGS

02

1 = 4.8 PPM NOX 2 = 15.6 % 02 6 = 0.0 PPM THC
11/DEC/91 8:33 3

15.5 02

1 = 4.8 PPM NOX 2 = 20.9 % 02 6 = -0.5 PPM THC
11/DEC/91 8:32 5

20.9 % 02

7 = 0.0 % CO2 16 = -0.1 PPM CO
1 = 5.1 PPM NOX 2 = 0.0 % 02 6 = -0.9 PPM THC
11/DEC/91 8:30 9

ZERO 02 -CO

OF 02
CALIBRATION

CHANNEL 16 - CO
100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100
CHANNEL 6 - THC AS PROPANE
CHANNEL 2 - 02
CHANNEL 1 -NOX

SOURCE - BAGHOUSE

TRI-COUNTY ASPHALT - ROCKAWAY FACILITY

74

ZERO

CALIB OF THC

100 90 80 70 60 50 40 30 20 10 0

16 = 871.5 PPM CO

0 1 = 3.7 10 PPM NOX 30 2 =-0.1 40 % 50 O2 60 6 =-0.8 70 PPM 80 THC 90 100

11/DEC/91 8:43:11

1 = 3.6 PPM NOX 2 =-0.1 % O2 6 =-0.8 PPM THC

11/DEC/91 8:42:52

16 = 878.6 PPM CO

1 = 3.7 PPM NOX 2 =-0.1 % O2 6 =-0.8 PPM THC

11/DEC/91 8:42:5

854 PPM CO

16 = 488.3 PPM CO

1 = 3.9 PPM NOX 2 =-0.1 % O2 6 =-0.9 PPM THC

11/DEC/91 8:39:14

494 PPM C

16 = 188.7 PPM CO

1 = 4.8 PPM NOX 2 =-0.1 % O2 6 =-0.9 PPM THC

11/DEC/91 8:36:31

183 PPM CO

CALIB OF CO

100 90 80 70 60 50 40 30 20 10 0

0 1 = 4.7 10 PPM NOX 30 2 = 6.1 40 % 50 O2 60 6 =-0.7 70 PPM 80 THC 90 100

11/DEC/91 8:34:20

68 5 PPM NO

1 = 19.5 PPM NOX 2 = -0.1 % O2 6 = -0.4 PPM THC
11/DEC/91 8:53:29

19 PPM NO

1 = 0.1 PPM NOX 2 = 10.1 % O2 6 = 0.4 PPM THC
11/DEC/91 8:51 2

ZERO

CALIB OF NOX

100 = 3.7 PPM NOX 2 = 19.3 % O2 6 = 89.7 PPM THC
11/DEC/91 8:48 19

82 PPM THC

1 = 3.6 PPM NOX 2 = 19.6 % O2 6 = 49.9 PPM THC
11/DEC/91 8:47 34

52 PPM THC AS PROPANE

1 = 3.5 PPM NOX 2 = 19.4 % O2 6 = 25.0 PPM THC
11/DEC/91 8:46 33

26 PPM THC

1 = 3.5 PPM NOX 2 = 21.3 % O2 6 = 0.0 PPM THC
11/DEC/91 8:45 39

5 = 9.0 PPM CO

1 = 43.0 PPM NOX 2 = 13.5 % O2 6 = 23.4 PPM THC

11/DEC/91 10:29:31

16 = 75.4 PPM CO

1 = 40.7 PPM NOX 2 = 13.7 % O2 6 = 23.9 PPM THC

11/DEC/91 10:28:16

16 = 86.3 PPM CO

1 = 23.9 PPM NOX 2 = 15.9 % O2 6 = 28.4 PPM THC

11/DEC/91 10:27:1

16 = 251.9 PPM CO

1 = 28.9 PPM NOX 2 = 16.5 % O2 6 = 20.5 PPM THC

11/DEC/91 10:25:46

16 = 62.9 PPM CO

1 = 33.8 PPM NOX 2 = 15.2 % O2 6 = 6.4 PPM THC

11/DEC/91 10:24:31

16 = 57.7 PPM CO

1 = 33.6 PPM NOX 2 = 15.2 % O2 6 = 6.1 PPM THC

11/DEC/91 10:23:16

16 = 16.6 PPM CO

1 = 34.5 PPM NOX 2 = 14.8 % O2 6 = 5.3 PPM THC

11/DEC/91 10:22:1

16 = 10.7 PPM CO

1 = 25.4 PPM NOX 2 = 15.4 % O2 6 = 5.2 PPM THC

11/DEC/91 10:20:46

16 = 8.0 PPM CO

1 = 20.9 PPM NOX 2 = 16.8 % O2 6 = 5.1 PPM THC

11/DEC/91 10:19:31

PLANT 3

1 = 96.2 PPM NOX 2 = -0.1 % O2 6 = -0.2 PPM THC

11/DEC/91 8:56:29

96 PPM NO

1 = 68.7 PPM NOX 2 = -0.1 % O2 6 = -0.4 PPM THC

11/DEC/91 8:55:14

1 = 39.4	PPM	NOX	2 = 1					6 = 25				
11/DEC/91 10:47: 1												
16 = 212.1	PPM	CO										
1 = 40.4	PPM	NOX	2 = 13.8	%	O2			6 = 25.8	PPM	THC		
11/DEC/91 10:45:46												
16 = 149.1	PPM	CO										
1 = 41.5	PPM	NOX	2 = 13.8	%	O2			6 = 23.7	PPM	THC		
11/DEC/91 10:44:31												
16 = 128.0	PPM	CO										
1 = 42.8	PPM	NOX	2 = 13.6	%	O2			6 = 24.3	PPM	THC		
11/DEC/91 10:43:16												
16 = 121.0	PPM	CO										
1 = 42.1	PPM	NOX	2 = 13.8	%	O2			6 = 16.4	PPM	THC		
11/DEC/91 10:42: 1												
16 = 150.7	PPM	CO										
1 = 42.6	PPM	NOX	2 = 14.2	%	O2			6 = 21.0	PPM	THC		
11/DEC/91 10:40:46												
16 = 111.5	PPM	CO										
1 = 42.6	PPM	NOX	2 = 13.9	%	O2			6 = 18.0	PPM	THC		
11/DEC/91 10:39:31												
16 = 92.5	PPM	CO										
1 = 40.4	PPM	NOX	2 = 14.3	%	O2			6 = 19.0	PPM	THC		
11/DEC/91 10:38:16												
16 = 115.3	PPM	CO										
1 = 37.9	PPM	NOX	2 = 14.3	%	O2			6 = 18.5	PPM	THC		
11/DEC/91 10:37: 1												
16 = 212.8	PPM	CO										
1 = 29.9	PPM	NOX	2 = 16.0	%	O2			6 = 20.1	PPM	THC		
11/DEC/91 10:35:46												
16 = 164.3	PPM	CO										
1 = 37.6	PPM	NOX	2 = 14.8	%	O2			6 = 22.7	PPM	THC		
11/DEC/91 10:34:31												
16 = 225.5	PPM	CO										
1 = 37.2	PPM	NOX	2 = 14.7	%	O2			6 = 25.0	PPM	THC		
11/DEC/91 10:33:16												
16 = 257.2	PPM	CO										
1 = 37.6	PPM	NOX	2 = 14.7	%	O2			6 = 22.1	PPM	THC		
11/DEC/91 10:32: 1												
16 = 275.7	PPM	CO										
1 = 40.9	PPM	NOX	2 = 14.2	%	O2			6 = 24.4	PPM	THC		
11/DEC/91 10:30:46												

16 = 115.2 PPM CO
1 = 32.2 PPM NOX 2 = 14.8 % O2 6 = 20.7 PPM THC
11/DEC/91 11: 3:16

16 = 115.5 PPM CO
1 = 31.1 PPM NOX 2 = 14.9 % O2 6 = 20.8 PPM THC
11/DEC/91 11: 2: 1

16 = 137.5 PPM CO
1 = 28.9 PPM NOX 2 = 15.3 % O2 6 = 19.7 PPM THC
11/DEC/91 11: 0:46

16 = 356.0 PPM CO
1 = 28.1 PPM NOX 2 = 15.4 % O2 6 = 23.1 PPM THC
11/DEC/91 10:59:31

16 = 320.7 PPM CO
1 = 30.0 PPM NOX 2 = 15.2 % O2 6 = 21.5 PPM THC
11/DEC/91 10:58:16

16 = 395.6 PPM CO
1 = 32.5 PPM NOX 2 = 14.6 % O2 6 = 28.7 PPM THC
11/DEC/91 10:57: 1

16 = 170.9 PPM CO
1 = 32.0 PPM NOX 2 = 14.7 % O2 6 = 23.9 PPM THC
11/DEC/91 10:55:46

16 = 138.6 PPM CO
1 = 26.0 PPM NOX 2 = 15.9 % O2 6 = 24.1 PPM THC
11/DEC/91 10:54:31

16 = 242.1 PPM CO
1 = 23.4 PPM NOX 2 = 17.0 % O2 6 = 20.5 PPM THC
11/DEC/91 10:53:16

16 = 263.6 PPM CO
1 = 39.6 PPM NOX 2 = 14.3 % O2 6 = 23.8 PPM THC
11/DEC/91 10:52: 1

16 = 137.0 PPM CO
1 = 40.0 PPM NOX 2 = 14.0 % O2 6 = 24.2 PPM THC
11/DEC/91 10:50:46

16 = 128.9 PPM CO
1 = 40.5 PPM NOX 2 = 14.1 % O2 6 = 27.8 PPM THC
11/DEC/91 10:49:31

16 = 251.8 PPM CO
1 = 39.3 PPM NOX 2 = 14.0 % O2 6 = 27.9 PPM THC
11/DEC/91 10:48:16

16 = 289.1 PPM CO

[illegible]	=	[illegible].6	PPM	[illegible]											
1	=	33.0	PPM	NOX		2	=	14.8	%	O2		6	=	26.9	PPM	THC
11/DEC/91 11:20:46																
16	=	369.8	PPM	CO												
1	=	36.1	PPM	NOX		2	=	14.6	%	O2		6	=	39.2	PPM	THC
11/DEC/91 11:19:31																
16	=	185.2	PPM	CO												
1	=	36.0	PPM	NOX		2	=	14.6	%	O2		6	=	28.1	PPM	THC
11/DEC/91 11:18:16																
16	=	158.1	PPM	CO												
1	=	34.7	PPM	NOX		2	=	14.5	%	O2		6	=	39.7	PPM	THC
11/DEC/91 11:17:1																
16	=	416.3	PPM	CO												
1	=	32.9	PPM	NOX		2	=	14.9	%	O2		6	=	29.0	PPM	THC
11/DEC/91 11:15:46																
16	=	122.8	PPM	CO												
1	=	41.3	PPM	NOX		2	=	13.7	%	O2		6	=	29.3	PPM	THC
11/DEC/91 11:14:31																
16	=	75.4	PPM	CO												
1	=	39.5	PPM	NOX		2	=	13.8	%	O2		6	=	15.8	PPM	THC
11/DEC/91 11:13:16																
16	=	77.4	PPM	CO												
1	=	39.7	PPM	NOX		2	=	13.7	%	O2		6	=	21.8	PPM	THC
11/DEC/91 11:12:1																
16	=	121.2	PPM	CO												
1	=	34.3	PPM	NOX		2	=	15.0	%	O2		6	=	21.6	PPM	THC
11/DEC/91 11:10:46																
16	=	421.6	PPM	CO												
1	=	38.7	PPM	NOX		2	=	14.9	%	O2		6	=	23.2	PPM	THC
11/DEC/91 11:9:31																
16	=	409.4	PPM	CO												
1	=	31.9	PPM	NOX		2	=	14.9	%	O2		6	=	25.6	PPM	THC
11/DEC/91 11:8:16																
16	=	254.6	PPM	CO												
1	=	33.0	PPM	NOX		2	=	14.8	%	O2		6	=	22.3	PPM	THC
11/DEC/91 11:7:1																
16	=	245.1	PPM	CO												
1	=	32.7	PPM	NOX		2	=	14.7	%	O2		6	=	23.2	PPM	THC
11/DEC/91 11:5:46																
16	=	218.0	PPM	CO												
1	=	32.3	PPM	NOX		2	=	14.7	%	O2		6	=	23.7	PPM	THC

/01 01 35

183 PPM CO

CALIB OF CO

16 =-0.1 PPM CO
1 = 0.7 PPM NOX 2 = 21.1 % O2 6 = 0.4 PPM THC
11/DEC/91 11:33:59

21% O2

1 = 0.7 PPM NOX 2 = 15.5 % O2 6 = 0.3 PPM THC
11/DEC/91 11:32:38

100 90 80 70 60 50 40 30 20 10 0
0 15.5 % O2 10 20 30 40 50 60 70 80 90 100

16 =-0.1 PPM CO
1 = 0.8 PPM NOX 2 =-0.1 % O2 6 = 0.4 PPM THC
11/DEC/91 11:30:54

11/DEC/91 11:29:38

ZERO O2 -CO

CALIB OF O2

16 = 246.4 PPM CO
1 = 41.0 PPM NOX 2 = 14.1 % O2 6 = 19.4 PPM THC
11/DEC/91 11:24:31
16 = 142.9 PPM CO
1 = 41.5 PPM NOX 2 = 13.9 % O2 6 = 22.1 PPM THC
11/DEC/91 11:23:16
16 = 148.9 PPM CO
1 = 36.9 PPM NOX 2 = 14.2 % O2 6 = 30.0 PPM THC
11/DEC/91 11:22:1

/DEC/91 [illegible]

ZERO

CALIB OF THC

7 = 17.6 % CO2 16 =-0.1 PPM CO
1 = 0.8 PPM NOX 2 =-0.1 % O2 6 = 0.2 PPM THC
11/DEC/91 11:44:21

17.8 % CO2

7 = 11.1 % CO2 16 =-0.1 PPM CO
1 = 1.0 PPM NOX 2 =-0.1 % O2 6 = 0.2 PPM THC
11/DEC/91 11:42:42

11% CO2

7 = 0.0 % CO2 16 = 1.0 PPM CO
1 = 1.3 PPM NOX 2 =-0.1 % O2 6 = 0.2 PPM THC
11/DEC/91 11:39:19

100 90 80 70 60 50 40 30 20 10 0

0 ZERO 10 20 30 40 50 60 70 80 90 100

CALIB OF CO2

16 = 486.2 PPM CO
1 = 1.2 PPM NOX 2 =-0.1 % O2 6 = 0.2 PPM THC
11/DEC/91 11:37:20

484 PPM CO

16 = 179.7 PPM CO
1 = 1.4 PPM NOX 2 =-0.1 % O2 6 = 0.2 PPM THC

1/[illegible]/91 [illegible] 52:[illegible]

68.5 PPM NO

1 = 18.3 PPM NOX 2 = -0.1 % O2 6 = -0.4 PPM THC
11/DEC/91 11:50:46

100 90 80 70 60 50 40 30 20 0
19 PPM NO
0 10 20 30 40 50 60 70 80 100

11/DEC/91 11:49: 8

1 = 0.5 PPM NOX 2 = 0.1 % O2 6 = 0.0 PPM THC
11/DEC/91 11:48:53

ZERO

CALIB OF NOX

1 = 0.6 PPM NOX 2 = 19.8 % O2 6 = 59.0 PPM THC
11/DEC/91 11:47:53

52 PPM THC

1 = 0.6 PPM NOX 2 = 19.6 % O2 6 = 24.6 PPM THC
11/DEC/91 11:46:53

26 PPM PROPANE

100 90 80 70 60 50 40 30 20 0
0 10 20 30 40 50 60 70 80 100

7 = 0.1 % CO2 16 = -0.1 PPM CO
1 = 0.7 PPM NOX 2 = 21.4 % O2 6 = 0.0 PPM THC

7 = 3.7	%	CO2	16 = 85.5	PPM	CO					
1 = 32.8	PPM	NOX	2 = 14.8	%	O2	6 = 25.0	PPM	THC		
11/DEC/91 12:10:27										
7 = 3.6	%	CO2	16 = 91.4	PPM	CO					
1 = 31.8	PPM	NOX	2 = 15.0	%	O2	6 = 27.1	PPM	THC		
11/DEC/91 12: 9:12										
7 = 3.5	%	CO2	16 = 122.0	PPM	CO					
1 = 31.3	PPM	NOX	2 = 15.3	%	O2	6 = 23.2	PPM	THC		
11/DEC/91 12: 7:57										
7 = 3.4	%	CO2	16 = 100.6	PPM	CO					
1 = 32.9	PPM	NOX	2 = 15.0	%	O2	6 = 25.8	PPM	THC		
11/DEC/91 12: 6:42										
7 = 3.6	%	CO2	16 = 83.4	PPM	CO					
1 = 31.4	PPM	NOX	2 = 15.1	%	O2	6 = 18.4	PPM	THC		
11/DEC/91 12: 5:27										
7 = 3.4	%	CO2	16 = 85.5	PPM	CO					
1 = 30.2	PPM	NOX	2 = 15.4	%	O2	6 = 19.8	PPM	THC		
11/DEC/91 12: 4:12										
7 = 3.5	%	CO2	16 = 109.5	PPM	CO					
1 = 30.7	PPM	NOX	2 = 15.2	%	O2	6 = 28.4	PPM	THC		
11/DEC/91 12: 2:57										
7 = 3.1	%	CO2	16 = 107.3	PPM	CO					
1 = 27.4	PPM	NOX	2 = 16.0	%	O2	6 = 25.3	PPM	THC		
11/DEC/91 12: 1:42										
7 = 3.0	%	CO2	16 = 274.9	PPM	CO					
1 = 25.9	PPM	NOX	2 = 16.0	%	O2	6 = 21.3	PPM	THC		
11/DEC/91 12: 0:27										
7 = 3.0	%	CO2	16 = 336.5	PPM	CO					
1 = 26.9	PPM	NOX	2 = 16.0	%	O2	6 = 26.3	PPM	THC		
11/DEC/91 11:59:12										

TEST 2

1 = 25.5	PPM	NOX	2 = 16.1	%	O2	6 = 19.3	PPM	THC		

1 = [illegible].6	PPM	NOX	2 = 1[illegible]	%	O2	6 = 58.[illegible]	PPM	THC		
11/DEC/91 12:27:57										
7 = 4.1	%	CO2	16 = 143.0	PPM	CO					
1 = 38.4	PPM	NOX	2 = 14.2	%	O2	6 = 53.0	PPM	THC		
11/DEC/91 12:26:42										
7 = 4.0	%	CO2	16 = 133.9	PPM	CO					
1 = 39.1	PPM	NOX	2 = 14.3	%	O2	6 = 44.6	PPM	THC		
11/DEC/91 12:25:27										
7 = 4.0	%	CO2	16 = 173.8	PPM	CO					
1 = 38.3	PPM	NOX	2 = 14.4	%	O2	6 = 45.2	PPM	THC		
11/DEC/91 12:24:12										
7 = 4.2	%	CO2	16 = 103.1	PPM	CO					
1 = 40.0	PPM	NOX	2 = 13.9	%	O2	6 = 43.7	PPM	THC		
11/DEC/91 12:22:57										
7 = 4.1	%	CO2	16 = 108.0	PPM	CO					
1 = 37.8	PPM	NOX	2 = 14.2	%	O2	6 = 50.0	PPM	THC		
11/DEC/91 12:21:42										
7 = 3.9	%	CO2	16 = 119.4	PPM	CO					
1 = 34.5	PPM	NOX	2 = 14.7	%	O2	6 = 54.2	PPM	THC		
11/DEC/91 12:20:27										
7 = 3.9	%	CO2	16 = 222.7	PPM	CO					
1 = 33.8	PPM	NOX	2 = 14.5	%	O2	6 = 66.2	PPM	THC		
11/DEC/91 12:19:12										
7 = 3.9	%	CO2	16 = 228.4	PPM	CO					
1 = 34.6	PPM	NOX	2 = 14.5	%	O2	6 = 79.9	PPM	THC		
11/DEC/91 12:17:57										
7 = 4.1	%	CO2	16 = 164.8	PPM	CO					
1 = 38.7	PPM	NOX	2 = 13.9	%	O2	6 = 89.2	PPM	THC		
11/DEC/91 12:16:42										
7 = 4.4	%	CO2	16 = 102.6	PPM	CO					
1 = 39.1	PPM	NOX	2 = 13.6	%	O2	6 = 83.9	PPM	THC		
11/DEC/91 12:15:27										
7 = 4.1	%	CO2	16 = 97.4	PPM	CO					
1 = 33.4	PPM	NOX	2 = 14.4	%	O2	6 = 37.9	PPM	THC		
11/DEC/91 12:14:12										
7 = 3.7	%	CO2	16 = 121.4	PPM	CO					
1 = 31.3	PPM	NOX	2 = 14.9	%	O2	6 = 25.7	PPM	THC		
11/DEC/91 12:12:57										
7 = 3.6	%	CO2	16 = 99.4	PPM	CO					
1 = 31.6	PPM	NOX	2 = 15.1	%	O2	6 = 23.8	PPM	THC		

/DE 91	15									
7 = 3.6	%	CO2	16 = 344.5	PPM	CO					
1 = 35.2	PPM	NOX	2 = 14.9	%	O2	6 = 39.2	PPM	THC		
11/DEC/91 12:44:12										
7 = 3.7	%	CO2	16 = 257.1	PPM	CO					
1 = 36.9	PPM	NOX	2 = 14.9	%	O2	6 = 22.8	PPM	THC		
11/DEC/91 12:42:57										
7 = 3.9	%	CO2	16 = 100.8	PPM	CO					
1 = 40.8	PPM	NOX	2 = 14.4	%	O2	6 = 39.2	PPM	THC		
11/DEC/91 12:41:42										
7 = 3.9	%	CO2	16 = 125.0	PPM	CO					
1 = 40.9	PPM	NOX	2 = 14.5	%	O2	6 = 26.7	PPM	THC		
11/DEC/91 12:40:27										
7 = 3.9	%	CO2	16 = 173.0	PPM	CO					
1 = 40.2	PPM	NOX	2 = 14.4	%	O2	6 = 23.3	PPM	THC		
11/DEC/91 12:39:12										
7 = 3.9	%	CO2	16 = 166.6	PPM	CO					
1 = 39.8	PPM	NOX	2 = 14.5	%	O2	6 = 35.5	PPM	THC		
11/DEC/91 12:37:57										
7 = 4.0	%	CO2	16 = 216.7	PPM	CO					
1 = 40.4	PPM	NOX	2 = 14.4	%	O2	6 = 41.9	PPM	THC		
11/DEC/91 12:36:42										
7 = 4.0	%	CO2	16 = 251.1	PPM	CO					
1 = 39.0	PPM	NOX	2 = 14.3	%	O2	6 = 39.6	PPM	THC		
11/DEC/91 12:35:27										
7 = 3.9	%	CO2	16 = 218.4	PPM	CO					
1 = 39.0	PPM	NOX	2 = 14.4	%	O2	6 = 45.6	PPM	THC		
11/DEC/91 12:34:12										
7 = 4.1	%	CO2	16 = 193.6	PPM	CO					
1 = 42.1	PPM	NOX	2 = 14.0	%	O2	6 = 50.7	PPM	THC		
11/DEC/91 12:32:57										
7 = 4.2	%	CO2	16 = 128.2	PPM	CO					
1 = 42.5	PPM	NOX	2 = 13.9	%	O2	6 = 52.8	PPM	THC		
11/DEC/91 12:31:42										
7 = 3.8	%	CO2	16 = 117.3	PPM	CO					
1 = 42.5	PPM	NOX	2 = 13.9	%	O2	6 = 56.2	PPM	THC		
11/DEC/91 12:30:27										
7 = 4.1	%	CO2	16 = 127.6	PPM	CO					
1 = 40.0	PPM	NOX	2 = 14.1	%	O2	6 = 52.0	PPM	THC		
11/DEC/91 12:29:12										
7 = 4.0	%	CO2	16 = 136.9	PPM	CO					

7 = 3.4 % CO2 16 = 116.6 PPM CO
1 = 31.7 PPM NOX 2 = 15.5 % O2 6 = 30.8 PPM THC
11/DEC/91 13:0:21
7 = 3.3 % CO2 16 = 233.9 PPM CO
1 = 30.4 PPM NOX 2 = 15.6 % O2 6 = 30.8 PPM THC
11/DEC/91 12:59:12
7 = 3.2 % CO2 16 = 355.4 PPM CO
1 = 30.8 PPM NOX 2 = 15.6 % O2 6 = 33.0 PPM THC
11/DEC/91 12:57:57
7 = 3.4 % CO2 16 = 245.2 PPM CO
1 = 36.0 PPM NOX 2 = 15.1 % O2 6 = 29.7 PPM THC
11/DEC/91 12:56:42
7 = 4.1 % CO2 16 = 105.9 PPM CO
1 = 41.5 PPM NOX 2 = 13.9 % O2 6 = 31.3 PPM THC
11/DEC/91 12:55:27
7 = 4.0 % CO2 16 = 98.5 PPM CO
1 = 37.9 PPM NOX 2 = 14.4 % O2 6 = 32.4 PPM THC
11/DEC/91 12:54:12
7 = 3.7 % CO2 16 = 125.3 PPM CO
1 = 32.6 PPM NOX 2 = 15.1 % O2 6 = 35.1 PPM THC
11/DEC/91 12:52:57
7 = 3.3 % CO2 16 = 441.7 PPM CO
1 = 31.3 PPM NOX 2 = 15.4 % O2 6 = 34.8 PPM THC
11/DEC/91 12:51:42
7 = 3.2 % CO2 16 = 307.7 PPM CO
1 = 33.4 PPM NOX 2 = 15.5 % O2 6 = 32.7 PPM THC
11/DEC/91 12:50:27
7 = 3.8 % CO2 16 = 214.5 PPM CO
1 = 41.0 PPM NOX 2 = 14.3 % O2 6 = 34.5 PPM THC
11/DEC/91 12:49:12
7 = 4.2 % CO2 16 = 133.2 PPM CO
1 = 42.7 PPM NOX 2 = 13.9 % O2 6 = 33.2 PPM THC
11/DEC/91 12:47:57
7 = 4.0 % CO2 16 = 103.4 PPM CO
1 = 36.5 PPM NOX 2 = 14.6 % O2 6 = 31.3 PPM THC
11/DEC/91 12:46:42
7 = 3.6 % CO2 16 = 193.6 PPM CO
1 = 35.5 PPM NOX 2 = 15.0 % O2 6 = 35.4 PPM THC

CALIB OF CO

100 90 80 70 60 50 40 30 20 10 0

0 10 20 30 40 50 60 70 80 90 100

1 = -0.3 PPM NOX 2 = 21.0 % O2 6 = 0.3 PPM THC

11/DEC/91 13: 6:28

21% O2

1 = 0.3 PPM NOX 2 = 15.3 % O2 6 = 0.2 PPM THC

11/DEC/91 13: 5:30

15.5 % O2

7 = 0.0 % CO2 16 = 1.0 PPM CO

1 = 1.6 PPM NOX 2 = 0.0 % O2 6 = 0.6 PPM THC

11/DEC/91 13: 4: 7

11/DEC/91 13: 3:45

ZERO

7 = 0.0 % CO2 16 = 1.9 PPM CO

1 = 5.5 PPM NOX 2 = 0.5 % O2 6 = 1.3 PPM THC

11/DEC/91 13: 3: 4

7 = 3.5 % CO2 16 = 128.1 PPM CO

1 = 33.1 PPM NOX 2 = 15.0 % O2 6 = 39.9 PPM THC

11/DEC/91 13: 1:49

ZERO

CALIB 0 O2

ZERO

CALIB OF THC

1 = 67.1 PPM NOX 2 =-0.1 % O2 6 =-0.2 PPM THC
11/DEC/91 13:14:24

68.5 PPM NO

100 90 80 70 60 50 40 30 20 10 0

0 1 =-0.2 10 PPM NOX 30 2 =-0.10 % 50 O2 60 6 =-0.1 PPM THC 90 100
11/DEC/91 13:11:13

ZERO

CALIB OF NOX

7 = 11.3 % CO2 16 = 6.0 PPM CO
1 =-0.7 PPM NOX 2 =-0.1 % O2 6 = 0.0 PPM THC
11/DEC/91 13: 9:36

11% CO2

CALIB OF CO2

7 = 0.0 % CO2 16 = 482.5 PPM CO
1 =-0.6 PPM NOX 2 = 0.1 % O2 6 = 0.0 PPM THC
11/DEC/91 13: 8: 0

7 = 4.2 % CO2 16 = 78.6 PPM CO

1 = 37.7 PPM NOX 2 = 14.2 % O2 6 = 28.0 PPM THC

11/DEC/91 13:32:17

7 = 3.8 % CO2 16 = 82.8 PPM CO

1 = 38.5 PPM NOX 2 = 15.2 % O2 6 = 18.6 PPM THC

11/DEC/91 13:31: 2

7 = 3.3 % CO2 16 = 222.7 PPM CO

1 = 32.0 PPM NOX 2 = 15.4 % O2 6 = 17.0 PPM THC

11/DEC/91 13:20:15

TEST 3

7 = 0.0 % CO2 16 = 998.1 PPM CO

100 90 80 70 60 50 40 30 20 10 0

0 10 20 30 40 50 60 70 80 90 100

1 = 2.4 PPM NOX 2 = 19.8 % O2 6 = 58.6 PPM THC

11/DEC/91 13:16:40

11/DEC/91 13:16:31

52 PPM PROPANE

7 = 0.0 % CO2 16 = -0.1 PPM CO

1 = 22.9 PPM NOX 2 = 21.1 % O2 6 = 0.0 PPM THC

11/DEC/91 13:15:26

11/DEC/91 13:49

7 = 3.6	%	CO2	16 = 0.0	PPM	CO					
1 = 31.4	PPM	NOX	2 = 15.3	%	O2	6 = 16.6	PPM	THC		

11/DEC/91 13:48:32

7 = 3.4	%	CO2	16 = 76.7	PPM	CO					
1 = 29.1	PPM	NOX	2 = 15.6	%	O2	6 = 23.9	PPM	THC		

11/DEC/91 13:47:17

7 = 3.2	%	CO2	16 = 96.6	PPM	CO					
1 = 27.3	PPM	NOX	2 = 16.0	%	O2	6 = 25.2	PPM	THC		

11/DEC/91 13:46:2

7 = 3.0	%	CO2	16 = 96.6	PPM	CO					
1 = 25.0	PPM	NOX	2 = 16.3	%	O2	6 = 18.8	PPM	THC		

11/DEC/91 13:44:47

7 = 2.8	%	CO2	16 = 157.0	PPM	CO					
1 = 24.2	PPM	NOX	2 = 16.6	%	O2	6 = 22.2	PPM	THC		

11/DEC/91 13:43:32

7 = 2.8	%	CO2	16 = 197.8	PPM	CO					
1 = 27.5	PPM	NOX	2 = 16.4	%	O2	6 = 22.8	PPM	THC		

11/DEC/91 13:42:17

7 = 3.6	%	CO2	16 = 145.6	PPM	CO					
1 = 33.9	PPM	NOX	2 = 15.1	%	O2	6 = 23.7	PPM	THC		

11/DEC/91 13:41:2

7 = 3.8	%	CO2	16 = 100.6	PPM	CO					
1 = 32.5	PPM	NOX	2 = 15.0	%	O2	6 = 25.7	PPM	THC		

11/DEC/91 13:39:47

7 = 3.8	%	CO2	16 = 100.8	PPM	CO					
1 = 29.4	PPM	NOX	2 = 15.1	%	O2	6 = 26.2	PPM	THC		

11/DEC/91 13:38:32

7 = 3.1	%	CO2	16 = 394.7	PPM	CO					
1 = 25.6	PPM	NOX	2 = 16.1	%	O2	6 = 25.6	PPM	THC		

11/DEC/91 13:37:17

7 = 3.2	%	CO2	16 = 362.6	PPM	CO					
1 = 29.5	PPM	NOX	2 = 15.7	%	O2	6 = 22.4	PPM	THC		

11/DEC/91 13:36:2

7 = 3.8	%	CO2	16 = 183.8	PPM	CO					
1 = 36.8	PPM	NOX	2 = 14.8	%	O2	6 = 23.8	PPM	THC		

11/DEC/91 13:34:47

7 = 4.1	%	CO2	16 = 122.0	PPM	CO					
1 = 39.0	PPM	NOX	2 = 14.5	%	O2	6 = 23.1	PPM	THC		

7 = 3.8 % CO2 16 = 73.6 PPM CO
1 = 35.3 PPM NOX 2 = 14.8 % O2 6 = 17.6 PPM THC
11/DEC/91 14: 6 2
7 = 4.0 % CO2 16 = 60.9 PPM CO
1 = 36.1 PPM NOX 2 = 14.5 % O2 6 = 18.2 PPM THC
11/DEC/91 14: 4 47
7 = 3.8 % CO2 16 = 63.8 PPM CO
1 = 32.9 PPM NOX 2 = 14.8 % O2 6 = 19.8 PPM THC
11/DEC/91 14: 3 32
7 = 3.4 % CO2 16 = 96.5 PPM CO
1 = 28.4 PPM NOX 2 = 15.7 % O2 6 = 21.5 PPM THC
11/DEC/91 14: 2 17
7 = 3.1 % CO2 16 = 119.6 PPM CO
1 = 27.9 PPM NOX 2 = 15.9 % O2 6 = 21.8 PPM THC
11/DEC/91 14: 1 2
7 = 3.2 % CO2 16 = 321.9 PPM CO
1 = 27.3 PPM NOX 2 = 15.7 % O2 6 = 28.3 PPM THC
11/DEC/91 13:59 47
7 = 3.2 % CO2 16 = 369.4 PPM CO
1 = 27.0 PPM NOX 2 = 15.8 % O2 6 = 27.4 PPM THC
11/DEC/91 13:58 32
7 = 3.3 % CO2 16 = 238.9 PPM CO
1 = 28.4 PPM NOX 2 = 15.7 % O2 6 = 25.9 PPM THC
11/DEC/91 13:57 17
7 = 3.5 % CO2 16 = 139.5 PPM CO
1 = 31.7 PPM NOX 2 = 15.3 % O2 6 = 24.3 PPM THC
11/DEC/91 13:56 2
7 = 3.5 % CO2 16 = 73.5 PPM CO
1 = 31.1 PPM NOX 2 = 15.3 % O2 6 = 25.5 PPM THC
11/DEC/91 13:54 47
7 = 3.4 % CO2 16 = 97.6 PPM CO
1 = 28.8 PPM NOX 2 = 15.7 % O2 6 = 26.6 PPM THC
11/DEC/91 13:53 32
7 = 3.3 % CO2 16 = 357.6 PPM CO
1 = 27.5 PPM NOX 2 = 15.7 % O2 6 = 27.5 PPM THC
11/DEC/91 13:52 17
7 = 3.3 % CO2 16 = 284.8 PPM CO
1 = 28.6 PPM NOX 2 = 15.7 % O2 6 = 23.8 PPM THC
11/DEC/91 13:51 2
7 = 3.5 % CO2 16 = 109.8 PPM CO
1 = 31.6 PPM NOX 2 = 15.2 % O2 6 = 19.5 PPM THC

11/DEC/91 14:25:38
7 = 4.0 % CO2 16 = 135.1 PPM CO
1 = 37.3 PPM NOX 2 = 14.4 % O2 6 = 19.8 PPM THC
11/DEC/91 14:24:23
7 = 3.9 % CO2 16 = 91.4 PPM CO
1 = 34.8 PPM NOX 2 = 14.7 % O2 6 = 23.0 PPM THC
11/DEC/91 14:23: 8
7 = 3.5 % CO2 16 = 107.4 PPM CO
1 = 33.1 PPM NOX 2 = 15.1 % O2 6 = 23.7 PPM THC
11/DEC/91 14:21:53
7 = 3.6 % CO2 16 = 213.6 PPM CO
1 = 31.5 PPM NOX 2 = 15.0 % O2 6 = 24.5 PPM THC
11/DEC/91 14:20:38
7 = 3.6 % CO2 16 = 251.1 PPM CO
1 = 30.9 PPM NOX 2 = 15.1 % O2 6 = 23.7 PPM THC
11/DEC/91 14:19:23
7 = 3.7 % CO2 16 = 133.7 PPM CO
1 = 34.4 PPM NOX 2 = 20.6 % O2 6 = 20.6 PPM THC
11/DEC/91 14:16: 2
7 = 3.7 % CO2 16 = 62.9 PPM CO
1 = 34.8 PPM NOX 2 = 15.0 % O2 6 = 20.1 PPM THC
11/DEC/91 14:14:47
7 = 3.7 % CO2 16 = 53.7 PPM CO
1 = 34.5 PPM NOX 2 = 15.1 % O2 6 = 19.3 PPM THC
11/DEC/91 14:13:32
7 = 3.4 % CO2 16 = 75.5 PPM CO
1 = 32.8 PPM NOX 2 = 15.1 % O2 6 = 21.3 PPM THC
11/DEC/91 14:12:17
7 = 3.5 % CO2 16 = 162.0 PPM CO
1 = 31.4 PPM NOX 2 = 15.3 % O2 6 = 20.6 PPM THC
11/DEC/91 14:11: 2
7 = 3.6 % CO2 16 = 207.8 PPM CO
1 = 31.4 PPM NOX 2 = 15.1 % O2 6 = 22.2 PPM THC
11/DEC/91 14: 9:47
7 = 3.6 % CO2 16 = 174.9 PPM CO
1 = 32.8 PPM NOX 2 = 15.0 % O2 6 = 19.2 PPM THC
11/DEC/91 14: 8:32
7 = 3.8 % CO2 16 = 113.5 PPM CO
1 = 34.1 PPM NOX 2 = 15.0 % O2 6 = 20.3 PPM THC
11/DEC/91 14: 7:17

= 1 PPM NOX = 1 6 0.6 PPM THC

11/DEC/91 14:39: 1

15.5 % O2

7 = 0.0 % CO2 16 =-0.1 PPM CO
1 = 4.5 PPM NOX 2 =-0.1 % O2 6 = 0.6 PPM THC

11/DEC/91 14:37: 8

100 90 80 70 60 50 40 30 20 10 0
0 ZERO O2- CO 10 20 30 40 50 60 70 80 90 100

CALIB OF O2

7 = 3.0 % CO2 16 = 357.5 PPM CO
1 = 27.6 PPM NOX 2 = 16.0 % O2 6 = 26.5 PPM THC

11/DEC/91 14:34:23

7 = 3.2 % CO2 16 = 363.8 PPM CO
1 = 29.5 PPM NOX 2 = 15.8 % O2 6 = 26.4 PPM THC

11/DEC/91 14:33: 8

7 = 3.6 % CO2 16 = 170.7 PPM CO
1 = 36.9 PPM NOX 2 = 14.9 % O2 6 = 24.0 PPM THC

11/DEC/91 14:31:53

7 = 4.2 % CO2 16 = 123.8 PPM CO
1 = 40.7 PPM NOX 2 = 14.1 % O2 6 = 22.2 PPM THC

11/DEC/91 14:30:38

7 = 4.1 % CO2 16 = 121.2 PPM CO
1 = 39.7 PPM NOX 2 = 14.1 % O2 6 = 20.6 PPM THC

11/DEC/91 14:29:23

7 = 3.8 % CO2 16 = 108.2 PPM CO
1 = 36.0 PPM NOX 2 = 14.8 % O2 6 = 21.9 PPM THC

11/DEC/91 14:28: 8

7 = 3.8 % CO2 16 = 215.6 PPM CO
1 = 35.2 PPM NOX 2 = 14.8 % O2 6 = 22.8 PPM THC

11/DEC/91 14:26:53

7 = 3.8 % CO2 16 = 199.7 PPM CO

CALIB OF CO2

7 = 0.0 % CO2 16 = 847.3 PPM CO

1 = 1.0 PPM NOX 2 = -0.2 % O2 6 = -0.3 PPM THC

11/DEC/91 14:45:17

864 PPM CO

7 = 0.0 % CO2 16 = 491.9 PPM CO

1 = 1.0 PPM NOX 2 = -0.1 % O2 6 = -0.3 PPM THC

11/DEC/91 14:43:32

484 PPM CO

7 = 0.0 % CO2 16 = 181.8 PPM CO

1 = 1.0 PPM NOX 2 = -0.1 % O2 6 = -0.2 PPM THC

11/DEC/91 14:41:57

100 90 80 70 60 50 40 30 20 10 0

0 10 20 30 40 50 60 70 80 90 100

183 PPM CO

CHN VALUE MAX MIN UNIT TAG 11/DEC/91 14:40:58

CALIB OF CO

1 = 1.1 PPM NOX 2 = 20.8 % O2 6 = 0.0 PPM THC

11/DEC/91 14:40: 1

21% O2

ALL F 1

100 90 80 70 60 50 40 30 20 10 0

0 10 20 30 40 50 60 70 80 90 100

7 = 0.0 % CO2 16 =-0.1 PPM CO
1 = 67.9 PPM NOX 2 =-0.2 % O2 6 =-0.5 PPM THC
11/DEC/91 14:54:38

59.5 PPM NO

1 = 18.6 PPM NOX 2 =-0.2 % O2 6 =-0.5 PPM THC
11/DEC/91 14:52:16

19 PPM NO

1 = 0.3 PPM NOX 2 =-0.2 % O2 6 =-0.5 PPM THC
11/DEC/91 14:50: 9

ZERO

CAIB OF NOX

7 = 18.0 % CO2 16 =-0.1 PPM CO
1 = 1.2 PPM NOX 2 =-0.1 % O2 6 =-0.4 PPM THC
11/DEC/91 14:48:39

17.8 % CO2

100 90 80 70 60 50 40 30 20 10 0

0 10 20 30 40 50 60 70 80 90 100

7 = 11.1 % CO2 16 = 1.0 PPM CO
1 = 1.2 PPM NOX 2 =-0.1 % O2 6 =-0.2 PPM THC
11/DEC/91 14:47: 4

11% CO2

RECORDER/DATA LOGGER VRS 5H

7 = 0.0 % CO2 16 = -0.1 PPM CO
1 = 0.2 PPM NOX 2 = 19.3 % O2 6 = 82.2 PPM THC
11/DEC/91 14:59 6

82 PPM C3H8

1 = 0.7 PPM NOX 2 = 19.6 % O2 6 = 51.4 PPM THC
11/DEC/91 14:58 4

52 PPM C3H8

1 = 2.0 PPM NOX 2 = 19.3 % O2 6 = 25.9 PPM THC
11/DEC/91 14:57 12

26 PPM PROPANE

1 = 17.2 PPM NOX 2 = 21.1 % O2 6 = 0.0 PPM THC
11/DEC/91 14:56 5

ZERO

APPENDIX IV

REAL-TIME DATA SUMMARY SHEET

TRI-COUNTY ASPHALT, INC.
ROCKAWAY, NJ PLANT COMPLIANCE TESTS
BAGHOUSE OUTLET STACK; PLANT NO. 3
DECEMBER 11, 1991
RUN # 1

DATE / TIME	NOx PPMV,DRY	O2 VOL %,DRY	THC AS C3H8 PPMV,WET	CO PPMV,DRY
11/Dec/91 10:24:37	33.8	15.2	6.4	63.7
11/Dec/91 10:25:37	31.9	15.8	20.3	192.8
11/Dec/91 10:26:37	21.6	17.3	25.7	126.1
11/Dec/91 10:27:37	33.6	14.5	23.3	94.5
11/Dec/91 10:28:37	41.7	13.7	23.3	81.4
11/Dec/91 10:29:37	43.0	13.5	23.5	181.6
11/Dec/91 10:30:37	41.2	14.1	24.0	265.6
11/Dec/91 10:31:37	37.7	14.6	25.2	247.9
11/Dec/91 10:32:37	37.1	14.8	23.7	244.9
11/Dec/91 10:33:37	37.1	14.7	23.3	243.2
11/Dec/91 10:34:37	37.6	14.8	22.8	169.6
11/Dec/91 10:35:37	29.5	16.0	22.2	293.7
11/Dec/91 10:36:37	33.9	15.2	21.5	89.4
11/Dec/91 10:37:37	39.9	14.6	21.7	94.5
11/Dec/91 10:38:36	40.9	14.1	20.2	100.6
11/Dec/91 10:39:37	42.6	13.9	18.0	119.2
11/Dec/91 10:40:37	42.8	13.8	20.1	131.9
11/Dec/91 10:41:37	41.4	14.0	17.6	119.9
11/Dec/91 10:42:37	42.9	13.7	21.7	117.9
11/Dec/91 10:43:36	42.6	13.6	24.3	135.8
11/Dec/91 10:44:35	41.4	13.8	23.7	144.4
11/Dec/91 10:45:36	40.6	13.8	23.9	182.9
11/Dec/91 10:46:36	39.3	14.0	26.5	251.9
11/Dec/91 10:47:37	37.6	14.1	27.7	283.6
11/Dec/91 10:48:35	39.5	14.0	28.9	206.6
11/Dec/91 10:49:36	40.5	14.1	27.7	127.3
11/Dec/91 10:50:36	41.3	14.0	23.3	125.8
11/Dec/91 10:51:36	40.3	13.6	24.8	138.9
11/Dec/91 10:52:36	34.7	15.2	26.2	329.2
11/Dec/91 10:53:36	21.8	17.0	19.3	239.0
11/Dec/91 10:54:36	26.0	15.9	24.1	134.2
11/Dec/91 10:55:36	31.1	14.8	21.9	166.8
11/Dec/91 10:56:36	32.7	14.6	25.0	229.5
11/Dec/91 10:57:35	30.8	15.1	25.9	434.2
11/Dec/91 10:58:36	29.7	15.3	23.9	323.7
11/Dec/91 10:59:36	28.1	15.4	23.2	377.9
11/Dec/91 11: 0:36	28.6	15.4	22.3	173.1
11/Dec/91 11: 1:35	30.7	15.0	17.4	115.2
11/Dec/91 11: 2:36	31.8	14.9	17.9	105.3
11/Dec/91 11: 3:36	32.2	14.8	19.7	118.1
11/Dec/91 11: 4:36	32.3	14.7	23.7	197.8
11/Dec/91 11: 5:35	32.3	14.7	24.4	291.7
11/Dec/91 11: 6:36	33.2	14.7	24.2	212.8
11/Dec/91 11: 7:36	32.2	14.9	21.9	313.9

11/Dec/91 11: 8:36	31.0	14.9	23.2	472.0
11/Dec/91 11: 9:36	30.7	14.9	23.1	448.7
11/Dec/91 11:10:36	33.0	14.6	23.0	190.1
11/Dec/91 11:11:35	37.0	14.3	18.9	74.6
11/Dec/91 11:12:35	40.8	13.6	19.0	89.4
11/Dec/91 11:13:35	40.5	13.7	17.4	79.5
11/Dec/91 11:14:36	41.3	13.7	20.3	112.0
11/Dec/91 11:15:36	35.0	14.9	28.3	292.8
11/Dec/91 11:16:35	33.1	14.9	28.6	255.2
11/Dec/91 11:17:36	37.5	14.1	27.4	131.1
11/Dec/91 11:18:36	36.5	14.6	26.9	109.4
11/Dec/91 11:19:36	36.1	14.5	30.1	340.6
11/Dec/91 11:20:36	33.1	14.8	29.5	448.6
11/Dec/91 11:21:36	36.2	14.8	27.1	221.6
11/Dec/91 11:22:36	39.8	14.0	25.8	149.7
11/Dec/91 11:23:35	41.7	13.9	23.8	141.8
11/Dec/91 11:24:36	41.0	14.1	19.4	204.6

AVG. =	35.83 PPMV,DRY	14.59 VOL% DRY	23.08 PPMV,WET	199.34 PPMV,DRY
	NOx	O2	THC	CO

TRI-COUNTY ASPHALT, INC.
ROCKAWAY, NJ PLANT COMPLIANCE TESTS
BAGHOUSE OUTLET STACK; PLANT NO. 3
DECEMBER 11, 1991
RUN # 2

DATE / TIME	NOx PPMV,DRY	O2 VOL %,DRY	THC AS C3H8 PPMV,WET	CO PPMV,DRY	CO2 VOL %,DRY
11/Dec/91 11:58: 5	30.8	15.6	21.2	258.9	3.2
11/Dec/91 11:59:20	26.7	16.0	26.5	321.8	3.0
11/Dec/91 12: 0:20	25.8	16.0	21.6	305.9	3.0
11/Dec/91 12: 1:20	27.4	15.7	24.8	141.8	3.2
11/Dec/91 12: 2:19	28.1	15.5	26.2	97.4	3.4
11/Dec/91 12: 3:19	31.1	15.1	25.6	108.2	3.5
11/Dec/91 12: 4:20	30.2	15.4	19.7	89.5	3.4
11/Dec/91 12: 5:20	30.9	15.1	18.5	79.5	3.6
11/Dec/91 12: 6:20	32.5	14.9	24.6	97.4	3.7
11/Dec/91 12: 7:20	30.7	15.2	27.4	93.5	3.5
11/Dec/91 12: 8:20	30.6	15.2	27.2	123.0	3.6
11/Dec/91 12: 9:19	31.8	15.0	27.0	94.6	3.6
11/Dec/91 12:10:20	32.7	14.9	26.1	85.5	3.7
11/Dec/91 12:11:20	32.9	15.0	27.0	88.6	3.6
11/Dec/91 12:12:20	31.4	15.1	21.6	107.8	3.6
11/Dec/91 12:13:19	32.4	14.9	23.1	105.3	3.7
11/Dec/91 12:14:20	33.5	14.3	39.5	93.5	4.1
11/Dec/91 12:15:20	38.8	13.6	80.2	98.6	4.4
11/Dec/91 12:16:20	39.8	13.7	87.7	117.3	4.3
11/Dec/91 12:17:20	36.9	14.1	87.5	178.8	4.0
11/Dec/91 12:18:20	34.1	14.5	81.0	242.0	3.9
11/Dec/91 12:19:19	34.0	14.5	65.6	246.0	3.9
11/Dec/91 12:20:20	36.0	14.8	57.1	135.1	3.7
11/Dec/91 12:21:20	37.0	14.4	51.0	108.2	4.0
11/Dec/91 12:22:20	35.8	14.1	45.9	112.1	4.1
11/Dec/91 12:23:20	40.0	13.9	44.6	103.6	4.2
11/Dec/91 12:24:20	38.1	14.4	45.8	181.5	4.0
11/Dec/91 12:25:20	38.6	14.3	44.3	151.9	4.0
11/Dec/91 12:26:20	38.2	14.3	51.7	173.9	4.0
11/Dec/91 12:27:19	39.3	14.1	55.6	126.0	4.1
11/Dec/91 12:28:20	39.2	14.2	58.0	134.2	4.0
11/Dec/91 12:29:20	40.2	14.1	52.2	128.0	4.1
11/Dec/91 12:30:20	42.2	13.9	59.1	114.1	4.2
11/Dec/91 12:31:20	39.7	14.1	54.6	111.9	4.2
11/Dec/91 12:32:20	42.9	13.8	53.7	147.3	4.2
11/Dec/91 12:33:20	41.4	14.1	48.8	199.5	4.0
11/Dec/91 12:34:20	38.9	14.4	45.4	207.7	3.9
11/Dec/91 12:35:20	39.4	14.3	41.4	245.9	4.0
11/Dec/91 12:36:19	40.3	14.3	42.6	207.7	4.0
11/Dec/91 12:37:20	40.1	14.5	37.4	207.5	3.9
11/Dec/91 12:38:20	40.0	14.5	31.4	158.5	3.9
11/Dec/91 12:39:19	40.1	14.5	23.3	178.6	3.9
11/Dec/91 12:40:20	40.6	14.4	28.0	147.7	3.9
11/Dec/91 12:41:19	40.4	14.5	28.3	138.6	3.9

11/Dec/91 12:42:20	39.7	14.5	25.9	144.8	3.8
11/Dec/91 12:43:20	36.5	14.8	23.1	259.9	3.7
11/Dec/91 12:44:20	35.3	15.0	30.7	376.9	3.6
11/Dec/91 12:45:20	35.4	15.0	33.4	265.0	3.6
11/Dec/91 12:46:20	37.1	15.1	30.8	126.0	3.5
11/Dec/91 12:47:20	40.2	14.1	35.9	135.1	4.1
11/Dec/91 12:48:19	42.8	13.8	36.5	143.9	4.2
11/Dec/91 12:49:20	40.8	14.3	34.0	189.6	3.9
11/Dec/91 12:50:19	34.[illegible]	15.3	32.5	335.6	3.4
11/Dec/91 12:51:20	31.2	15.4	37.2	468.1	3.3
11/Dec/91 12:52:20	31.6	15.6	32.6	305.6	3.1
11/Dec/91 12:53:20	34.7	14.8	33.5	119.2	3.7
11/Dec/91 12:54:20	36.0	14.4	32.1	99.4	4.0
11/Dec/91 12:55:20	40.6	13.9	30.7	104.8	4.2
11/Dec/91 12:56:19	39.3	14.6	27.3	123.0	3.8
11/Dec/91 12:57:20	31.6	15.4	26.6	293.6	3.4
11/Dec/91 12:58:20	29.8	15.6	31.2	372.9	3.3
11/Dec/91 12:59:20	30.5	15.6	30.9	226.8	3.3

AVG. =	35.85 PPMV,DRY	14.68 VOL% DRY	38.69 PPMV,WET	172.34 PPMV,DRY	3.77 VOL% DRY
	NOx	O2	THC	CO	CO2

TRI-COUNTY ASPHALT, INC.
ROCKAWAY, NJ PLANT COMPLIANCE TESTS
BAGHOUSE OUTLET STACK; PLANT NO. 3
DECEMBER 11, 1991
RUN # 3

DATE / TIME	NOx PPMV,DRY	O2 VOL %,DRY	THC AS C3H8 PPMV,WET	CO PPMV,DRY	CO2 VOL %,DRY
11/Dec/91 13:20:25	31.6	15.5	16.2	222.7	3.4
11/Dec/91 13:31:17	31.9	14.9	20.0	82.6	3.8
11/Dec/91 13:32:14	37.3	14.3	26.8	72.5	4.2
11/Dec/91 13:33:12	39.6	14.0	28.9	113.8	4.3
11/Dec/91 13:34:12	38.4	14.3	25.5	141.3	4.1
11/Dec/91 13:35:13	35.5	15.2	23.6	308.2	3.6
11/Dec/91 13:36:13	29.0	15.8	22.2	362.4	3.2
11/Dec/91 13:37:13	25.9	16.1	26.7	374.9	3.1
11/Dec/91 13:38:13	26.1	15.8	24.4	140.7	3.3
11/Dec/91 13:39:13	32.0	15.4	27.0	92.8	3.5
11/Dec/91 13:40:13	33.5	15.0	25.5	100.7	3.8
11/Dec/91 13:41:13	33.7	15.2	22.8	145.2	3.6
11/Dec/91 13:42:13	28.1	16.2	22.1	212.4	3.0
11/Dec/91 13:43:12	24.5	16.5	21.9	202.9	2.8
11/Dec/91 13:44:13	24.0	16.6	17.5	151.9	2.8
11/Dec/91 13:45:13	25.7	16.2	22.4	101.5	3.1
11/Dec/91 13:46:13	27.0	16.0	24.8	96.7	3.2
11/Dec/91 13:47:13	28.5	15.7	23.9	78.6	3.3
11/Dec/91 13:48:13	30.2	15.4	20.1	87.2	3.5
11/Dec/91 13:49:13	31.8	15.3	14.5	0.0	3.6
11/Dec/91 13:50:13	31.4	15.3	20.2	109.8	3.5
11/Dec/91 13:51:13	28.5	15.7	24.3	283.2	3.3
11/Dec/91 13:52:13	27.7	15.7	28.5	330.8	3.3
11/Dec/91 13:53:13	28.8	15.6	27.4	153.2	3.4
11/Dec/91 13:54:12	30.1	15.4	25.8	82.8	3.5
11/Dec/91 13:55:13	31.5	15.3	24.4	77.5	3.5
11/Dec/91 13:56:13	31.5	15.3	24.4	136.2	3.6
11/Dec/91 13:57:13	28.6	15.7	25.0	215.2	3.3
11/Dec/91 13:58:13	27.8	15.8	26.1	280.9	3.2
11/Dec/91 13:59:12	27.1	15.8	26.4	359.5	3.2
11/Dec/91 14: 0:13	27.1	15.7	23.9	383.5	3.2
11/Dec/91 14: 1:13	28.1	15.9	22.2	119.6	3.1
11/Dec/91 14: 2:13	29.1	15.8	21.6	106.0	3.2
11/Dec/91 14: 3:13	30.8	15.3	20.5	65.7	3.6
11/Dec/91 14: 4:13	34.5	14.7	18.6	60.9	3.9
11/Dec/91 14: 5:12	36.6	14.4	17.6	65.0	4.1
11/Dec/91 14: 6:13	35.1	14.8	17.8	74.5	3.9
11/Dec/91 14: 7:13	34.7	14.8	20.0	109.0	3.7
11/Dec/91 14: 8:13	33.7	14.9	20.4	148.5	3.7
11/Dec/91 14: 9:13	31.7	15.3	20.6	165.4	3.5
11/Dec/91 14:10:13	31.3	15.1	21.8	235.3	3.6
11/Dec/91 14:11:13	31.4	15.3	21.0	162.3	3.5
11/Dec/91 14:12:12	32.9	15.1	21.0	89.7	3.6
11/Dec/91 14:13:13	33.4	15.3	20.8	52.0	3.6

11/Dec/91 14:14:13	34.5	19.9	19.8	54.9	3.6
11/Dec/91 14:15:13	35.2	15.0	19.3	65.5	3.7
11/Dec/91 14:16:12	34.2	20.6	21.2	123.4	3.7
11/Dec/91 14:17:13	32.4	15.1	23.1	235.9	3.7
11/Dec/91 14:18:13	19.2	15.3	22.4	114.3	3.6
11/Dec/91 14:19:13	30.3	15.1	24.9	265.3	3.6
11/Dec/91 14:20:13	31.1	15.0	24.4	256.3	3.6
11/Dec/91 14:21:13	31.9	15.1	23.7	148.0	3.6
11/Dec/91 14:22:13	33.2	15.3	23.4	92.2	3.5
11/Dec/91 14:23:13	34.7	14.7	23.0	91.0	3.9
11/Dec/91 14:24:13	37.0	14.3	22.1	128.0	4.0
11/Dec/91 14:25:13	37.1	14.5	23.0	170.3	3.9
11/Dec/91 14:26:13	36.3	14.8	22.6	184.5	3.8
11/Dec/91 14:27:13	35.4	14.7	22.4	206.9	3.8
11/Dec/91 14:28:13	36.0	14.8	22.0	108.8	3.8
11/Dec/91 14:31:13	38.6	14.2	21.9	105.5	4.1
11/Dec/91 14:32:13	40.5	14.2	20.6	110.0	4.1
11/Dec/91 14:33:13	40.2	14.3	21.0	143.0	4.0

AVG. =	31.85 PPMV,DRY	15.39 VOL% DRY	22.58 PPMV,WET	154.18 PPMV,DRY	3.57 VOL% DRY
	NOx	O2	THC	CO	CO2

APPENDIX V

EMISSIONS CALCULATIONS TABLE

Company: TRI-COUNTY ASPHALT COMPANY
Unit: BAGHOUSE OUTLET STACK; PLANT 3
Site: ROCKAWAY, NJ
Date: DECEMBER 11, 1991

	General Parameters			Nitrogen Oxides as (NO2) MW= 46.01 LB/LB-MOLE			Total Hydrocarbons (THC) As Propane (C3H8); MW = 44.09		
RUN No.	Bws (%) (B)	Oxygen (%,Dry) (D)	CO2 (%, Dry)	PPMV (Wet) (E)	PPMV (Dry) (F)	PPMV@ 7 % O2 (Dry) (G)	PPMV (Wet) (E)	PPMV (Dry) (F)	PPMV@ 7 % O2 (Dry) (G)
1	18.79	14.59	3.67	29.10	35.83	78.9	23.08	28.42	62.6
2	20.33	14.68	3.77	26.59	35.88	80.2	38.69	48.56	108.5
3	17.83	15.39	3.57	26.17	31.85	80.3	22.58	27.48	69.3
Avg =	18.98	14.89	3.67	27.95	34.52	79.8	28.12	34.82	80.2

	Carbon Monoxide (CO) MW = 28.01 LB/LB-MOLE		
RUN No.	PPMV (Wet) (E)	PPMV (Dry) (F)	PPMV@ 7 % O2 (Dry) (G)
1	161.88	199.34	439.1
2	137.30	172.34	385.1
3	126.69	154.18	388.9
Avg =	141.96	175.29	404.4

Equations:
(E)=(F)(100-(B)/100) OR (F)=(E)(100/(100-(B))
(G)=(F)(13.9/(20.9-(D))