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VOC Emissions From the Drying of Douglas-fir Lumber

Report to

Columbia Vista Corporation - 1119
Vancouver, WA

Report by

Michael R. Milota
Department of Wood Science and Engineering
Oregon State University
Corvallis, OR 97331

June 14, 2005

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VOC emissions from the drying of Douglas-fir lumber

I. Results Summary

One charge, containing 98 board feet of 4" by 4" Douglas-fir, was dried from green in a small kiln at Oregon State University. The kiln dry- and wet-bulb temperatures based on a schedule provided by Columbia Vista. The maximum temperature was 180°F (82.2°C). The air velocity was 500 feet per minute (2.5 m/s). The kiln was indirectly heated with steam. There was no humidification. Regulating the amount of air entering the kiln controlled venting and the humidity.

A JUM 3-200 total hydrocarbon analyzer was used to measure organic emissions following EPA Method 25A. The results are shown in Table 1.

TABLE 1. Summary of results.

Initial MC	Final MC[A]	Time	VOC[B]
%	%	hr:min	lb/mbf
29.8	19	67:30	0.39

[A] actual final MC was 10.3% at 144:09 hours
[B] as carbon

II. Lumber Source and Handling

Enough wood for the two charges of lumber was delivered by Columbia Vista on 6-1-05. Upon receipt, the wood was wrapped in plastic. On 6-2-05, half the wood was randomly selected for the first charge. The remaining wood was wrapped in plastic and stored in a refrigerator in case it was needed. The charge was dried for six days starting on Thursday, June 2.

III. Kiln Description and Operation

A schematic of the kiln is shown in Figure 1. The kiln box is approximately 4' by 4' by 4'. It is indirectly heated by steam. Four dry-bulb thermocouples and two wet-bulb thermocouples are located on the entering-air side of the load. The dry-bulb thermocouples are spaced in a grid. The two wet-bulb thermocouples are under a single sock at the center of the entering-air side of the load.

Humidity control

A 200 L/min MKS mass flow meter controlled and measured the amount of air entering the kiln. It was factory calibrated and checked using a bubble meter. The amount of air entering the kiln is based on the wet-bulb temperature - if it is above setpoint, the airflow is increased and if it is below setpoint the airflow is decreased. This is analogous to venting for a commercial kiln. A minimum of 6 L/min entered the kiln at all times, more than removed by the analyzer (2.6 L/min). Putting air into the kiln at a rate of 100 L/min causes the pressure in the kiln to be 60 to 130 Pa above ambient, depending on location in the kiln (high-pressure or low-pressure side). Thus, any fugitive leakage should be out of the kiln. Two additional flow meters can be manually set to provide additional airflow. These were not used in this study. The steam spray line is disabled, so no water vapor is added to the kiln atmosphere. The impinger train in Figure 1 was not used in this work.

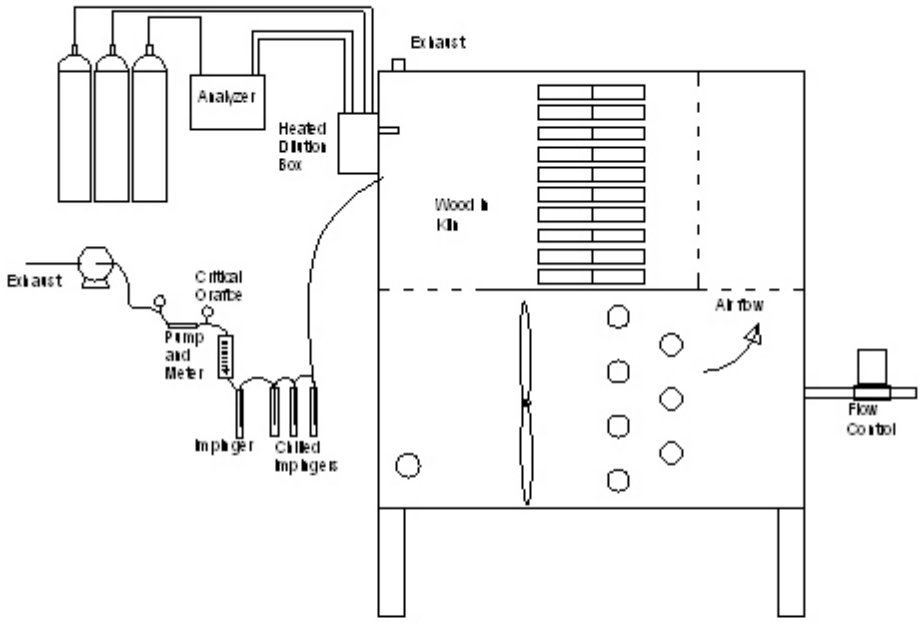


FIGURE 1. Schematic of kiln and sampling system.

Temperature control

Temperature in the kiln is controlled by indirect steam heating. When the average of the four dry-bulb thermocouples is below setpoint, the steam pressure in the coil is increased. When it is above setpoint, steam flow to the coil is reduced.

Schedules

The drying schedule used (Figure 2) was based on drying conditions supplied by the mill. The values in Figure 2 are based on the entering-air temperature. This represents the highest temperature the wood would experience in a commercial kiln.

Charge Sequence

The lumber was unwrapped and 2" were trimmed from each end of each board to give 44" samples. These were then weighed, placed in the kiln and dried according to the schedule in Figure 2. The actual temperatures are shown in Figure 3. Sampling for hydrocarbon was done as described in section IV. At the end of drying the wood was weighed, oven dried (four 4 days at 103°C to a constant weight), and reweighed so initial and final moisture contents could be determined by ASTM D4442 (oven-dry method).

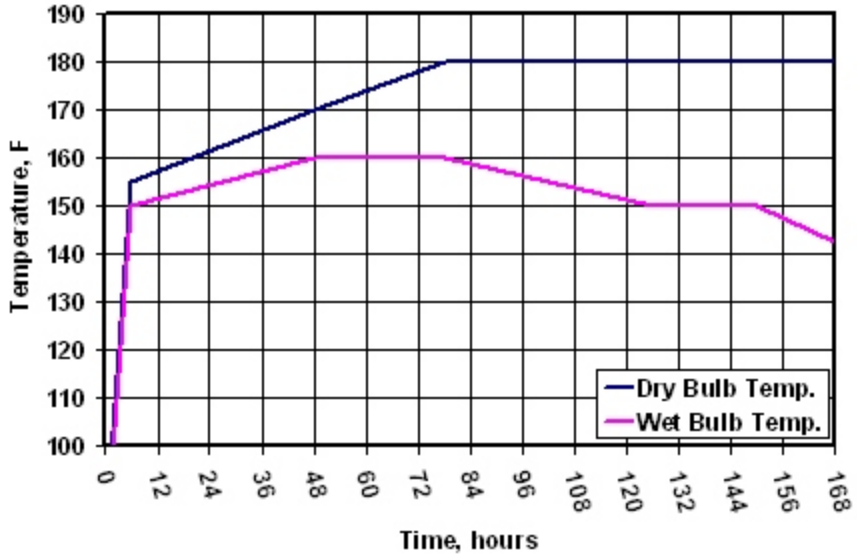


FIGURE 2. Drying schedule.

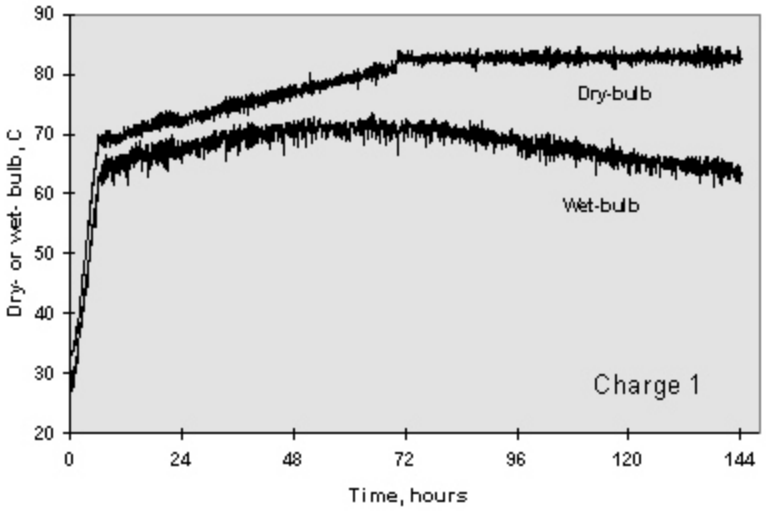


FIGURE 3. Dry- and wet-bulb temperatures.

IV. Sampling Systems and Methodologies

Sampling for total hydrocarbon is done directly from the kiln as shown in Figure 1. The concentration obtained from the hydrocarbon analyzer and the amount of air entering the kiln allow the total hydrocarbon emissions to be calculated. No impingers were used.

Figures 4a and 4b show the hydrocarbon sampling system. Unlike stack testing, all necessary equipment is permanently mounted on the kiln and flows are controlled with valves. The sample is withdrawn from the kiln under the assumption that the gas in the kiln is well-mixed and that the composition in the kiln near the exhaust is the same as the composition of the exhaust. The THC sample was drawn from the kiln directly into a heated dilution/filter box mounted on the side of the kiln. The box was heated to 125°C. Heated dilution gas can be added to the hydrocarbon sample gas to lower the gas moisture content to the detector. Dilution air was used when the gas moisture content in the kiln was greater than 15% so that the air moisture content to the detector remained less than 15%. The sample line from the box to the analyzer was heated to 133°C. The valve at the back of the analyzer was heated to 145°C.

The fuel gas was hydrogen. The span gas was EPA Protocol 905 ppm propane in air, the mid-gas was certified 412 ppm propane. The zero gas was 0.1 ppm air. Detailed sampling procedures are in Appendix 1 and a summary is presented below.

Leak checks were conducted before and after the charge was dried. Valves are closed and all components from just behind the probe tip to the valve at the back of the analyzer are placed under a 18-20 inHg vacuum. Less than one inHg pressure change during two minutes is acceptable and this was met.

Total flow and sample flow to the analyzer were checked using an NIST-traceable flow meter. Total flow is measured with the dilution gas off. Sample flow is measured with it on. This was done at the beginning and end of each sampling interval. The meter was attached to the system near the probe tip within the heated box. The valves were repositioned so that the sample came from the flow meter rather than the kiln. Readings of flow were made with the dilution gas both off and on. The flow readings were verified by observing the change in the analyzer reading for span gas with the dilution gas off and on. The dilution ratio calculated based on the analyzer readings was within 2% of that determined by the flow meter.

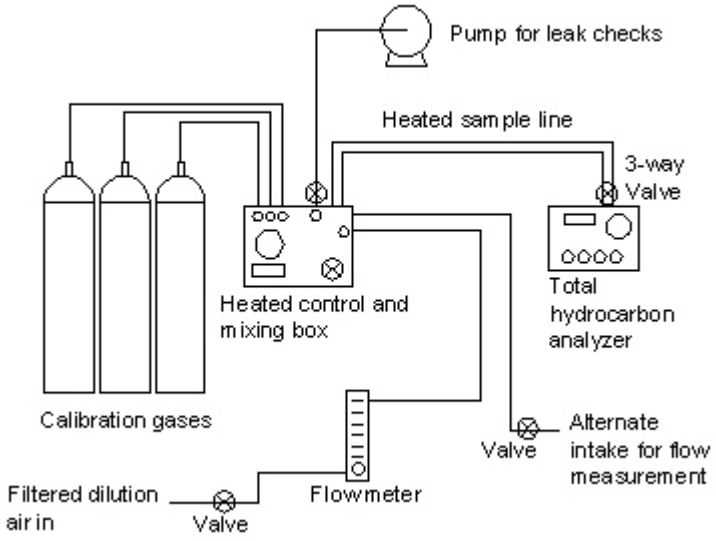


FIGURE 4A. Schematic of heated filter box with air dilution system, heated sample line, and analyzer. Sample enters heated box from back of drawing (box is attached to kiln).

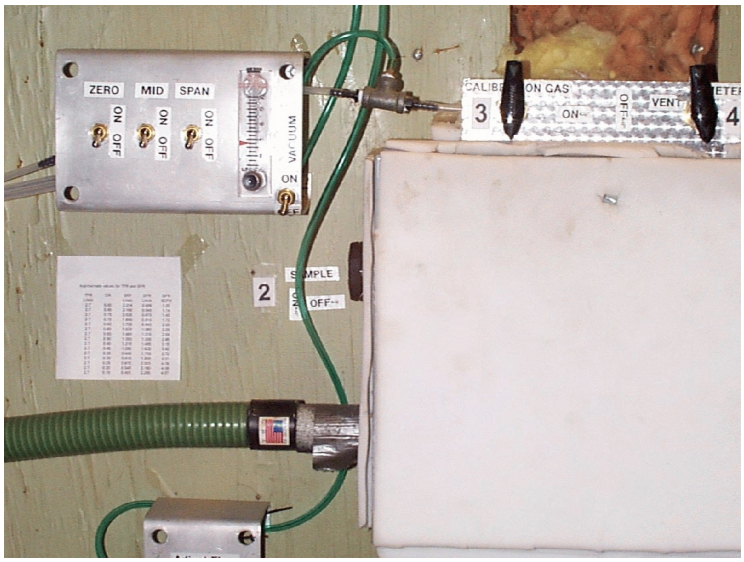


FIGURE 4B. Photo of VOC sampling system showing heated sample box (with white insulation), toggle valves and flow meter for calibration gases (upper left), on/off valve for calibration gas (3 at upper center right), heated sample line to analyzer (green tube, lower left), valve for sample (2 at center), toggle valve to vacuum pump (near calibration gas valves), and vent/flowmeter valve (4 at upper right).

Calibration of the zero and span of the detector was done at the beginning of each run (about every six to nine hours). The calibration gas was introduced by setting the valves so the calibration gas entered the system near the probe tip at ambient pressure. The calibration was checked at the end of each run with no adjustments made to the zero or span during the run. The span drift was always less than two percent of full scale for a run and generally less than one percent. The zero drift was minimal during entire drying cycles.

V. Data Reduction and Treatment

The “FlowCalc” worksheet in the Excel file “Kiln, Run1.XLS” in Appendix 2 shows the calculations for each 3-minute interval during the charges. Column A is a reading number. Columns B and C are the clock and charge times, respectively. Columns D and E are the average dry- and wet-bulb temperatures. Column F is the vapor pressure of water at the wet-bulb temperature. The absolute humidity is shown in column G and the

molal humidity in column H. These are calculated based on the dry-bulb temperature, wet-bulb temperature, vapor pressure.

Flow calculations

The volumetric dry gas flow rate in column I is the flowmeter reading adjusted for the meter calibrations and the molar humidity of the entering gas. This is in standard (at 0°C) liters per minute. In column J this has been converted to a mass flow rate in kg/min and in column K is the same information is expressed as a molal flow rate. These values are for the dry gas vented from the kiln.

Moisture calculations

The water removal rate in g/min (column L) is calculated from the humidity (column G) and the gas flow (column J). The and the total water (column M) is an integration of column L over time.

The moisture content of the wood at each time interval in the event (column N) was determined by reducing the MC of the wood from the previous value by accounting for the amount of water leaving the kiln during the interval. This amount has been adjusted by adjusting the wet-bulb temperature to make the ending moisture content match.

Total hydrocarbon calculations

The original total hydrocarbon analyzer reading is shown in column O. In column P this has been corrected to compensate for the range setting switch on the analyzer and scaling between the analyzer reading and the computer reading. Also in column P, the THA data between sampling runs has been adjusted to the average of the data during the 12-minute period before the analyzer testing and calibration time. The dilution THA (column Q) is the corrected THA reading divided by the dilution ratio (from column Y). In column R we have the opportunity to compensate for the effect of moisture on the JUM detector. This was not done so column R equals column Q. Finally in column S, the hydrocarbon concentration is converted to a dry gas basis concentration using the molar humidity (column H).

In column T, the hydrocarbon flow rate in g_{carbon}/min is calculated in a manner analogous to the water flow rate using the dry gas flow rate and the hydrocarbon concentration. Column U is the integral of column T over time, the cumulative hydrocarbon release up to that point in the schedule. Column V is the cumulative unit emissions, that is, column U divided by the oven-dry weight of the wood in the kiln.

Column X indicates the hydrocarbon sampling run and column Y is the dilution ratio during that run. The next two columns, Z and AA, are the cumulative dry gas and water during the kiln cycle. These are used obtain the average gas moisture contents. The uncorrected wood moisture content is shown in column AC. This is the MC in column N before adjustment of the wet-bulb to make the beginning and ending MCs match the oven-dry test. The kiln air and analyzer air moisture contents (based on volume) are shown in columns AD and AE.

At the end of the FlowCalc spreadsheet are summaries by run of the flow data for the total hydrocarbon run intervals. Further down are summaries by impinger interval. These are the tables that appear in the body of the report. The other pages in the files "Kiln.XLS" are graphs of the data in the FlowCalc page.

Moisture content and board weight data are in the files named "Board, Run 1.XLS."

VI. Sampling Results

The hydrocarbon emissions are summarized graphically here. All emission data is presented in detail in electronic form in Appendix 2. A summary for each sampling interval is in Table 2.

Figure 5 shows total hydrocarbon concentration (left scale) and dry gas vent rate (right scale) versus time. The vent rate is low (compared to venting from dimension lumber) throughout the schedule because of the thickness of the wood and its low initial moisture content. The venting increases as the kiln reaches setpint and as the wet-bulb depression is increased. By the fourth day, the wood is at too low a moisture content for the water from the wood to maintain the wet-bulb temperature so venting is low for the remainder of the schedule.

Initially, the total hydrocarbon concentration increases to a maximum, then decreases as venting increases. The total hydrocarbon concentration is very dependent on the venting throughout the schedule with a higher vent rate resulting in a lower hydrocarbon concentration and vice versa. Note that total hydrocarbon concentration is not indicative of the amount of hydrocarbon emissions unless one also considers the vent rate. These two factors combined determine the emissions.

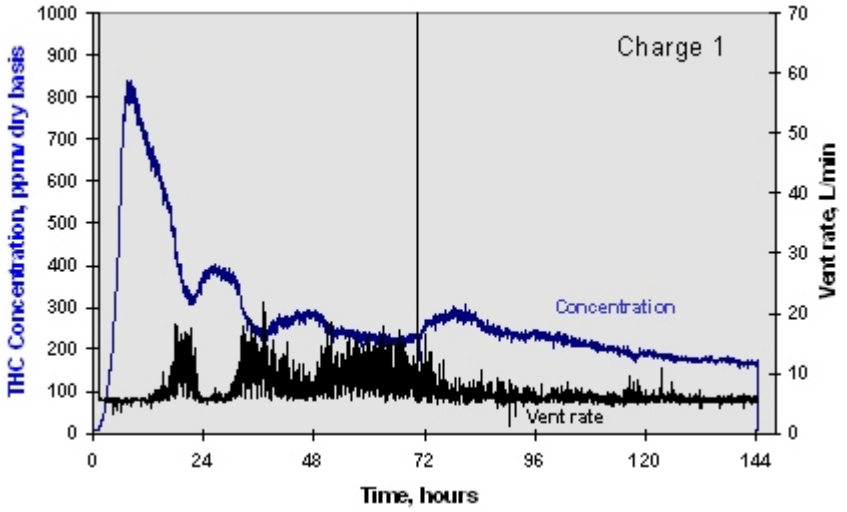


FIGURE 5. Hydrocarbon concentration and vent rate versus time.

Figure 6 shows the cumulative hydrocarbon emissions and the rate of emissions versus time. The cumulative emissions is the emissions up to any point in time in the schedule. The rate of emissions is how much is coming out per unit time. The maximum emission rates occur early in the schedule. The rate of emissions is very low at the end of the schedule.

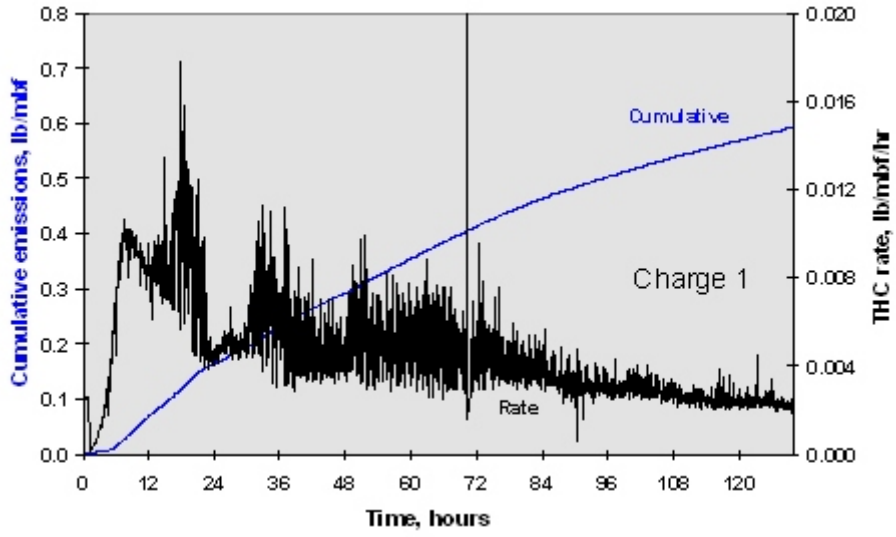


FIGURE 6. Cumulative and rate of emissions versus time (as carbon).

Figure 7 shows the wood moisture content versus time. The estimated moisture content is obtained from the humidity, vent rate, initial sample weight, final sample weight, and oven-dry sample weight. The initial moisture content was 29.8% on a dry basis by ASTM D4442. The final moisture content was 10.3%.

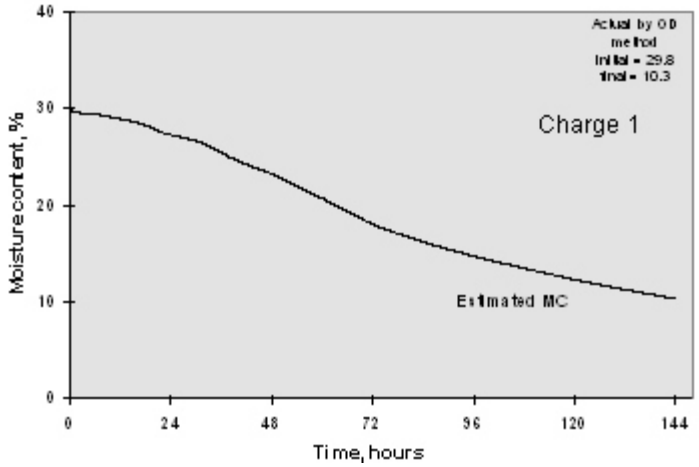


FIGURE 7. Moisture content versus time.

Figure 8 shows the cumulative hydrocarbon emissions versus moisture content. The hydrocarbon emissions for drying to any moisture content can be read from this graph. In agreement with past studies, there is a fairly linear relationship between the emissions and the decrease in moisture content, especially at lower moisture contents

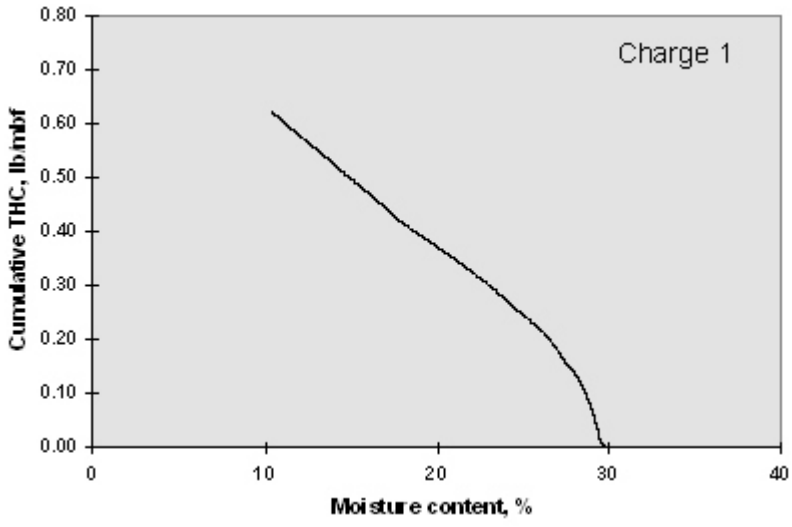


FIGURE 8. Cumulative emissions (as carbon) versus moisture content.

Table 2 shows the VOC results by run for the charge. A run is an interval between analyzer calibrations, about five to nine hours of data (recorded every 3 minutes). The interval time periods shown in the table include the times between sampling and mass calculations are adjusted to account for these. Sampling occurred for approximately 98% of the drying time. Samples of field sampling sheets, including dilution system and heated component data are given in Appendix 3 with full PDF format versions in Appendix 2.

TABLE 2. Summary of sample runs for analysis of total hydrocarbon.

Sample Run	Time hrs	Average Humidity kg/kg	Dry Flow Rate @68 l/min	Wet Flow Rate @68 l/min	THC mass as C g	THC wet conc ppmv	THC dry conc ppmv	THC mass as C lbs/mbf	THC rate as C lb/hr/mbf	Average Wood MC %	Average Anal. MC %
1	7.70	0.028	33.2	34.8	1.29	229.7	284.2	0.029	0.0038	29.5	2.8
2	4.75	0.195	6.0	7.9	1.90	564.3	748.2	0.043	0.0090	29.1	15.5
3	9.85	0.220	9.5	12.9	3.75	351.2	478.2	0.084	0.0086	28.3	15.4
4	8.05	0.232	6.3	8.7	1.72	270.2	374.4	0.039	0.0048	27.0	13.3
5	1.45	0.247	8.8	12.2	0.40	251.5	354.7	0.009	0.0063	26.5	14.0
6	5.10	0.255	12.5	17.6	1.51	186.3	265.0	0.034	0.0067	25.8	14.3
7	9.00	0.269	9.4	13.5	1.98	180.6	261.2	0.045	0.0050	24.4	14.5
8	7.70	0.283	9.6	13.9	1.73	180.1	264.3	0.039	0.0051	22.9	13.8
9	6.90	0.283	10.7	15.6	1.55	159.3	233.9	0.035	0.0051	21.3	13.8
10	7.00	0.285	11.1	16.2	1.54	150.0	220.8	0.035	0.0050	19.8	13.5
Sum	67.50				17.4			0.392			
Average		0.230	11.7	15.3		252.3	348.5		0.0059		

VII. Quality Assurance

Leak checks

Leak checks were performed on the VOC system before and after drying by pulling a 17inHg vacuum and sealing the system for 2 minutes with less than 1 inHg change in pressure.

Calibration

Data for the calibration gases are given in Appendix 4. The mid gas was not named because the analyzer was within tolerance without naming. The calibration sheet for the flow meter is also included is also included in Appendix 4 as is the thermocouple calibration check.

Anomalies

There were no anomalies during the work that would significantly affect the data.

Appendix 1. Detailed Sampling Procedures

INSTRUCTIONS FOR CHECKS OF EMISSIONS KILN

Purpose: Ensure kiln is operating correctly

Clock time: Record from computer

Run time: Record from computer. Check the box if the computer screen being refreshed and time is advancing.

Box temperature: Read from metal electrical box under desk, left controller. The top and bottom numbers should be similar on the box should be similar, about 126 C..

Valve temperature: Read from metal electrical box under desk, right controller. The top and bottom numbers should be similar on the box should be similar, about 154 C..

Dry-bulb temperature: Read from computer screen. Compare to graph to be sure it's correct. If it's not within a degree or two of the chart, check again in a few minutes. During startup (the first 3 or so hours), it may not be able to track. If it's too high, the heat valve should be closed, too low and the heat valve should be open. If it does not appear to be working correctly, call Mike or Mark.

Wet-bulb temperature: Read from computer screen. Compare to graph to be sure it's correct.

If it is too low, it means that the kiln atmosphere is too dry. Check the flow meters. If Flow1 is about 10 L/min (its lower limit), make sure that Flow2 and Flow3 are turned off

I*f it's too high,* then either the kiln atmosphere is too humid or the sock is not being wetted. If Flow 1 is near 200 L/min (its upper limit) add venting by opening Flow2 and/or Flow 3. The maximum for Flow2 is 50 L/min, if it reads over this value for several readings, reduce it to about 45 L/min. Don't change Flow3 often, rather set it and leave it for several hours if possible. Keep the Flow 3 reading constant by small adjustments. As Flow1 decreases or Flow2 turned down, there is more pressure behind Flow3 and the flow increased. Check for water in the wet-bulb reservoir (push the float down and make sure it's getting water).

Check both Wet-bulb1 and Wet-bulb2 and make sure they are reading about the same. If they differ by more than 2 C, call Mike or Mark.

If both wet-bulbs are reading the same as the dry-bulb, check the wet-bulb water.

If these procedures do not correct the wet-bulb temperature within 30 minutes, call Mike or Mark.

Line temperature: Read from gray box on wall above analyzer. It should read about 275°F.

Chiller temperature: Read the chiller temperature. It should be about -1°C.

Flow 1: Read from computer. The value of Flow1 changes depending on the wet-bulb. If Flow 1 is 10 L/min and the wet-bulb is too low, there's probably nothing we can do. If it's 200 L/min and the wet-bulb is too high, Flow2 and/or Flow3 can be opened. Flow2 and Flow3 should be adjusted so that Flow1 stays below 175 to 200 L/min.

Flow 2: Read from computer. The value of Flow2 is set by you. It will vary a little - as flow 1 goes down, flow 2 will go up. Do not set it to < 40 L/min if you think Flow1 is going to decrease or it will go off scale and not be read by the computer

Flow 3: Read from meter. The value of Flow3 is set by you. It will vary a little - as flow 1 goes down, flow 2 will go up. Be sure to clearly record this value and when you change it

Dilution flow: Read dilution flow meter. It should read the same setting as the red flag. Do not adjust. If significantly different, investigate.

F/M Flow: Read from rotometer. This should be about 400 to 500 cc/min.

Line vacuum: Read from the vacuum gauge. This should be about 20"Hg.

INSTRUCTIONS - FIELD DATA SHEET FOR TOTAL HYDROCARBON ANALYZER PRE-SAMPLE PROCEDURE

BACKGROUND INFORMATION

Get the dry- and wet-bulb temperatures from the kiln schedule or off the computer. Use the highest expected values for the run.

Read absolute humidity off the psychrometric chart or table.
Calculate or read from tables -

Percent moisture = 100 / [1 + 1 / 1.61*AbHum]
Target Dilution Ratio (TDR) = 15 / Percent Moisture

Event = the name of the drying cycle.
Run = the number of the 3-hour interval.
Operator, that's you.
Date and time are now, as you start the data collection process.

AMBIENT DATA

Call 9-754-0081 and get altimeter setting.
Read the laboratory temperature from the thermometer.

ANALYZER CALIBRATION

Set valves so that 1, 2 = off; 3=on; 4=vent. This allows gas to flow out of the vents from the calibration tanks and shuts off all other sources. Only calibration gas should go through the detector.

Open the zero gas tank valve

- zero toggle switch up (on), others down (off)
- set flow to 3.5 L/min using regulator on tank
- wait for a stable reading (about 30 to 60 seconds)
- use the zero dial (pot) on THA to get a zero reading
- read the analyzer
- read computer
- note pot setting
- close valve on zero gas tank

Open span gas tank valve

- span toggle switch up (on), others down (off)
- set flow to 3.5 L/min using regulator on tank
- set analyzer to range 3
- wait for a stable reading (about 30 to 60 seconds)
- use the span dial (pot) on THA to get a reading of 905 ppm

read the analyzer, record, for example, 9.05 or 900
read computer (should read about 905)
note pot setting

Open mid gas tank valve
mid toggle switch up (on), others down (off)
set flow to 3.5 L/min using regulator on tank
wait for a stable reading (about 30 to 60 seconds)
read analyzer (do not adjust pot settings), record, for example, 4.12 or 412
read computer (should about 412)
check for within tolerance
turn off mid gas
all toggle switches off

SET DILUTION FLOW BEFORE RUN

Set valves so that 1, 2, 3 = off; 4=meter. This allows gas to flow only from the meter to the detector.

Use the Gilibrator to take 4 readings of the total flow rate (TFR). This is the total flow drawn by the analyzer and should be about 2.6 L/min
Make sure the average does not include any "bad" readings
Record the average, L/min = cc/min / 1000
Write the Event, Run, and "Pre-TFR" on the Gilibrator printout.

Calculate the next two values -
Target dilution flow rate (TDFR) is the TFR x (1 - DR)
Target sample flow rate (TSFR) is the TFR x DR
Check that the sum of these is the Total Flow Rate

Set dilution flow
Set red pointer to desired dilution flow (on meter with valve 1)
Slowly open lower valve on dilution flow meter (1=on; 2, 3=off; 4=meter)
Use upper valve on dilution flow meter to adjust flow
Do not adjust this meter after this point
Read the meter that you just set and record the value

Use the Gilibrator to take 4 readings of the sample flow rate (SFR). This is the flow through the analyzer after dilution is set. It will vary, depending on the dilution setting.
Make sure the average does not include any "bad" readings
Record the average, L/min = cc/min / 1000
Write "Pre-SFR" on the Gilibrator printout.

CHECK DILUTION FLOW BEFORE RUN

Set valves so that 1, 3 = on; 2=off; 4=vent. This allows gas to flow out of the vent from the calibration tank and shuts off all other sources. Calibration gas and dilution air will go through the detector.

Open span gas tank valve
- span toggle switch up (on), others down (off)
- set flow to 3.5 L/min using regulator on tank
- set analyzer to range 3
- wait for a stable reading (about 30 to 60 seconds) record
- turn off all calibration gas tank valves
- all toggle switches off

Calculate the dilution ratio based on gas flow by dividing the Sample Flow Rate by the Total Flow Rate.

Calculate the dilution ratio based on span gas by dividing the Diluted span by the undiluted span.

If the Dilution ratios do not agree within 5% - DO NOT PROCEED****. Use $100*(DR_{Span} - DR_{Flow})/DR_{Flow}$ to calculate the % difference.

**** check calculations, check that values for ppm and flows make sense, remeasure everything. If it still does not agree, call Mike or Mark

START RUN

Set valve so that 1, 2, 5 = on; 3, 4=off; all calibration tank valves off

Record the start time. Use the computer clock for all times or set your watch to the computer time.

Make sure analyzer is on appropriate range, usually range 3, to keep THC reading on computer between 60 and 750.

Monitor system, as needed. Record system condition at least hourly.

End time should be no more than 3 hours from start time.

POST-SAMPLE PROCEDURE

AT END OF RUN

Record your name as the operator.
Event = the drying cycle. Run = the 3-hour interval.
Operator, that's you. Date and time are now, as you start the data collection process.

AMBIENT DATA

Call 9-754-0081 and get temperature and altimeter
Local pressure = (Altimeter - 0.23) x 3.3867
Read the laboratory temperature from the thermometer.

Fill out appropriate information on Pre-sample side of data sheet for next run. This will save time in between runs.

END TIME

Record computer time.
DO NOT adjust dilution gas yet.

CHECK DILUTION FLOW AFTER RUN

Set valves so that 1, 3 = on; 2=off; 4=vent. This allows gas to flow out of the vent from the calibration tank and shuts off all other sources. Calibration gas and dilution air will go through the detector.

Open span gas tank valve
- span toggle switch up (on), others down (off)
- set flow to 3.5 L/min using regulator on tank
- wait for a stable reading (about 30 -60 seconds)
- record
- all toggle switches off

Sample flow rate. Set valves so that 1=on; 2, 3 = off; 4=meter. This allows gas to flow only from the meter and the dilution to the detector.

- Use the Gilibrator to take 5 readings of the sample flow rate (SFR). This is the flow through the analyzer with dilution on.
- Make sure the average does not include any "bad" readings
- Record the average, L/min = cc/min / 1000
- Write "Post-SFR" on the Gilibrator printout.

Read dilution flow meter
To calculate the L/min, divide scfh by 2.12
Turn off dilution flow meter using valve 1

Total flow rate. Set valves so that 1, 2, 3 = off; 4=meter. This allows gas to flow only from the meter to the detector.

Use the Gilibrator to take 5 readings of the total flow rate (TFR). This is the total flow drawn by the analyzer and should be about 2.6 L/min
Make sure the average does not include any "bad" readings
Record the average, L/min = cc/min / 1000
Write "Post-TFR" on the Gilibrator printout.

CHECK CALIBRATION OF ANALYZER

Set valves so that 1, 2 = off; 3=on; 4=vent. This allows gas to flow out of the vents from the calibration tanks and shuts off all other sources. Only calibration gas should go through the detector.

Span gas tank valve should be open
span toggle switch up (on), others down (off)
set flow to 3.5 L/min using regulator on tank
set analyzer to range 4
wait for a stable reading (about 30 -60 seconds)
read analyzer (do not adjust pot settings), record, for example, 1.50 as 1500
read computer (should read about 152 due to range 4 setting)
note pot setting
check for within tolerance - between 1483 and 1573

Open mid gas tank valve
mid toggle switch up (on), others down (off)
set flow to 3.5 L/min using regulator on tank
set analyzer to range 3
wait for a stable reading (about 30 -60 seconds)
read analyzer (do not adjust pot settings), record, for example, 8.50 as 850
read computer (should read same as analyzer)
check for within tolerance

Open the zero gas tank valve
zero toggle switch up (on), others down (off)
set flow to 3.5 L/min using regulator on tank
wait for a stable reading (about 30 -60 seconds)
read analyzer (do not adjust pot settings)

read computer
note pot setting

Calculate the dilution ratio based on gas flow by dividing the Sample Flow Rate by the Total Flow Rate.

Calculate the dilution ratio based on gas flow by dividing the Sample Flow Rate by the Total Flow Rate.

Calculate % difference as 100 * {Absolute Value (DR_{Span}-DR_{Flow})} / DR_{Flow}

Record the time now as the end time for check.

Tear off the four sets of Gilibrator readings (Pre-TFR, Pre-SFR, Post-SFR, Post-TFR) and staple to paper with other records.

Start Pre-Sample procedure for next run.

Appendix 2. Data in Electronic Form

Appendix 3. Samples of Field Data Sheets

Charge:	1
Columbia Vista	
Page:	1

	Date		Time
Start:	9:27	6-2-05	
End:	9:30	6-8-05	

Clock time	Run time	✓	Run	Temperatures								Flows						Line Vac.
				Box	Valve	Dry-bulb	✓	Wet-bulb	✓	Line	Chiller	Flow 1	Flow 2	Flow 3	✓	Dilution	F/M	
	hrs		#	°C	°C	°C		°C		°F	°C	L/min	L/min	SCFH		SCFM	mL/min	inHg
9:28	00:01		1	125	145	32.7		27.0		273		196	0			1.9		
11:14	1:45		1	125	145	39.4		34.7		273		5	0			1.9		
13:35	4:08		1	125	145	56.5		49.7		273		5	0			1.9		
16:59	7:32		1	125	145	69.7		64.1		274		5	0			1.9		
17:12	7:45		2	125	145	68.8		64		274		6	0			2.3		
21:48	12:21		2	125	145	70.0		66.1		274		6	0			2.3		
21:59	12:32		3	126	145	70.0		66.4		274		7	0			2.8		
7:47	22:20		4	126	145	72.1		68.0		273		7	0			2.8		
10:21	24:54		4	125	145	72.8		67.4		273		6	0			2.8		
15:51	30:24		5	126	145	73.4		68.9		274		6	0			2.8		
17:17	31:49		6	126	145	73.8		68.7		274		8	0			2.9		
22:23	36:56		7	126	145	74.9		69.4		274		20	0			3.0		
7:23	45:55		8	126	145	76.6		70.4		274		7	0			3.0		
15:05	53:38		9	126	145	78.0		71.4		275		9	0			3.1		
10:00	60:32		10	126	145	79.1		70.7		275		6	0			3.1		
7:29	70:02		11	126	145	80.8		70.7		274		10	0			3.1		
14:28	6:52		11	125	145	82.4		71.1		274		6	0			3.1		

6/02/05
6/03
6/4
6/5

Charge: **Columbia 1**
Date: **2-Jun-05**

Board		Weights			Moisture contents		Notes
		Initial Wt.	Final Wt.	Oven	Initial	Final	
		kg	kg	kg	%	%	
1	1	5.735	4.990	4.575	25.4	9.1	
1	2	7.185	6.215	5.610	28.1	10.8	
1	3	6.735	5.470	4.945	36.2	10.6	
1	4	6.150	5.385	4.920	25.0	9.5	
1	5	6.760	5.890	5.330	26.8	10.5	
1	6	6.095	5.265	4.755	28.2	10.7	
1	7	6.880	5.915	5.360	28.4	10.4	
1	8	5.630	4.840	4.410	57.7	9.8	
1	9	6.955	5.670	5.130	13.9	10.5	
1	10	5.845	5.045	4.575	48.9	10.3	
1	11	6.810	5.875	5.315	17.0	10.5	
1	12	6.220	5.430	4.940	25.9	9.9	
1	13	8.325	6.245	5.600	48.7	11.5	
1	14	7.330	6.260	5.670	29.3	10.4	
1	15	5.895	5.030	4.540	29.8	10.8	
1	16	6.985	6.075	5.460	27.9	11.3	
1	17	6.990	5.465	4.940	41.5	10.6	
1	18	6.195	5.430	4.945	25.3	9.8	
1	19	6.575	5.810	5.265	24.9	10.4	
1	20	5.925	5.210	4.775	24.1	9.1	
Sums:		131.220	111.515	101.060			
Averages:					29.8	10.3	

9-113

FIELD DATA SHEET FOR TOTAL HYDROCARBON ANALYZER - PRE

BACKGROUND INFORMATION

Event (kiln charge): Columbia Vista - 1

Run (sample): 1

Operator: MDotz

Date: June 2, 05

Time now : 9:19A

Dry-bulb temperature: 155

Wet-bulb temperature: 150

Target Dilution Ratio (TDR): 0.66

AMBIENT DATA

Laboratory temperature: 25 °C

ANALYZER CALIBRATION

[1, 2 = off; 3=on; 4=vent]

	Analyzer, ppm	Computer	Within range	Pot settings
zero	0 (0)	—	does not apply	480
span	905 (905)	—	does not apply	249
mid	410 (412)		379 to 437	none

SET DILUTION FLOW BEFORE RUN

Total flow rate (TFR): 2.629 L/min [1, 2, 3 = off; 4=meter]

Target dilution flow rate (TDFR) 0.894 L/min [TFR x (1 - DR)]

sample flow rate (TSFR) 1.735 L/min [TFR x DR]

Set and read dilution meter: 1.895 scfh → 1.9 [scfh = L/min * 2.12]

Sample flow rate (SFR): 1.698 L/min [1 = on; 2, 3 = off; 4=meter]

CHECK DILUTION FLOW BEFORE RUN

[1, 3=on; 2=off; 4=vent]

	Analyzer	DR_{Span} [$Span_{Diluted}$/Span]	DR_{Flow} [SFR / TFR]	Difference, % $100*(DR_{Span} - DR_{Flow})/DR_{Flow}$
$Span_{Diluted}$	582	0.643	0.642	0.2

START TIME: 9:27 **[1, 2, 5 = on; 3, 4 = off; tank valves off]**

ANALYZER RANGE: 2 **[60 < computer reading < 750]**

FIELD DATA SHEET FOR TOTAL HYDROCARBON ANALYZER - POST

Operator: Milota Event (kiln charge): Columbia Vista - 1

Time now: 5:01 Run (sample): 1

AMBIENT DATA

Laboratory temperature: 32 °C

END TIME: 5:01

CHECK DILUTION FLOW AFTER RUN [1, 3=on; 2=off; 4=vent]

	Analyzer	Computer
$Span_{Diluted}$	618	618

Sample flow rate (SFR): 1.744 L/min [1= on, 2, 3 = off, 4=meter]

Read dilution meter: 1.9 scfh _____ L/min [L/min = scfh*0.472]

Total flow rate (TFR): 2.661 L/min [1, 2, 3 = off; 4=meter]
(attach print out with all four sets of data)

Dilution ratio (DR_{Flow}): 0.655 [SFR / TFR]

CHECK OF ANALYZER CALIBRATION [1, 2=off; 3=on, 4=vent]

	Analyzer	Computer	Within range	Pot settings
span	931	930	875 to 935	248
mid	420	419	379 to 437	none
zero	0	0	-45 to +45	480

Dilution ratio (DR_{Span}): 0.663 [$Span_{Diluted}$ / Span]

Dilution ratio difference: 2.3 % [$100*(Abs(DR_{Span} - DR_{Flow}))/DR_{Flow}$]

End time for check: 5:05

Comments: 9:17 - 9:19AM 17.9 → 17.9 "Hg VAC

Span gas running to analyzer until 9:30AM

Appendix 4. Calibration Data

Airgas

Certificate of Analysis: EPA Protocol Gas Mixture

Airgas Specialty Gases
12722 South Wentworth Avenue
Chicago, IL 60628
www.airgas.com

Cylinder Number: CC166118 Reference Number: 54-124033817-1
Cylinder Pressure: Expiration Date: 4/12/2008
Certification Date: 4/12/2005 Laboratory: ASG - Chicago - IL

Certified Concentrations

Component	Concentration	Accuracy	Analytical Principle	Procedure
PROPANE	905.3 PPM	+/- 1%	FID	G1
Air	Balance			

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed. Analytical Methodology does not require correction for analytical interferences.

Notes:

Do not use cylinder below 150 psig. Approval Signature

Reference Standard Information

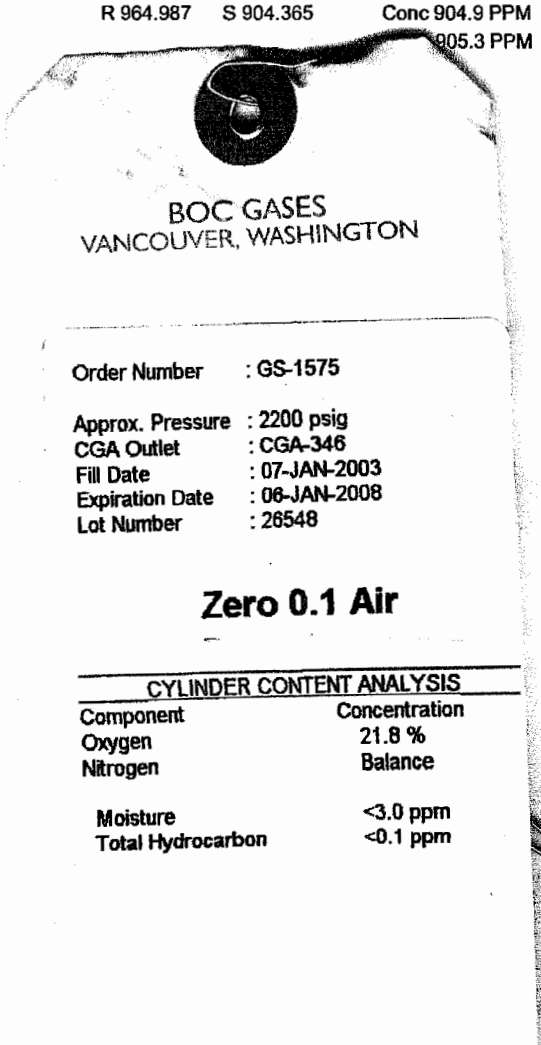
Type	Balance Gas	Component	Cyl.Number	Concentration
NTRM 1050606		PROPANE	SG9133675BAL	965.6 PPM

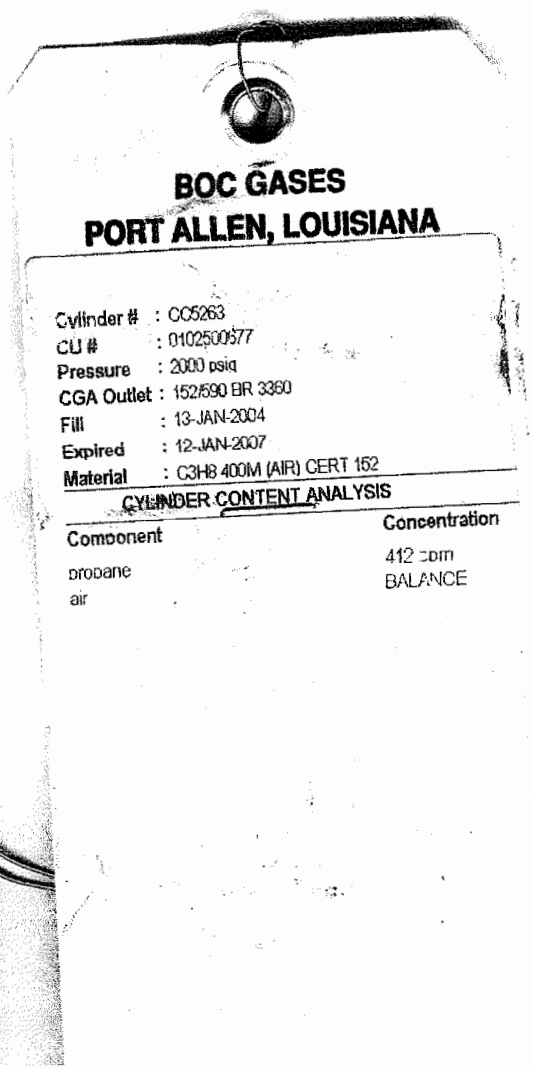
Analytical Results

1st Component PROPANE

1st Analysis Date: 04/12/2005

R 964.139	S 905.388	Z 0	Conc 906.8 PPM
S 904.269	Z 0	R 965.706	Conc 904.2 PPM
Z 0	R 964.987	S 904.365	Conc 904.9 PPM
			905.3 PPM





MKS INSTRUMENTS

Flow
Calibration Record Sheet
(200 SLM)

ERA #: 128989W

Customer: OREGON STATE UNIVERSITY

MKS Transfer Standard Type: 1559A-200L-SV

Serial Number: WS 136

MKS Primary Standard Type: A-200-1

Serial Number: 14952-1-1

Standard Flow Rate (SLM)	UUT Flow Rate (SLM)	UUT Error (SLM)	Percent of full scale Error
0.00	0.000	0.000	0.000%
50.000	50.880	0.880	0.440%
100.000	99.880	-0.120	-0.060%
150.000	150.040	0.040	0.020%
200.000	200.000	0.000	0.000%

UUT Model: 1559A-200L-SV

UUT Serial #: 000317785

UUT Process Gas: N2

UUT Range: 200 SLM

Process Gas used: N2

Calibrated by: DP

Date of Calibration: 05/10/00

Verified by:

Notes:

1. All units must be operated on regulated heat (Power on) for a minimum of of one hour before any adjustment is made.
2. Flowmeters and/or Controllers are Calibrated at atmospheric pressure.
3. This Calibration is referenced to 0 Degrees Centigrade and 760 Torr.

TC Calibration 6/10/2002	
Omega Calibrator C	PC Readout C
30.0	30.0
50.0	50.1
70.0	70.1
90.0	90.1
110.0	110.0

Field Data

Charge:	1
Columbia Vista	
Page:	1

	Date		Time
Start:	9:27	6-2-05	
End:	9:30	6-8-05	

Clock time	Run time	✓	Run	Temperatures								Flows						Line Vac.
				Box	Valve	Dry-bulb	✓	Wet-bulb	✓	Line	Chiller	Flow 1	Flow 2	Flow 3	✓	Dilution	F/M	
	hrs		#	°C	°C	°C		°C		°F	°C	L/min	L/min	SCFH		SCFM	mL/min	inHg
9:28	00:01		1	125	145	32.7		27.0		273		196	0			1.9		
11:14	1:45		1	125	145	39.4		34.7		273		5	0			1.9		
13:35	4:08		1	125	145	56.5		49.7		273		5	0			1.9		
16:59	7:32		1	125	145	69.7		64.1		274		5	0			1.9		
17:12	7:45		2	125	145	68.8		64		274		6	0			2.3		
21:48	12:21		2	125	145	70.0		66.1		274		6	0			2.3		
21:59	12:32		3	126	145	70.0		66.4		274		7	0			2.8		
7:47	22:20		4	126	145	72.1		68.0		273		7	0			2.8		
10:21	24:54		4	125	145	72.8		67.4		273		6	0			2.8		
15:51	30:24		5	126	145	73.4		68.9		274		6	0			2.8		
17:17	31:49		6	126	145	73.8		68.7		274		8	0			2.9		
22:23	36:56		7	126	145	74.9		69.4		274		20	0			3.0		
7:23	45:55		8	126	145	76.6		70.4		274		7	0			3.0		
15:05	53:38		9	126	145	78.0		71.4		275		9	0			3.1		
10:00	60:32		10	126	145	79.1		70.7		275		6	0			3.1		
7:29	70:02		11	126	145	80.8		70.7		274		10	0			3.1		
14:28	6:52		11	125	145	82.4		71.1		274		6	0			3.1		

6/02/05
6/03
6/4
6/5

Charge:	1
Columbia Vista	
Page:	2

	Date		Time
Start:			
End:	6-8-05		9:30

	Clock time	Run time	✓	Run	Temperatures								Flows						Line Vac.
					Box	Valve	Dry-bulb	✓	Wet-bulb	✓	Line	Chiller	Flow 1	Flow 2	Flow 3	✓	Dilution	F/M	
		hrs		#	°C	°C	°C		°C		°F	°C	L/min	L/min	SCFH		SCFM	mL/min	inHg
6/5	14:38	7:01		12	126	145	82.2		71		274		8	0	5		3.0		
	9:33	13:57		12	125	145	82.5		70.3		274		6	0			3.0		
	21:42	14:05		13	126	145	82.6		70.4		274		5	0			2.9		
6/6	7:46	24:09		13	125	145	82.2		68.7		274		6	0			2.9		
	8:21	24:44		14	125	145	82.2		68.9		273		6	0			2.8		
	10:38	27:02		14	124	145	83.0		69.2		273		7	0			2.8		
	13:20	29:43		14	126	145	82.8		68.4		273		7	0			2.8		
	1523	31:46		15	126	145	82.7		68.6		273		6	0			2.8		
	21:52	38:15		16	126	145	83.1		67.3		273		6	0			2.7		
6/7	7:42	48:05		17	126	145	82.9		66.7		273		6	0			2.3		
	14:15	54:35		17	125	145	82.7		65.8		273		7	0			2.3		
	5:23	57:46		18	124	145	82.9		64.9		273		6	0			2.25		
	9:43	62:06		18	124	145	82.7		64.9		273		6	0			2.25		
	9:51	62:15		19	125	145	82.2		64.4		274		6	0			2.2		
6/8	7:20	71:44		19	124	145	82.4		63.7		274		6	0			2.2		

Charge: **Columbia 1**
Date: **2-Jun-05**

Board		Weights			Moisture contents		Notes
		Initial Wt.	Final Wt.	Oven	Initial	Final	
		kg	kg	kg	%	%	
1	1	5.735	4.990	4.575	25.4	9.1	
1	2	7.185	6.215	5.610	28.1	10.8	
1	3	6.735	5.470	4.945	36.2	10.6	
1	4	6.150	5.385	4.920	25.0	9.5	
1	5	6.760	5.890	5.330	26.8	10.5	
1	6	6.095	5.265	4.755	28.2	10.7	
1	7	6.880	5.915	5.360	28.4	10.4	
1	8	5.630	4.840	4.410	57.7	9.8	
1	9	6.955	5.670	5.130	13.9	10.5	
1	10	5.845	5.045	4.575	48.9	10.3	
1	11	6.810	5.875	5.315	17.0	10.5	
1	12	6.220	5.430	4.940	25.9	9.9	
1	13	8.325	6.245	5.600	48.7	11.5	
1	14	7.330	6.260	5.670	29.3	10.4	
1	15	5.895	5.030	4.540	29.8	10.8	
1	16	6.985	6.075	5.460	27.9	11.3	
1	17	6.990	5.465	4.940	41.5	10.6	
1	18	6.195	5.430	4.945	25.3	9.8	
1	19	6.575	5.810	5.265	24.9	10.4	
1	20	5.925	5.210	4.775	24.1	9.1	
Sums:		131.220	111.515	101.060			
Averages:					29.8	10.3	

9-113

FIELD DATA SHEET FOR TOTAL HYDROCARBON ANALYZER - PRE

BACKGROUND INFORMATION

Event (kiln charge): Columbia Vista - 1

Run (sample): 1

Operator: MDotz

Date: June 2, 05

Time now : 9:19A

Dry-bulb temperature: 155

Wet-bulb temperature: 150

Target Dilution Ratio (TDR): 0.66

AMBIENT DATA

Laboratory temperature: 25 °C

ANALYZER CALIBRATION

[1, 2 = off; 3=on; 4=vent]

	Analyzer, ppm	Computer	Within range	Pot settings
zero	0 (0)	—	does not apply	480
span	905 (905)	—	does not apply	249
mid	410 (412)		379 to 437	none

SET DILUTION FLOW BEFORE RUN

Total flow rate (TFR): 2.629 L/min [1, 2, 3 = off; 4=meter]

Target dilution flow rate (TDFR) 0.894 L/min [TFR x (1 - DR)]

sample flow rate (TSFR) 1.735 L/min [TFR x DR]

Set and read dilution meter: 1.895 scfh → 1.9 [scfh = L/min * 2.12]

Sample flow rate (SFR): 1.698 L/min [1 = on; 2, 3 = off; 4=meter]

CHECK DILUTION FLOW BEFORE RUN

[1, 3=on; 2=off; 4=vent]

	Analyzer	DR_{Span} [$Span_{Diluted}$/Span]	DR_{Flow} [SFR / TFR]	Difference, % $100*(DR_{Span} - DR_{Flow})/DR_{Flow}$
$Span_{Diluted}$	582	0.643	0.642	0.2

START TIME: 9:27 **[1, 2, 5 = on; 3, 4 = off; tank valves off]**

ANALYZER RANGE: 2 **[60 < computer reading < 750]**

FIELD DATA SHEET FOR TOTAL HYDROCARBON ANALYZER - POST

Operator: Milota Event (kiln charge): Columbia Vista - 1

Time now: 5:01 Run (sample): 1

AMBIENT DATA

Laboratory temperature: 32 °C

END TIME: 5:01

CHECK DILUTION FLOW AFTER RUN [1, 3=on; 2=off; 4=vent]

	Analyzer	Computer
$Span_{Diluted}$	618	618

Sample flow rate (SFR): 1.744 L/min [1= on, 2, 3 = off, 4=meter]

Read dilution meter: 1.9 scfh _____ L/min [L/min = scfh*0.472]

Total flow rate (TFR): 2.661 L/min [1, 2, 3 = off; 4=meter]
(attach print out with all four sets of data)

Dilution ratio (DR_{Flow}): 0.655 [SFR / TFR]

CHECK OF ANALYZER CALIBRATION [1, 2=off; 3=on, 4=vent]

	Analyzer	Computer	Within range	Pot settings
span	931	930	875 to 935	248
mid	420	419	379 to 437	none
zero	0	0	-45 to +45	480

Dilution ratio (DR_{Span}): 0.663 [$Span_{Diluted}$ / Span]

Dilution ratio difference: 2.3 % [$100*(Abs(DR_{Span} - DR_{Flow}))/DR_{Flow}$]

End time for check: 5:05

Comments: 9:17 - 9:19AM 17.9 → 17.9 "Hg VAC

Span gas running to analyzer until 9:30AM

FIELD DATA SHEET FOR TOTAL HYDROCARBON ANALYZER - PRE

BACKGROUND INFORMATION

Event (kiln charge): Columbia Vista - 1

Run (sample): 2

Operator: Milota

Date: June 2 05

Time now : 5:00

Dry-bulb temperature: _____

Wet-bulb temperature: 153

Target Dilution Ratio (TDR): 0.6

AMBIENT DATA

Laboratory temperature: 31 °C

ANALYZER CALIBRATION

[1, 2 = off; 3=on; 4=vent]

	Analyzer, ppm	Computer	Within range	Pot settings
zero	0 (0)	0	does not apply	470
span	905 (905)	905	does not apply	228
mid	412 (412)	412	379 to 437	none

SET DILUTION FLOW BEFORE RUN

Total flow rate (TFR): 2.654 L/min [1, 2, 3 = off; 4=meter]

Target dilution flow rate (TDFR) 1.063 L/min [TFR x (1 - DR)]

sample flow rate (TSFR) 1.592 L/min [TFR x DR]

Set and read dilution meter: 2.25 scfh [scfh = L/min * 2.12]

Sample flow rate (SFR): 1.536 L/min [1 = on; 2, 3 = off; 4=meter]

CHECK DILUTION FLOW BEFORE RUN

[1, 3=on; 2=off; 4=vent]

	Analyzer	DR_{Span} [$Span_{Diluted}/Span$]	DR_{Flow} [SFR / TFR]	Difference, % $100*(DR_{Span} - DR_{Flow})/DR_{Flow}$
$Span_{Diluted}$	525	0.580	0578	0.3

START TIME: 5:10 **[1, 2, 5 = on; 3, 4 = off; tank valves off]**

ANALYZER RANGE: 3 **[60 < computer reading < 750]**

FIELD DATA SHEET FOR TOTAL HYDROCARBON ANALYZER - POST

Operator: Milota Event (kiln charge): Columbia Vista - 1

Time now: 9:49 Run (sample): 2

AMBIENT DATA

Laboratory temperature: 32 °C

END TIME: 9:49p

CHECK DILUTION FLOW AFTER RUN [1, 3=on; 2=off; 4=vent]

	Analyzer	Computer
$Span_{Diluted}$	536	537

Sample flow rate (SFR): 1.585 L/min [1= on, 2, 3 = off, 4=meter]

Read dilution meter: 2.3 scfh _____ L/min [L/min = scfh*0.472]

Total flow rate (TFR): 2,678 L/min [1, 2, 3 = off; 4=meter]
(attach print out with all four sets of data)

Dilution ratio (DR_{Flow}): 0.592 [SFR / TFR]

CHECK OF ANALYZER CALIBRATION [1, 2=off; 3=on, 4=vent]

	Analyzer	Computer	Within range	Pot settings
span	907	907	875 to 935	228
mid	413	413	379 to 437	none
zero	0	0	-45 to +45	470

Dilution ratio (DR_{Span}): 0.591 [$Span_{Diluted}$ / Span]

Dilution ratio difference: 0.15 % [$100*(Abs(DR_{Span} - DR_{Flow}))/DR_{Flow}$]

End time for check: 9:53

Comments:

~~258~~
455

FIELD DATA SHEET FOR TOTAL HYDROCARBON ANALYZER - PRE

BACKGROUND INFORMATION

Event (kiln charge): Columbia Vista - 1

Run (sample): 3

Operator: Mlota

Date: June 2 05

Time now : 9:48 p

Dry-bulb temperature: _____

Wet-bulb temperature: 155

Target Dilution Ratio (TDR): 0.5

AMBIENT DATA

Laboratory temperature: 32 °C

ANALYZER CALIBRATION

[1, 2 = off; 3=on; 4=vent]

	Analyzer, ppm	Computer	Within range	Pot settings
zero	0 (0)	0	does not apply	470
span	905 (905)	906	does not apply	228
mid	411 (412)	412	379 to 437	none

SET DILUTION FLOW BEFORE RUN

Total flow rate (TFR): 2,682 L/min [1, 2, 3 = off; 4=meter]

Target dilution flow rate (TDFR): 1.34 L/min [TFR x (1 - DR)]

sample flow rate (TSFR): 1.34 L/min [TFR x DR]

Set and read dilution meter: 2.8 scfh [scfh = L/min * 2.12]

Sample flow rate (SFR): 1,281 L/min [1 = on; 2, 3 = off; 4=meter]

CHECK DILUTION FLOW BEFORE RUN

[1, 3=on; 2=off; 4=vent]

	Analyzer	DR_{Span} [$Span_{Diluted}$/Span]	DR_{Flow} [SFR / TFR]	Difference, % $100*(DR_{Span} - DR_{Flow})/DR_{Flow}$
$Span_{Diluted}$	434	0.480	0.478	0.5

START TIME: 9:56 p **[1, 2, 5 = on; 3, 4 = off; tank valves off]**

ANALYZER RANGE: 3 **[60 < computer reading < 750]**

FIELD DATA SHEET FOR TOTAL HYDROCARBON ANALYZER - POST

Operator: M Vista Event (kiln charge): Columbia Vista - 1

Time now: 7:30 A Run (sample): 3

AMBIENT DATA

Laboratory temperature: 32 °C

END TIME: 7:30 A

CHECK DILUTION FLOW AFTER RUN [1, 3=on; 2=off; 4=vent]

	Analyzer	Computer
$Span_{Diluted}$	440	439

Sample flow rate (SFR): 1.307 L/min [1= on, 2, 3 = off, 4=meter]

Read dilution meter: 2.9 scfh _____ L/min [L/min = scfh*0.472]

Total flow rate (TFR): 2.680 L/min [1, 2, 3 = off; 4=meter]
(attach print out with all four sets of data)

Dilution ratio (DR_{Flow}): 0.488 [SFR / TFR]

CHECK OF ANALYZER CALIBRATION [1, 2=off; 3=on, 4=vent]

	Analyzer	Computer	Within range	Pot settings
span	900	901	875 to 935	224
mid	409	409	379 to 437	none
zero	0	0	-45 to +45	470

Dilution ratio (DR_{Span}): 0.489 [$Span_{Diluted}$ / Span]

Dilution ratio difference: 0.3 % [$100*(Abs(DR_{Span} - DR_{Flow}))/DR_{Flow}$]

End time for check: 7:40

Comments:

485
616

FIELD DATA SHEET FOR TOTAL HYDROCARBON ANALYZER - PRE

BACKGROUND INFORMATION

Event (kiln charge): Columbia Vista - 1

Run (sample): B 4

Operator: M Clots

Date: June 3 05

Time now : 7:40

Dry-bulb temperature: _____

Wet-bulb temperature: 156

Target Dilution Ratio (TDR): 0.5

AMBIENT DATA

Laboratory temperature: 26 °C

ANALYZER CALIBRATION

[1, 2 = off; 3=on; 4=vent]

	Analyzer, ppm	Computer	Within range	Pot settings
zero	0 (0)	0	does not apply	475
span	905 (905)	905	does not apply	242
mid	411 (412)	410	379 to 437	none

SET DILUTION FLOW BEFORE RUN

Total flow rate (TFR): 2.696 L/min [1, 2, 3 = off; 4=meter]

Target
dilution flow rate (TDFR) _____ L/min [TFR x (1 - DR)]

sample flow rate (TSFR) _____ L/min [TFR x DR]

Set and read dilution meter: 2.9 scfh [scfh = L/min * 2.12]

Sample flow rate (SFR): 1.302 L/min [1 = on; 2, 3 = off; 4=meter]

CHECK DILUTION FLOW BEFORE RUN

[1, 3=on; 2=off; 4=vent]

	Analyzer	DR_{Span} [$Span_{Diluted}/Span$]	DR_{Flow} [SFR / TFR]	Difference, % $100*(DR_{Span} - DR_{Flow})/DR_{Flow}$
$Span_{Diluted}$	434	0.479	0.483	0.7

START TIME: 7:47 **[1, 2, 5 = on; 3, 4 = off; tank valves off]**

ANALYZER RANGE: 3 **[60 < computer reading < 750]**

FIELD DATA SHEET FOR TOTAL HYDROCARBON ANALYZER - POST

Operator: Milota Event (kiln charge): Columbia Vista - 1

Time now: 15:41 Run (sample): 4

AMBIENT DATA

Laboratory temperature: 30 °C

END TIME: 1541

CHECK DILUTION FLOW AFTER RUN [1, 3=on; 2=off; 4=vent]

	Analyzer	Computer
$Span_{Diluted}$	442	441

Sample flow rate (SFR): 1.315 L/min [1= on, 2, 3 = off, 4=meter]

Read dilution meter: 2.8 scfh _____ L/min [L/min = scfh*0.472]

Total flow rate (TFR): 2.660 L/min [1, 2, 3 = off; 4=meter]
(attach print out with all four sets of data)

Dilution ratio (DR_{Flow}): 0.494 [SFR / TFR]

CHECK OF ANALYZER CALIBRATION [1, 2=off; 3=on, 4=vent]

	Analyzer	Computer	Within range	Pot settings
span	896	896	875 to 935	242
mid	408	406	379 to 437	none
zero	0.0	0.0	-45 to +45	475

Dilution ratio (DR_{Span}): 0.493 [$Span_{Diluted}$ / Span]

Dilution ratio difference: 0.2 % [$100*(Abs(DR_{Span} - DR_{Flow}))/DR_{Flow}$]

End time for check: 15:45

Comments: 10:21 – Span = 434 RT = 26

FIELD DATA SHEET FOR TOTAL HYDROCARBON ANALYZER - PRE

BACKGROUND INFORMATION

Event (kiln charge): Columbia Vista - 1

Run (sample): 5

Operator: Milota

Date: June 3, 05

Time now : 3:45

Dry-bulb temperature: _____

Wet-bulb temperature: 158

Target Dilution Ratio (TDR): 0.5

AMBIENT DATA

Laboratory temperature: 30 °C

ANALYZER CALIBRATION

[1, 2 = off; 3=on; 4=vent]

	Analyzer, ppm	Computer	Within range	Pot settings
zero	0 (0)	0	does not apply	475
span	905 (905)	905	does not apply	245
mid	411 (412)	412	379 to 437	none

SET DILUTION FLOW BEFORE RUN

Total flow rate (TFR): 2,654 L/min [1, 2, 3 = off; 4=meter]

Target
dilution flow rate (TDFR) _____ L/min [TFR x (1 - DR)]

sample flow rate (TSFR) _____ L/min [TFR x DR]

Set and read dilution meter: 2.8 scfh [scfh = L/min * 2.12]

Sample flow rate (SFR): 1,269 L/min [1 = on; 2, 3 = off; 4=meter]

CHECK DILUTION FLOW BEFORE RUN

[1, 3=on; 2=off; 4=vent]

	Analyzer	DR_{Span} [$Span_{Diluted}/Span$]	DR_{Flow} [SFR / TFR]	Difference, % $100*(DR_{Span} - DR_{Flow})/DR_{Flow}$
$Span_{Diluted}$	427	0.471	0.478	1.3

START TIME: 3:50 **[1, 2, 5 = on; 3, 4 = off; tank valves off]**

ANALYZER RANGE: 3 **[60 < computer reading < 750]**

FIELD DATA SHEET FOR TOTAL HYDROCARBON ANALYZER - POST

Operator: Milota Event (kiln charge): Columbia Vista - 1

Time now: 1709 Run (sample): 5

AMBIENT DATA

Laboratory temperature: 34 °C

END TIME: 17:09

CHECK DILUTION FLOW AFTER RUN [1, 3=on; 2=off; 4=vent]

	Analyzer	Computer
$Span_{Diluted}$	157	457

Sample flow rate (SFR) : 1.328 L/min [1= on, 2, 3 = off, 4=meter]

Read dilution meter: 2.8 scfh _____ L/min [L/min = scfh*0.472]

Total flow rate (TFR): 2.673 L/min [1, 2, 3 = off; 4=meter]
(attach print out with all four sets of data)

Dilution ratio (DR_{Flow}): 0.497 [SFR / TFR]

CHECK OF ANALYZER CALIBRATION [1, 2=off; 3=on, 4=vent]

	Analyzer	Computer	Within range	Pot settings
span	920	920	875 to 935	245
mid	419	416	379 to 437	none
zero	0	0	-45 to +45	475

Dilution ratio (DR_{Span}): 0.497 [$Span_{Diluted}$ / Span]

Dilution ratio difference: 0.02 % [100*(Abs(DR_{Span} - DR_{Flow}))/DR_{Flow}]

End time for check: 17:12

Comments:

FIELD DATA SHEET FOR TOTAL HYDROCARBON ANALYZER - PRE

BACKGROUND INFORMATION

Event (kiln charge): Columbia Vista - 1

Run (sample): 6

Operator: M. Lota

Date: June 3 05

Time now : 17:09

Dry-bulb temperature: _____

Wet-bulb temperature: 158

Target Dilution Ratio (TDR): 0.5

AMBIENT DATA

Laboratory temperature: 34 °C

ANALYZER CALIBRATION

[1, 2 = off; 3=on; 4=vent]

	Analyzer, ppm	Computer	Within range	Pot settings
zero	0 (0)	0	does not apply	~~24~~ 475
span	905 (905)	904	does not apply	234
mid	411 (412)	410	379 to 437	none

SET DILUTION FLOW BEFORE RUN

Total flow rate (TFR): 2.678 L/min [1, 2, 3 = off; 4=meter]

Target
dilution flow rate (TDFR) _____ L/min [TFR x (1 - DR)]

sample flow rate (TSFR) _____ L/min [TFR x DR]

Set and read dilution meter: 2.9 scfh [scfh = L/min * 2.12]

Sample flow rate (SFR): 1.286 L/min [1 = on; 2, 3 = off; 4=meter]

CHECK DILUTION FLOW BEFORE RUN

[1, 3=on; 2=off; 4=vent]

	Analyzer	DR_{Span} [$Span_{Diluted}/Span$]	DR_{Flow} [SFR / TFR]	Difference, % $100*(DR_{Span} - DR_{Flow})/DR_{Flow}$
$Span_{Diluted}$	431	0.476	0.480	0.8

START TIME: 17:16 **[1, 2, 5 = on; 3, 4 = off; tank valves off]**

ANALYZER RANGE: 3 **[60 < computer reading < 750]**

FIELD DATA SHEET FOR TOTAL HYDROCARBON ANALYZER - POST

Operator: Milta Event (kiln charge): Columbia Vista - 1

Time now: 10 15 p Run (sample): 6

AMBIENT DATA

Laboratory temperature: 33 °C

END TIME: 10:16

CHECK DILUTION FLOW AFTER RUN [1, 3=on; 2=off; 4=vent]

	Analyzer	Computer
$Span_{Diluted}$	427	~~420~~ 427

Sample flow rate (SFR): 1,291 L/min [1= on, 2, 3 = off, 4=meter]

Read dilution meter: 2.9 scfh _____ L/min [L/min = scfh*0.472]

Total flow rate (TFR): 2,682 L/min [1, 2, 3 = off; 4=meter]
(attach print out with all four sets of data)

Dilution ratio (DR_{Flow}): 0.481 [SFR / TFR]

CHECK OF ANALYZER CALIBRATION [1, 2=off; 3=on, 4=vent]

	Analyzer	Computer	Within range	Pot settings
span	905	905	875 to 935	234
mid	411	411	379 to 437	none
zero	0	0	-45 to +45	~~45~~

Dilution ratio (DR_{Span}): 0.471 [$Span_{Diluted}$ / Span]

Dilution ratio difference: 2.0 % [$100*(Abs(DR_{Span} - DR_{Flow}))/DR_{Flow}$]

End time for check: 10:19

Comments:

FIELD DATA SHEET FOR TOTAL HYDROCARBON ANALYZER - PRE

BACKGROUND INFORMATION

Event (kiln charge): Columbia Vista - 1

Run (sample): 7

Operator: Milota

Date: June 3, 05

Time now : 10:15

Dry-bulb temperature: _____

Wet-bulb temperature: 160

Target Dilution Ratio (TDR): 0.45

AMBIENT DATA

Laboratory temperature: 34 °C

ANALYZER CALIBRATION

[1, 2 = off; 3=on; 4=vent]

	Analyzer, ppm	Computer	Within range	Pot settings
zero	0 (0)	0	does not apply	474
span	905 (905)	904	does not apply	234
mid	411 (412)	411	379 to 437	none

SET DILUTION FLOW BEFORE RUN

Total flow rate (TFR): 2.673 L/min [1, 2, 3 = off; 4=meter]

Target
dilution flow rate (TDFR) _____ L/min [TFR x (1 - DR)]

sample flow rate (TSFR) _____ L/min [TFR x DR]

Set and read dilution meter: 3.0 scfh [scfh = L/min * 2.12]

Sample flow rate (SFR): 1.184 L/min [1 = on; 2, 3 = off; 4=meter]

CHECK DILUTION FLOW BEFORE RUN

[1, 3=on; 2=off; 4=vent]

	Analyzer	DR_{Span} [$Span_{Diluted}/Span$]	DR_{Flow} [SFR / TFR]	Difference, % $100*(DR_{Span} - DR_{Flow})/DR_{Flow}$
$Span_{Diluted}$	396	0.438	0.443	1.2

START TIME: 10:22p **[1, 2, 5 = on; 3, 4 = off; tank valves off]**

ANALYZER RANGE: 3 **[60 < computer reading < 750]**

FIELD DATA SHEET FOR TOTAL HYDROCARBON ANALYZER - POST

Operator: Mlota Event (kiln charge): Columbia Vista - 1

Time now: 7:15A Run (sample): 7

AMBIENT DATA

Laboratory temperature: 31 °C

END TIME: 7:15 A

CHECK DILUTION FLOW AFTER RUN [1, 3=on; 2=off; 4=vent]

	Analyzer	Computer
$Span_{Diluted}$	397	397

Sample flow rate (SFR): 1,191 L/min [1= on, 2, 3 = off, 4=meter]

Read dilution meter: 30 scfh _____ L/min [L/min = scfh*0.472]

Total flow rate (TFR): 2,670 L/min [1, 2, 3 = off; 4=meter]
(attach print out with all four sets of data)

Dilution ratio (DR_{Flow}): 0,446 [SFR / TFR]

CHECK OF ANALYZER CALIBRATION [1, 2=off; 3=on, 4=vent]

	Analyzer	Computer	Within range	Pot settings
span	897	897	875 to 935	234
mid	408	407	379 to 437	none
zero	0	0	-45 to +45	474

Dilution ratio (DR_{Span}): 0,443 [$Span_{Diluted}$ / Span]

Dilution ratio difference: 0,7 % [$100*(Abs(DR_{Span} - DR_{Flow}))/DR_{Flow}$]

End time for check: 7:19

Comments:

1081

FIELD DATA SHEET FOR TOTAL HYDROCARBON ANALYZER - PRE

BACKGROUND INFORMATION

Event (kiln charge): Columbia Vista - 1

Run (sample): 8

Operator: MDotz

Date: June 4, 05

Time now : 7:15

Dry-bulb temperature: _____

Wet-bulb temperature: 160

Target Dilution Ratio (TDR): 0.45

AMBIENT DATA

Laboratory temperature: 31 °C

ANALYZER CALIBRATION

[1, 2 = off; 3=on; 4=vent]

	Analyzer, ppm	Computer	Within range	Pot settings
zero	0.0 (0)	0.0	does not apply	464
span	905 (905)	905	does not apply	238
mid	411 (412)	411	379 to 437	none

SET DILUTION FLOW BEFORE RUN

Total flow rate (TFR): 2,660 L/min [1, 2, 3 = off; 4=meter]

Target
dilution flow rate (TDFR) _____ L/min [TFR x (1 - DR)]

sample flow rate (TSFR) _____ L/min [TFR x DR]

Set and read dilution meter: 3.0 scfh [scfh = L/min * 2.12]

Sample flow rate (SFR): 1,163 L/min [1 = on; 2, 3 = off; 4=meter]

CHECK DILUTION FLOW BEFORE RUN

[1, 3=on; 2=off; 4=vent]

	Analyzer	DR_{Span} [$Span_{Diluted}/Span$]	DR_{Flow} [SFR / TFR]	Difference, % $100*(DR_{Span} - DR_{Flow})/DR_{Flow}$
$Span_{Diluted}$	391	0.432	0437	1.2

START TIME: 7:22 **[1, 2, 5 = on; 3, 4 = off; tank valves off]**

ANALYZER RANGE: 3 **[60 < computer reading < 750]**

FIELD DATA SHEET FOR TOTAL HYDROCARBON ANALYZER - POST

Operator: Mota Event (kiln charge): Columbia Vista - 1

Time now: 258p Run (sample): 8

AMBIENT DATA

Laboratory temperature: 34 °C

END TIME: 2:58

CHECK DILUTION FLOW AFTER RUN [1, 3=on; 2=off; 4=vent]

	Analyzer	Computer
$Span_{Diluted}$	388	388

Sample flow rate (SFR): 1.185 L/min [1= on, 2, 3 = off, 4=meter]

Read dilution meter: 3.0 scfh _____ L/min [L/min = scfh*0.472]

Total flow rate (TFR): 2,694 L/min [1, 2, 3 = off; 4=meter]
(attach print out with all four sets of data)

Dilution ratio (DR_{Flow}): 0.440 [SFR / TFR]

CHECK OF ANALYZER CALIBRATION [1, 2=off; 3=on, 4=vent]

	Analyzer	Computer	Within range	Pot settings
span	903	902	875 to 935	238
mid	409	407	379 to 437	none
zero	0	0	-45 to +45	461

Dilution ratio (DR_{Span}): 0.430 [$Span_{Diluted}$ / Span]

Dilution ratio difference: 2.3 % [$100*(Abs(DR_{Span} - DR_{Flow}))/DR_{Flow}$]

End time for check: 3:02

Comments:

1219

FIELD DATA SHEET FOR TOTAL HYDROCARBON ANALYZER - PRE

BACKGROUND INFORMATION

Event (kiln charge): Columbia Vista - 1

Run (sample): 9

Operator: Milo

Date: June 4 05

Time now : 2:59

Dry-bulb temperature: 1

Wet-bulb temperature: 160

Target Dilution Ratio (TDR): 0.45

AMBIENT DATA

Laboratory temperature: 34 °C

ANALYZER CALIBRATION

[1, 2 = off; 3=on; 4=vent]

	Analyzer, ppm	Computer	Within range	Pot settings
zero	0 (0)	0	does not apply	464
span	905 (905)	905	does not apply	239
mid	440 (412)	409	379 to 437	none

SET DILUTION FLOW BEFORE RUN

Total flow rate (TFR): 2.693 L/min [1, 2, 3 = off; 4=meter]

Target
dilution flow rate (TDFR) _____ L/min [TFR x (1 - DR)]

sample flow rate (TSFR) _____ L/min [TFR x DR]

Set and read dilution meter: 3.1 scfh [scfh = L/min * 2.12]

Sample flow rate (SFR): 1.149 L/min [1 = on; 2, 3 = off; 4=meter]

CHECK DILUTION FLOW BEFORE RUN

[1, 3=on; 2=off; 4=vent]

	Analyzer	DR_{Span} [$Span_{Diluted}/Span$]	DR_{Flow} [SFR / TFR]	Difference, % $100*(DR_{Span} - DR_{Flow})/DR_{Flow}$
$Span_{Diluted}$	381	0.421	0.427	1.3

START TIME: 3:05p **[1, 2, 5 = on; 3, 4 = off; tank valves off]**

ANALYZER RANGE: 3 **[60 < computer reading < 750]**

FIELD DATA SHEET FOR TOTAL HYDROCARBON ANALYZER - POST

Operator: MLota Event (kiln charge): Columbia Vista - 1

Time now: 9:51 Run (sample): 9

AMBIENT DATA

Laboratory temperature: 33 °C

END TIME: 951p

CHECK DILUTION FLOW AFTER RUN [1, 3=on; 2=off; 4=vent]

	Analyzer	Computer
$Span_{Diluted}$	381	380

Sample flow rate (SFR): 1.161 L/min [1= on, 2, 3 = off, 4=meter]

Read dilution meter: 3.1 scfh _____ L/min [L/min = scfh*0.472]

Total flow rate (TFR): 2.685 L/min [1, 2, 3 = off; 4=meter]
(attach print out with all four sets of data)

Dilution ratio (DR_{Flow}): 0.432 [SFR / TFR]

CHECK OF ANALYZER CALIBRATION [1, 2=off; 3=on, 4=vent]

	Analyzer	Computer	Within range	Pot settings
span	896	896	875 to 935	237
mid	406	406	379 to 437	none
zero	0	0	-45 to +45	464

Dilution ratio (DR_{Span}): 0.425 [$Span_{Diluted}$ / Span]

Dilution ratio difference: 1.7 % [$100*(Abs(DR_{Span} - DR_{Flow}))/DR_{Flow}$]

End time for check: 9:55

Comments:

1412

FIELD DATA SHEET FOR TOTAL HYDROCARBON ANALYZER - PRE

BACKGROUND INFORMATION

Event (kiln charge): Columbia Vista - 1

Run (sample): 10

Operator: M Dota

Date: June 4 05

Time now : 9:51

Dry-bulb temperature: _____

Wet-bulb temperature: 160

Target Dilution Ratio (TDR): 0.45

AMBIENT DATA

Laboratory temperature: 33 °C

ANALYZER CALIBRATION

[1, 2 = off; 3=on; 4=vent]

	Analyzer, ppm	Computer	Within range	Pot settings
zero	0 (0)	0	does not apply	464
span	905 (905)	905	does not apply	240
mid	412 (412)	411	379 to 437	none

SET DILUTION FLOW BEFORE RUN

Total flow rate (TFR): 2.690 L/min [1, 2, 3 = off; 4=meter]

Target
dilution flow rate (TDFR) _____ L/min [TFR x (1 - DR)]

sample flow rate (TSFR) _____ L/min [TFR x DR]

Set and read dilution meter: 3.1 scfh [scfh = L/min * 2.12]

Sample flow rate (SFR): 1.185 L/min [1 = on; 2, 3 = off; 4=meter]

CHECK DILUTION FLOW BEFORE RUN

[1, 3=on; 2=off; 4=vent]

	Analyzer	DR_{Span} [$Span_{Diluted}$/Span]	DR_{Flow} [SFR / TFR]	Difference, % $100*(DR_{Span} - DR_{Flow})/DR_{Flow}$
$Span_{Diluted}$	396	0.438	0.441	0.6

START TIME: 957p **[1, 2, 5 = on; 3, 4 = off; tank valves off]**

ANALYZER RANGE: 3 **[60 < computer reading < 750]**

FIELD DATA SHEET FOR TOTAL HYDROCARBON ANALYZER - POST

Operator: Mike Event (kiln charge): Columbia Vista - 1

Time now: 7:20 Run (sample): 10

AMBIENT DATA

Laboratory temperature: 32 °C

END TIME: 7:20

CHECK DILUTION FLOW AFTER RUN [1, 3=on; 2=off; 4=vent]

	Analyzer	Computer
$Span_{Diluted}$	~~378~~ 377	376

Sample flow rate (SFR): 1.131 L/min [1= on, 2, 3 = off, 4=meter]

Read dilution meter: 3.1 scfh _____ L/min [L/min = scfh*0.472]

Total flow rate (TFR): 2.674 L/min [1, 2, 3 = off; 4=meter]
(attach print out with all four sets of data)

Dilution ratio (DR_{Flow}): 0.423 [SFR / TFR]

CHECK OF ANALYZER CALIBRATION [1, 2=off; 3=on, 4=vent]

	Analyzer	Computer	Within range	Pot settings
span	890	890	875 to 935	240
mid	409	404	379 to 437	none
zero	0	0	-45 to +45	464

Dilution ratio (DR_{Span}): 0424 [$Span_{Diluted}$ / Span]

Dilution ratio difference: 0.15 % [100*(Abs(DR_{Span} - DR_{Flow}))/DR_{Flow}]

End time for check: 7:25

Comments:

1551

FIELD DATA SHEET FOR TOTAL HYDROCARBON ANALYZER - PRE

BACKGROUND INFORMATION

Event (kiln charge): Columbia Vista - 1

Run (sample): 11

Operator: Milta

Date: June 5, 05

Time now : _____

Dry-bulb temperature: _____

Wet-bulb temperature: 158

Target Dilution Ratio (TDR): 0.45

AMBIENT DATA

Laboratory temperature: 32 °C

ANALYZER CALIBRATION

[1, 2 = off; 3=on; 4=vent]

	Analyzer, ppm	Computer	Within range	Pot settings
zero	0 (0)	0	does not apply	464
span	905 (905)	906	does not apply	250
mid	412 (412)	413	379 to 437	none

SET DILUTION FLOW BEFORE RUN

Total flow rate (TFR): 2.680 L/min [1, 2, 3 = off; 4=meter]

Target
dilution flow rate (TDFR) _____ L/min [TFR x (1 - DR)]

sample flow rate (TSFR) _____ L/min [TFR x DR]

Set and read dilution meter: 3.1 scfh [scfh = L/min * 2.12]

Sample flow rate (SFR): 1.172 L/min [1 = on; 2, 3 = off; 4=meter]

CHECK DILUTION FLOW BEFORE RUN

[1, 3=on; 2=off; 4=vent]

	Analyzer	DR_{Span} [$Span_{Diluted}/Span$]	DR_{Flow} [SFR / TFR]	Difference, % $100*(DR_{Span} - DR_{Flow})/DR_{Flow}$
$Span_{Diluted}$	393	0.434	0.437	0.7

START TIME: 7:27 **[1, 2, 5 = on; 3, 4 = off; tank valves off]**

ANALYZER RANGE: 3 **[60 < computer reading < 750]**

FIELD DATA SHEET FOR TOTAL HYDROCARBON ANALYZER - POST

Operator: M Vista Event (kiln charge): Columbia Vista - 1

Time now: 2:30p Run (sample): 11

AMBIENT DATA

Laboratory temperature: 32 °C

END TIME: 2:30

CHECK DILUTION FLOW AFTER RUN [1, 3=on; 2=off; 4=vent]

	Analyzer	Computer
$Span_{Diluted}$	389	389

Sample flow rate (SFR) : 1.162 L/min [1= on, 2, 3 = off, 4=meter]

Read dilution meter: 3.1 scfh _____ L/min [L/min = scfh*0.472]

Total flow rate (TFR): 3.678 L/min [1, 2, 3 = off; 4=meter]
(attach print out with all four sets of data)

Dilution ratio (DR_{Flow}): 0.434 [SFR / TFR]

CHECK OF ANALYZER CALIBRATION [1, 2=off; 3=on, 4=vent]

	Analyzer	Computer	Within range	Pot settings
span	905	904	875 to 935	250
mid	411	410	379 to 437	none
zero	0	0	-45 to +45	464

Dilution ratio (DR_{Span}): 0.430 [$Span_{Diluted}$ / Span]

Dilution ratio difference: 0.9 % [100*(Abs(DR_{Span} - DR_{Flow}))/DR_{Flow}]

End time for check: 2:34

Comments:

1693

FIELD DATA SHEET FOR TOTAL HYDROCARBON ANALYZER - PRE

BACKGROUND INFORMATION

Event (kiln charge): Columbia Vista - 1

Run (sample): 12

Operator: Milota

Date: June 5 05

Time now : _____

Dry-bulb temperature: _____

Wet-bulb temperature: 160

Target Dilution Ratio (TDR): _____

AMBIENT DATA

Laboratory temperature: 32 °C

ANALYZER CALIBRATION

[1, 2 = off; 3=on; 4=vent]

	Analyzer, ppm	Computer	Within range	Pot settings
zero	0 (0)	410	does not apply	464
span	905 (905)	904	does not apply	247
mid	40 (412)	410	379 to 437	none

SET DILUTION FLOW BEFORE RUN

Total flow rate (TFR): 2.674 L/min [1, 2, 3 = off; 4=meter]

Target
dilution flow rate (TDFR) _____ L/min [TFR x (1 - DR)]

sample flow rate (TSFR) _____ L/min [TFR x DR]

Set and read dilution meter: 3.0 scfh [scfh = L/min * 2.12]

Sample flow rate (SFR): 1.161 L/min [1 = on; 2, 3 = off; 4=meter]

CHECK DILUTION FLOW BEFORE RUN

[1, 3=on; 2=off; 4=vent]

	Analyzer	DR_{Span} [$Span_{Diluted}$/Span]	DR_{Flow} [SFR / TFR]	Difference, % $100*(DR_{Span} - DR_{Flow})/DR_{Flow}$
$Span_{Diluted}$	387	0.428	0.434	1.5

START TIME: 235 **[1, 2, 5 = on; 3, 4 = off; tank valves off]**

ANALYZER RANGE: 3 **[60 < computer reading < 750]**

FIELD DATA SHEET FOR TOTAL HYDROCARBON ANALYZER - POST

Operator: Mlotz Event (kiln charge): Columbia Vista - 1

Time now: 9:33 Run (sample): 12

AMBIENT DATA

Laboratory temperature: 31 °C

END TIME: 9:34

CHECK DILUTION FLOW AFTER RUN [1, 3=on; 2=off; 4=vent]

	Analyzer	Computer
$Span_{Diluted}$	383	382

Sample flow rate (SFR) : 1.151 L/min [1= on, 2, 3 = off, 4=meter]

Read dilution meter: 3.1 scfh _____ L/min [L/min = scfh*0.472]

Total flow rate (TFR): 2.679 L/min [1, 2, 3 = off; 4=meter]
(attach print out with all four sets of data)

Dilution ratio (DR_{Flow}): 0.430 [SFR / TFR]

CHECK OF ANALYZER CALIBRATION [1, 2=off; 3=on, 4=vent]

	Analyzer	Computer	Within range	Pot settings
span	897	895	875 to 935	247
mid	407	407	379 to 437	none
zero	0	0	-45 to +45	464

Dilution ratio (DR_{Span}): 0.427 [$Span_{Diluted}$ / Span]

Dilution ratio difference: 0.6 % [$100*(Abs(DR_{Span} - DR_{Flow}))/DR_{Flow}$]

End time for check: 9:39

Comments:

1906

FIELD DATA SHEET FOR TOTAL HYDROCARBON ANALYZER - PRE

BACKGROUND INFORMATION

Event (kiln charge): Columbia Vista - 1

Run (sample): 13

Operator: MDota

Date: June 5, 05

Time now : 9:33

Dry-bulb temperature: _____

Wet-bulb temperature: 158—

Target Dilution Ratio (TDR): 0.5

AMBIENT DATA

Laboratory temperature: 31 °C

ANALYZER CALIBRATION

[1, 2 = off; 3=on; 4=vent]

	Analyzer, ppm	Computer	Within range	Pot settings
zero	0 (0)	0	does not apply	464
span	905 (905)	905	does not apply	252
mid	412 (412)	408	379 to 437	none

SET DILUTION FLOW BEFORE RUN

Total flow rate (TFR): 2.685 L/min [1, 2, 3 = off; 4=meter]

Target
dilution flow rate (TDFR) _____ L/min [TFR x (1 - DR)]

sample flow rate (TSFR) 2.9 L/min [TFR x DR]

Set and read dilution meter: ~~1.22~~ 2.9 scfh [scfh = L/min * 2.12]

Sample flow rate (SFR): 1.293 L/min [1 = on; 2, 3 = off; 4=meter]

CHECK DILUTION FLOW BEFORE RUN

[1, 3=on; 2=off; 4=vent]

	Analyzer	DR_{Span} [$Span_{Diluted}$/Span]	DR_{Flow} [SFR / TFR]	Difference, % $100*(DR_{Span} - DR_{Flow})/DR_{Flow}$
$Span_{Diluted}$	43	0.480	0.482	0.4

START TIME: 9:41 **[1, 2, 5 = on; 3, 4 = off; tank valves off]**

ANALYZER RANGE: 3 **[60 < computer reading < 750]**

FIELD DATA SHEET FOR TOTAL HYDROCARBON ANALYZER - POST

Operator: M Vista Event (kiln charge): Columbia Vista - 1

Time now: _____ Run (sample): 13

AMBIENT DATA

Laboratory temperature: 31 °C

END TIME: 7:46A

CHECK DILUTION FLOW AFTER RUN [1, 3=on; 2=off; 4=vent]

	Analyzer	Computer
$Span_{Diluted}$	428 433	432

Sample flow rate (SFR) : 1.299 L/min [1= on, 2, 3 = off, 4=meter]

Read dilution meter: 2.9 scfh _____ L/min [L/min = scfh*0.472]

Total flow rate (TFR): 2.670 L/min [1, 2, 3 = off; 4=meter]
(attach print out with all four sets of data)

Dilution ratio (DR_{Flow}): 0.487 [SFR / TFR]

CHECK OF ANALYZER CALIBRATION [1, 2=off; 3=on, 4=vent]

	Analyzer	Computer	Within range	Pot settings
span	893	894	875 to 935	252
mid	407	406	379 to 437	none
zero	0	6	-45 to +45	464

Dilution ratio (DR_{Span}): 0.485 [$Span_{Diluted}$ / Span]

Dilution ratio difference: 0.3 % [$100*(Abs(DR_{Span} - DR_{Flow}))/DR_{Flow}$]

End time for check: 7:51

Comments:

2047

FIELD DATA SHEET FOR TOTAL HYDROCARBON ANALYZER - PRE

BACKGROUND INFORMATION

Event (kiln charge): Columbia Vista - 1

Run (sample): 14

Operator: MDota

Date: June 6 05

Time now : 8:14

Dry-bulb temperature: _____

Wet-bulb temperature: 158

Target Dilution Ratio (TDR): 0.5

AMBIENT DATA

Laboratory temperature: 20 °C

ANALYZER CALIBRATION

[1, 2 = off; 3=on; 4=vent]

	Analyzer, ppm	Computer	Within range	Pot settings
zero	0 (0)	0	does not apply	~~480~~ 480
span	905 (905)	904	does not apply	284
mid	411 (412)	411	379 to 437	none

SET DILUTION FLOW BEFORE RUN

Total flow rate (TFR): 2.643 L/min [1, 2, 3 = off; 4=meter]

Target dilution flow rate (TDFR) _____ L/min [TFR x (1 - DR)]

sample flow rate (TSFR) _____ L/min [TFR x DR]

Set and read dilution meter: 2.8 scfh [scfh = L/min * 2.12]

Sample flow rate (SFR): 1.289 L/min [1 = on; 2, 3 = off; 4=meter]

CHECK DILUTION FLOW BEFORE RUN

[1, 3=on; 2=off; 4=vent]

	Analyzer	DR_{Span} [$Span_{Diluted}/Span$]	DR_{Flow} [SFR / TFR]	Difference, % $100*(DR_{Span} - DR_{Flow})/DR_{Flow}$
$Span_{Diluted}$	444	0.491	0.488	0.6

START TIME: 8:19 A **[1, 2, 5 = on; 3, 4 = off; tank valves off]**

ANALYZER RANGE: 3 **[60 < computer reading < 750]**

FIELD DATA SHEET FOR TOTAL HYDROCARBON ANALYZER - POST

Operator: M. Lota Event (kiln charge): Columbia Vista - 1

Time now: 15:14 Run (sample): 14

AMBIENT DATA

Laboratory temperature: 23 °C

END TIME: 15:15

CHECK DILUTION FLOW AFTER RUN [1, 3=on; 2=off; 4=vent]

	Analyzer	Computer
$Span_{Diluted}$	438	437

Sample flow rate (SFR): 1.258 L/min [1= on, 2, 3 = off, 4=meter]

Read dilution meter: 2.8 scfh _____ L/min [L/min = scfh*0.472]

Total flow rate (TFR): 2.606 L/min [1, 2, 3 = off; 4=meter]
(attach print out with all four sets of data)

Dilution ratio (DR_{Flow}): 0.483 [SFR / TFR]

CHECK OF ANALYZER CALIBRATION [1, 2=off; 3=on, 4=vent]

	Analyzer	Computer	Within range	Pot settings
span	908	907	875 to 935	284
mid	414	413	379 to 437	none
zero	0	0	-45 to +45	480

Dilution ratio (DR_{Span}): 0.482 [$Span_{Diluted}$ / Span]

Dilution ratio difference: 0.07 % [100*(Abs(DR_{Span} - DR_{Flow}))/DR_{Flow}]

End time for check: 3:19p

Comments: Span diluted 443 @ 10:37A lab @ 24 C
Cooled lab between #13 & #14
Span diluted = 439 @ 1:22 lab at 23C

2176

FIELD DATA SHEET FOR TOTAL HYDROCARBON ANALYZER - PRE

BACKGROUND INFORMATION

Event (kiln charge): Columbia Vista - 1

Run (sample): 15

Operator: MDota

Date: June 6, 2005

Time now : 3:15

Dry-bulb temperature: _____

Wet-bulb temperature: 155

Target Dilution Ratio (TDR): 0.55

AMBIENT DATA

Laboratory temperature: 23 °C

ANALYZER CALIBRATION

[1, 2 = off; 3=on; 4=vent]

	Analyzer, ppm	Computer	Within range	Pot settings
zero	0 (0)	0	does not apply	475
span	905 (905)	905	does not apply	282
mid	412 (412)	411	379 to 437	none

SET DILUTION FLOW BEFORE RUN

Total flow rate (TFR): 2.614 L/min [1, 2, 3 = off; 4=meter]

Target
dilution flow rate (TDFR) _____ L/min [TFR x (1 - DR)]

sample flow rate (TSFR) _____ L/min [TFR x DR]

Set and read dilution meter: 2.8 scfh [scfh = L/min * 2.12]

Sample flow rate (SFR): 1.332 L/min [1 = on; 2, 3 = off; 4=meter]

CHECK DILUTION FLOW BEFORE RUN

[1, 3=on; 2=off; 4=vent]

	Analyzer	DR_{Span} [$Span_{Diluted}$/Span]	DR_{Flow} [SFR / TFR]	Difference, % $100*(DR_{Span} - DR_{Flow})/DR_{Flow}$
$Span_{Diluted}$	463	0.512	0.510	0.4

START TIME: 3:22 **[1, 2, 5 = on; 3, 4 = off; tank valves off]**

ANALYZER RANGE: 3 **[60 < computer reading < 750]**

FIELD DATA SHEET FOR TOTAL HYDROCARBON ANALYZER - POST

Operator: M Ibata Event (kiln charge): Columbia Vista - 1

Time now: 9:43 Run (sample): 15

AMBIENT DATA

Laboratory temperature: 24 °C

END TIME: 9:43

CHECK DILUTION FLOW AFTER RUN [1, 3=on; 2=off; 4=vent]

	Analyzer	Computer
$Span_{Diluted}$	456 458	456

Sample flow rate (SFR): 1.302 L/min [1= on, 2, 3 = off, 4=meter]

Read dilution meter: 2.8 scfh _____ L/min [L/min = scfh*0.472]

Total flow rate (TFR): 2.607 L/min [1, 2, 3 = off; 4=meter]
(attach print out with all four sets of data)

Dilution ratio (DR_{Flow}): 0.499 [SFR / TFR]

CHECK OF ANALYZER CALIBRATION [1, 2=off; 3=on, 4=vent]

	Analyzer	Computer	Within range	Pot settings
span	918	917	875 to 935	282
mid	416	416	379 to 437	none
zero	0	0	-45 to +45	475

Dilution ratio (DR_{Span}): 0499 [$Span_{Diluted}$ / Span]

Dilution ratio difference: 0.1 % [$100*(Abs(DR_{Span} - DR_{Flow}))/DR_{Flow}$]

End time for check: 9:47

Comments:

2373

FIELD DATA SHEET FOR TOTAL HYDROCARBON ANALYZER - PRE

BACKGROUND INFORMATION

Event (kiln charge): Columbia Vista - 1

Run (sample): 16

Operator: MDate

Date: June 6 05

Time now : 9:45

Dry-bulb temperature: _____

Wet-bulb temperature: 154

Target Dilution Ratio (TDR): 0.56

AMBIENT DATA

Laboratory temperature: 24 °C

ANALYZER CALIBRATION

[1, 2 = off; 3=on; 4=vent]

	Analyzer, ppm	Computer	Within range	Pot settings
zero	0 (0)	0	does not apply	475
span	905 (905)	906	does not apply	272
mid	411 (412)	412	379 to 437	none

SET DILUTION FLOW BEFORE RUN

Total flow rate (TFR): 2.607 L/min [1, 2, 3 = off; 4=meter]

Target
dilution flow rate (TDFR) _____ L/min [TFR x (1 - DR)]

sample flow rate (TSFR) _____ L/min [TFR x DR]

Set and read dilution meter: 2.7 scfh [scfh = L/min * 2.12]

Sample flow rate (SFR): 1.357 L/min [1 = on; 2, 3 = off; 4=meter]

CHECK DILUTION FLOW BEFORE RUN

[1, 3=on; 2=off; 4=vent]

	Analyzer	DR_{Span} [$Span_{Diluted}/Span$]	DR_{Flow} [SFR / TFR]	Difference, % $100*(DR_{Span} - DR_{Flow})/DR_{Flow}$
$Span_{Diluted}$	469	0.518	0.521	0.5

START TIME: 9:50 **[1, 2, 5 = on; 3, 4 = off; tank valves off]**

ANALYZER RANGE: 3 **[60 < computer reading < 750]**

FIELD DATA SHEET FOR TOTAL HYDROCARBON ANALYZER - POST

Operator: Mlota Event (kiln charge): Columbia Vista - 1

Time now: 7:33 Run (sample): 16

AMBIENT DATA

Laboratory temperature: 22 °C

END TIME: 7:33

CHECK DILUTION FLOW AFTER RUN [1, 3=on; 2=off; 4=vent]

	Analyzer	Computer
$Span_{Diluted}$	452	452

Sample flow rate (SFR) : 1.337 L/min [1= on, 2, 3 = off, 4=meter]

Read dilution meter: 27 scfh _____ L/min [L/min = scfh*0.472]

Total flow rate (TFR): 2.603 L/min [1, 2, 3 = off; 4=meter]
(attach print out with all four sets of data)

Dilution ratio (DR_{Flow}): 0.514 [SFR / TFR]

CHECK OF ANALYZER CALIBRATION [1, 2=off; 3=on, 4=vent]

	Analyzer	Computer	Within range	Pot settings
span	883	882	875 to 935	272
mid	402	401	379 to 437	none
zero	0	0	-45 to +45	475

Dilution ratio (DR_{Span}): 0.512 [$Span_{Diluted}$ / Span]

Dilution ratio difference: 0.3 % [100*(Abs(DR_{Span} - DR_{Flow}))/DR_{Flow}]

End time for check: 7:38

Comments:

2508

FIELD DATA SHEET FOR TOTAL HYDROCARBON ANALYZER - PRE

BACKGROUND INFORMATION

Event (kiln charge): Columbia Vista - 1

Time now : 7:33

Run (sample): 17

Dry-bulb temperature: _____

Operator: Milota

Wet-bulb temperature: 150

Date: June 7 05

Target Dilution Ratio (TDR): 0.6

AMBIENT DATA

Laboratory temperature: 22 °C

ANALYZER CALIBRATION

[1, 2 = off; 3=on; 4=vent]

	Analyzer, ppm	Computer	Within range	Pot settings
zero	0 (0)	0	does not apply	474
span	905 (905)	904	does not apply	288
mid	411 (412)	411	379 to 437	none

SET DILUTION FLOW BEFORE RUN

Total flow rate (TFR): 2.599 L/min [1, 2, 3 = off; 4=meter]

Target dilution flow rate (TDFR) 1.039 L/min [TFR x (1 - DR)]

sample flow rate (TSFR) 1.559 L/min [TFR x DR]

Set and read dilution meter: 2.2 scfh [scfh = L/min * 2.12]

Sample flow rate (SFR): 1.482 L/min [1 = on; 2, 3 = off; 4=meter]

CHECK DILUTION FLOW BEFORE RUN

[1, 3=on; 2=off; 4=vent]

	Analyzer	DR_{Span} [$Span_{Diluted}$/Span]	DR_{Flow} [SFR / TFR]	Difference, % $100*(DR_{Span} - DR_{Flow})/DR_{Flow}$
$Span_{Diluted}$	516	0.570	0.570	0.009

START TIME: 7:41 **[1, 2, 5 = on; 3, 4 = off; tank valves off]**

ANALYZER RANGE: 3 **[60 < computer reading < 750]**

FIELD DATA SHEET FOR TOTAL HYDROCARBON ANALYZER - POST

Operator: M Lista Event (kiln charge): Columbia Vista - 1

Time now: 2:15 Run (sample): 17

AMBIENT DATA

Laboratory temperature: 22 °C

END TIME: 2:15

CHECK DILUTION FLOW AFTER RUN [1, 3=on; 2=off; 4=vent]

	Analyzer	Computer
$Span_{Diluted}$	530	531

Sample flow rate (SFR): 1,509 L/min [1= on, 2, 3 = off, 4=meter]

Read dilution meter: 2.3 scfh _____ L/min [L/min = scfh*0.472]

Total flow rate (TFR): 2,599 L/min [1, 2, 3 = off; 4=meter]
(attach print out with all four sets of data)

Dilution ratio (DR_{Flow}): 0581 [SFR / TFR]

CHECK OF ANALYZER CALIBRATION [1, 2=off; 3=on, 4=vent]

	Analyzer	Computer	Within range	Pot settings
span	914	913	875 to 935	288
mid	417	417	379 to 437	none
zero	0	0	-45 to +45	474

Dilution ratio (DR_{Span}): 0.580 [$Span_{Diluted}$ / Span]

Dilution ratio difference: 0.1 % [100*(Abs(DR_{Span} - DR_{Flow}))/DR_{Flow}]

End time for check: 2:20

Comments:

2656

FIELD DATA SHEET FOR TOTAL HYDROCARBON ANALYZER - PRE

BACKGROUND INFORMATION

Event (kiln charge): Columbia Vista - 1 Time now : 2:15

Run (sample): 18 Dry-bulb temperature: _____

Operator: MRoda Wet-bulb temperature: 150

Date: June 705 Target Dilution Ratio (TDR): 0.6

AMBIENT DATA

Laboratory temperature: 22 °C

ANALYZER CALIBRATION

[1, 2 = off; 3=on; 4=vent]

	Analyzer, ppm	Computer	Within range	Pot settings
zero	0 (0)	0	does not apply	465
span	905 (905)	905	does not apply	280
mid	411 (412)	411	379 to 437	none

SET DILUTION FLOW BEFORE RUN

Total flow rate (TFR): 2.605 L/min [1, 2, 3 = off; 4=meter]

Target
dilution flow rate (TDFR) _____ L/min [TFR x (1 - DR)]

sample flow rate (TSFR) _____ L/min [TFR x DR]

Set and read dilution meter: 2.25 scfh [scfh = L/min * 2.12]

Sample flow rate (SFR): 1.518 L/min [1 = on; 2, 3 = off; 4=meter]

CHECK DILUTION FLOW BEFORE RUN

[1, 3=on; 2=off; 4=vent]

	Analyzer	DR_{Span} [$Span_{Diluted}/Span$]	DR_{Flow} [SFR / TFR]	Difference, % $100*(DR_{Span} - DR_{Flow})/DR_{Flow}$
$Span_{Diluted}$	530	0586	0.583	0.5

START TIME: 14:23 **[1, 2, 5 = on; 3, 4 = off; tank valves off]**

ANALYZER RANGE: 3 **[60 < computer reading < 750]**

FIELD DATA SHEET FOR TOTAL HYDROCARBON ANALYZER - POST

Operator: MDota Event (kiln charge): Columbia Vista - 1

Time now: 9:44p Run (sample): 18

AMBIENT DATA

Laboratory temperature: 25 °C

END TIME: 9:44

CHECK DILUTION FLOW AFTER RUN [1, 3=on; 2=off; 4=vent]

	Analyzer	Computer
$Span_{Diluted}$	539	538

Sample flow rate (SFR) : 1,560 L/min [1= on, 2, 3 = off, 4=meter]

Read dilution meter: 2.25 scfh _____ L/min [L/min = scfh*0.472]

Total flow rate (TFR): 2.602 L/min [1, 2, 3 = off; 4=meter]
(attach print out with all four sets of data)

Dilution ratio (DR_{Flow}): 0.60 [SFR / TFR]

CHECK OF ANALYZER CALIBRATION [1, 2=off; 3=on, 4=vent]

	Analyzer	Computer	Within range	Pot settings
span	909	908	875 to 935	280
mid	412	412	379 to 437	none
zero	0	0	-45 to +45	45

Dilution ratio (DR_{Span}): 0.593 [$Span_{Diluted}$ / Span]

Dilution ratio difference: 1.1 % [$100*(Abs(DR_{Span} - DR_{Flow}))/DR_{Flow}$]

End time for check: _____

Comments:

2849

FIELD DATA SHEET FOR TOTAL HYDROCARBON ANALYZER - PRE

BACKGROUND INFORMATION

Event (kiln charge): Columbia Vista - 1

Run (sample): 19

Operator: M. Lotta

Date: June 7

Time now : 10:45 p

Dry-bulb temperature: _____

Wet-bulb temperature: 150-

Target Dilution Ratio (TDR): 0.16

AMBIENT DATA

Laboratory temperature: 25 °C

ANALYZER CALIBRATION

[1, 2 = off; 3=on; 4=vent]

	Analyzer, ppm	Computer	Within range	Pot settings
zero	0 (0)	0	does not apply	465
span	905 (905)	904	does not apply	278
mid	412 (412)	412	379 to 437	none

SET DILUTION FLOW BEFORE RUN

Total flow rate (TFR): 2.610 L/min [1, 2, 3 = off; 4=meter]

Target
dilution flow rate (TDFR) _____ L/min [TFR x (1 - DR)]

sample flow rate (TSFR) _____ L/min [TFR x DR]

Set and read dilution meter: 2.2 scfh [scfh = L/min * 2.12]

Sample flow rate (SFR): 1.574 L/min [1 = on; 2, 3 = off; 4=meter]

CHECK DILUTION FLOW BEFORE RUN

[1, 3=on; 2=off; 4=vent]

	Analyzer	DR_{Span} [$Span_{Diluted}/Span$]	DR_{Flow} [SFR / TFR]	Difference, % $100*(DR_{Span} - DR_{Flow})/DR_{Flow}$
$Span_{Diluted}$	547	0.604	0.603	0.3

START TIME: 9:50 p **[1, 2, 5 = on; 3, 4 = off; tank valves off]**

ANALYZER RANGE: 3 **[60 < computer reading < 750]**

FIELD DATA SHEET FOR TOTAL HYDROCARBON ANALYZER - POST

Operator: Milsta Event (kiln charge): Columbia Vista - 1

Time now: 7:20 Run (sample): 19

AMBIENT DATA

Laboratory temperature: 21 °C

END TIME: 7:21

CHECK DILUTION FLOW AFTER RUN [1, 3=on; 2=off; 4=vent]

	Analyzer	Computer
$Span_{Diluted}$	523	523

Sample flow rate (SFR) : 1.554 L/min [1= on, 2, 3 = off, 4=meter]

Read dilution meter: 2.25 scfh _____ L/min [L/min = scfh*0.472]

Total flow rate (TFR): 2.599 L/min [1, 2, 3 = off; 4=meter]
(attach print out with all four sets of data)

Dilution ratio (DR_{Flow}): 0598 [SFR / TFR]

CHECK OF ANALYZER CALIBRATION [1, 2=off; 3=on, 4=vent]

	Analyzer	Computer	Within range	Pot settings
span	876	876	875 to 935	278
mid	399	398	379 to 437	none
zero	0	0	-45 to +45	465

Dilution ratio (DR_{Span}): 0.597 [$Span_{Diluted}$ / Span]

Dilution ratio difference: 0.15 % [100*(Abs(DR_{Span} - DR_{Flow}))/DR_{Flow}]

End time for check: 7:26

Comments:

2892

FIELD DATA SHEET FOR TOTAL HYDROCARBON ANALYZER - PRE

BACKGROUND INFORMATION

Event (kiln charge): Columbia Vista - 1

Run (sample): 20

Operator: Milota

Date: June 8 05

Time now : 7:20

Dry-bulb temperature: _____

Wet-bulb temperature: 150

Target Dilution Ratio (TDR): 0.66

AMBIENT DATA

Laboratory temperature: 21 °C

ANALYZER CALIBRATION

[1, 2 = off; 3=on; 4=vent]

	Analyzer, ppm	Computer	Within range	Pot settings
zero	0 (0)	0	does not apply	465
span	905 (905)	904	does not apply	298
mid	411 (412)	411	379 to 437	none

SET DILUTION FLOW BEFORE RUN

Total flow rate (TFR): 2.594 L/min [1, 2, 3 = off; 4=meter]

Target
dilution flow rate (TDFR) _____ L/min [TFR x (1 - DR)]

sample flow rate (TSFR) _____ L/min [TFR x DR]

Set and read dilution meter: 2.2 scfh [scfh = L/min * 2.12]

Sample flow rate (SFR): 1.588 L/min [1 = on; 2, 3 = off; 4=meter]

CHECK DILUTION FLOW BEFORE RUN

[1, 3=on; 2=off; 4=vent]

	Analyzer	DR_{Span} [$Span_{Diluted}/Span$]	DR_{Flow} [SFR / TFR]	Difference, % $100*(DR_{Span} - DR_{Flow})/DR_{Flow}$
$Span_{Diluted}$	553	0.611	0.612	0.2

START TIME: 7:28

[1, 2, 5 = on; 3, 4 = off; tank valves off]

ANALYZER RANGE: 3

[60 < computer reading < 750]

FIELD DATA SHEET FOR TOTAL HYDROCARBON ANALYZER - POST

Operator: M Vota Event (kiln charge): Columbia Vista - 1

Time now: 9:35 Run (sample): 20

AMBIENT DATA

Laboratory temperature: 20 °C

END TIME: 9:36

CHECK DILUTION FLOW AFTER RUN [1, 3=on; 2=off; 4=vent]

	Analyzer	Computer
$Span_{Diluted}$	547	545

Sample flow rate (SFR) : 1,570 L/min [1= on, 2, 3 = off, 4=meter]

Read dilution meter: 2.2 scfh _____ L/min [L/min = scfh*0.472]

Total flow rate (TFR): 2,585 L/min [1, 2, 3 = off; 4=meter]
(attach print out with all four sets of data)

Dilution ratio (DR_{Flow}): 0.607 [SFR / TFR]

CHECK OF ANALYZER CALIBRATION [1, 2=off; 3=on, 4=vent]

	Analyzer	Computer	Within range	Pot settings
span	905	904	875 to 935	298
mid	412	411	379 to 437	none
zero	0	0	-45 to +45	465

Dilution ratio (DR_{Span}): 0.604 [$Span_{Diluted}$ / Span]

Dilution ratio difference: 0,5 % [100*(Abs(DR_{Span} - DR_{Flow}))/DR_{Flow}]

End time for check: 9:39

Comments: End change
VAC check 9:40 - 9:50 18.1" → 17.8" Hg

June 2 05
Columbia Vista

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
378.8	378.8	01
-378.8	0.000	00
2626	2626	01
2629	2628	02
2629	2628	03
2633	2629	04

1

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
426.2	426.2	01
11764	6095	02

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
1687	1687	01
1688	1687	02
1689	1688	03
1687	1688	04
1690	1688	05

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
405.6	405.6	01
-405.6	0.000	00
1742	1742	01
1748	1745	02
1742	1744	03
1739	1742	04
1750	1744	05

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
2664	2664	01
2661	2663	02
2661	2662	03
2661	2662	04
2659	2661	05

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
1780	1780	01

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
2654	2654	01
2659	2657	02
2650	2654	03
2652	2654	04

2

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
408.2	408.2	01

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
1539	1539	01
1534	1536	02
1534	1536	03
1536	1536	04
1536	1536	05

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
1588	1588	01
1585	1587	02
1582	1585	03
1584	1585	04
1584	1585	05

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
2680	2680	01
2678	2679	02
2680	2680	03
2671	2677	04
2678	2678	05

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
2683	2683	01
2680	2682	02
2683	2682	03
2688	2683	04
2676	2682	05

3

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
1284	1284	01
1283	1283	02
1279	1282	03
1276	1281	04

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
1297	1297	01
1310	1303	02
1310	1306	03
1308	1306	04
1309	1307	05

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
2680	2680	01
2678	2679	02
2683	2680	03
2676	2679	04
2680	2680	05

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
2506	2506	01

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
2702	2702	01
2697	2700	02
2695	2698	03
2692	2697	04
2692	2696	05

4

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
1306	1306	01
1302	1304	02
1304	1304	03
312.0	1056	04
-312.0	1304	03
1303	1304	04
1298	1302	05

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
1312	1312	01
1314	1313	02
1312	1313	03
1322	1315	04
1313	1315	05

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
2664	2664	01
2661	2663	02
2664	2663	03
2652	2660	04
2659	2660	05

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
222.2	222.2	01

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
490.3	490.3	01

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
2657	2657	01
2652	2654	02
2657	2655	03
2652	2654	04

5

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
1272	1272	01
1269	1270	02
1271	1271	03
1264	1269	04

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
1330	1330	01
1330	1330	02
1321	1327	03
1329	1328	04
1329	1328	05

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
2673	2673	01
2669	2671	02
2678	2673	03
2673	2673	04
2673	2673	05

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
2673	2673	01
2673	2673	02
2683	2676	03
2683	2678	04
2676	2678	05

6

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
1289	1289	01
1288	1288	02
1280	1286	03
1285	1286	04

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
1288	1288	01
1291	1290	02
1290	1290	03
1294	1291	04

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
2678	2678	01
2688	2683	02
2688	2684	03
2680	2683	04
2678	2682	05

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
420.1	420.1	01

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
2676	2676	01
2676	2676	02
2673	2675	03
2671	2674	04
2671	2673	05

7

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
1182	1182	01
1182	1182	02
1182	1182	03
1191	1184	04

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
1195	1195	01
1189	1192	02
1186	1190	03
1195	1191	04
1190	1191	05

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
1691	1691	01
2673	2182	02

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
2669	2669	01
2669	2669	02
2671	2669	03
2673	2670	04

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
362.7	362.7	01

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
2669	2669	01
2643	2656	02
2664	2658	03
2666	2660	04

8

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
1164	1164	01
1165	1165	02
1162	1164	03
1162	1163	04

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
1187	1187	01
1184	1186	02
1183	1185	03
1184	1185	04

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
858.1	858.1	01
-858.1	0.000	00
2692	2692	01
2697	2695	02
2688	2693	03
2700	2694	04

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
654.1	654.1	01

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
2692	2692	01
2700	2696	02
2690	2694	03
2690	2693	04

9

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
1151	1151	01
1151	1151	02
1146	1149	03
1148	1149	04

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
1163	1163	01
1157	1160	02
1162	1161	03
1162	1161	04

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
2688	2688	01
2685	2686	02
2678	2684	03
2683	2683	04
2685	2684	05
2690	2685	06

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
2683	2683	01
2690	2686	02
2705	2693	03
2688	2691	04
2683	2690	05

10

PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
1184	1184	01
1187	1185	02
1184	1185	03
1185	1185	04
1187	1185	05

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
1132	1132	01
1132	1132	02
1132	1132	03
1130	1131	04

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
2671	2671	01
2671	2671	02
2683	2675	03
2671	2674	04
2673	2674	05

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
2685	2685	01
2676	2680	02
2678	2680	03
2683	2680	04

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GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
1172	1172	01
1171	1172	02
1175	1173	03
1171	1172	04

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
1161	1161	01
1165	1163	02
1159	1162	03
1164	1162	04

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
2678	2678	01
2680	2679	02
2671	2676	03
2680	2677	04
2680	2678	05

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
818.1	818.1	01
-818.1	0.000	00
2678	2678	01
2673	2676	02
2670	2675	03

17

2671	2674	04
2676	2674	05

18

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
1162	1162	01
1160	1161	02
1156	1160	03
1163	1160	04
1162	1161	05

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
1153	1153	01
1151	1152	02
1153	1152	03
1148	1151	04

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
2683	2683	01
2676	2679	02
2678	2679	03
2680	2679	04

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
2683	2683	01
2690	2686	02
2685	2686	03
2683	2685	04

13

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
1294	1294	01
1292	1293	02
1293	1293	03
1294	1293	04
1293	1293	05

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
1300	1300	01
1304	1302	02
1298	1301	03
1299	1300	04
1296	1299	05

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
2669	2669	01
2661	2665	02
2661	2664	03
2688	2670	04

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES

2647	2642	03
2638	2641	04

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
2643	2643	01
2633	2638	02
2661	2646	03
2636	2643	04

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GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
1283	1283	01
1289	1286	02
1292	1288	03
1290	1289	04
1293	1289	05

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
1255	1255	01
1255	1255	02
1256	1255	03
1253	1255	04
1254	1255	05
1274	1258	06

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
2604	2604	01
2606	2605	02
2608	2606	03
2606	2606	04
2606	2606	05

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
2613	2613	01
2624	2618	02
2610	2616	03
2610	2614	04

15

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
1327	1327	01
1332	1330	02
1334	1331	03
1335	1332	04

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
1301	1301	01
1303	1302	02
1300	1301	03
1303	1302	04

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
2606	2606	01
2597	2601	02
2622	2608	03
2601	2607	04
2606	2606	05

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
2601	2601	01
2610	2606	02
2601	2604	03
2606	2605	04
2617	2607	05

16

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
1358	1358	01
1358	1358	02
1358	1358	03
1355	1357	04

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
1338	1338	01
1337	1337	02
1338	1337	03
1337	1337	04

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
2597	2597	01
2592	2595	02
2615	2601	03
2606	2603	04

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
581.1	581.1	01
-581.1	0.000	00
2597	2597	01
2599	2598	02
2601	2599	03
2597	2599	04

17

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
1482	1482	01
1482	1482	02
1482	1482	03
1481	1482	04
1482	1482	05

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
1508	1508	01
1510	1509	02
1514	1511	03
		04

1507	1509	05

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
2597	2597	01
2601	2599	02
2599	2599	03
2599	2599	04
2597	2599	05

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
2595	2595	01
2617	2606	02
2610	2607	03
2604	2607	04
2597	2605	05

18

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
1521	1521	01
1520	1520	02
1516	1519	03
1518	1519	04
1515	1518	05

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
1559	1559	01
1561	1560	02
1563	1561	03
1558	1560	04

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
2608	2608	01
2610	2609	02
2606	2608	03
2608	2608	04
2610	2609	05

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
601.8	601.8	01
-601.8	0.000	00
2608	2608	01
2610	2609	02
2617	2612	03
2606	2610	04

19

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
1574	1574	01
1578	1576	02
1572	1575	03
1573	1574	04
1576	1574	05

GILIBRATOR 2 WET V4.4 DATE.....

PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
1556	1556	01
1555	1556	02
1554	1555	03
1551	1554	04

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
2595	2595	01
2604	2599	02
2606	2601	03
2592	2599	04

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
582.9	582.9	01
-582.9	0.000	00
2595	2595	01
2592	2594	02
2595	2594	03
2595	2594	04
2592	2594	05

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GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
1590	1590	01
1590	1590	02
1584	1588	03
1589	1588	04
-1589	1588	03

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
1568	1568	01
1570	1569	02
1575	1571	03
1569	1570	04

GILIBRATOR 2 WET V4.4 DATE.....
PUMP S/N.....ID.....

FLOW	AVERAGE	# SAMPLES
2583	2583	01
2568	2576	02
2592	2581	03
2597	2585	04