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Assessment of the Group 5-6 (LB-C2, LB-S2, LV-S1) Stack Sampling Probe Locations for Compliance with ANSI/HPS N13.1-1999

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March 2011

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Test Specification:	24590-QL-SRA-W000-00101
Work Authorization:	WA# 009
Test Plan:	TP-RPP-WTP-594, Rev 0.0
Test Exceptions:	N/A
Test Scoping Statement(s):	NA
QA Technology Level:	Development Research

Pacific Northwest National Laboratory
Richland, Washington 99352

Completeness of Testing

This report describes the results of work and testing specified by test plan TP-RPP-WTP-594. The work and any associated testing followed the quality assurance requirements outlined in the test specification/plan. The descriptions provided in this test report are an accurate account of both the conduct of the work and the data collected. Test plan results are reported. Also reported are any unusual or anomalous occurrences that are different from expected results. The test results and this report have been reviewed and verified.

Approved:

John A. Glissmeyer 3/11/11

John A. Glissmeyer
Project Manager

Date

Summary

This document reports on a series of tests to assess the proposed air sampling locations for the Hanford Tank Waste Treatment and Immobilization Plant (WTP) Group 5-6 exhaust stacks with respect to the applicable criteria regarding the placement of an air sampling probe. The LB-C2, LV-S1, and LB-S2 exhaust stacks were tested together as a group (Test Group 5-6) because the common factor in their design is that the last significant flow disturbance upstream of the air sampling probe is a reduction in duct diameter. Federal regulations[(a)] require that a sampling probe be located in the exhaust stack according to the criteria of the American National Standards Institute/Health Physics Society (ANSI/HPS) N13.1-1999, *Sampling and Monitoring Releases of Airborne Radioactive Substances from the Stack and Ducts of Nuclear Facilities*. These criteria address the capability of the sampling probe to extract a sample that represents the effluent stream.

The testing on scale models of the stacks conducted for this project was part of the River Protection Project—Waste Treatment Plant Support Program under Contract No. DE-AC05-76RL01830 according to the statement of work issued by Bechtel National Inc. (BNI, 24590-QL-SRA-W000-00101, *N13.1-1999 Stack Monitor Scale Model Testing and Qualification*, Revision 1, 9/12/2007) and Work Authorization 09 of Memorandum of Agreement 24590-QL-HC9-WA49-00001. The internal Pacific Northwest National Laboratory (PNNL) project for this task is 53024, *Work for Hanford Contractors Stack Monitoring*. The testing described in this document was further guided by the Test Plan *Scale Model Testing the Waste Treatment Plant LB-C2, LB-S2, and LV-S1 (Test Group 5-6) Stack Air Sampling Positions* (TP-RPP-WTP-594).

The tests conducted by PNNL during 2009 and 2010 on the Group 5-6 scale model systems are described in this report. The series of tests consists of various measurements taken over a grid of points in the duct cross-section at the designed sampling probe locations and at five duct diameters up and downstream from the design location to accommodate potential construction variability. The tests were done only at the design sampling probe location on the scale model of LB-S2 because that ductwork was already constructed. The ANSI/HPS N13.1-1999 criteria and the corresponding results of the test series on the scale models are summarized below.

1. Uniform Air Velocity—The gas momentum across the stack cross-section where the sample is extracted should be well mixed or uniform. The uniformity is expressed as the variability of the measurements about the mean, expressed as the percent coefficient of variance (%COV). It is calculated as the standard deviation divided by the mean and expressed as a percentage—the lower the %COV value, the more uniform the velocity. The qualification criterion is that the %COV of the air velocity must be ≤ 20% across the center two-thirds of the cross-section of the duct. The air velocity uniformity measurements for each of the LB-C2, LV-S1, and LB-S2 scale models ranged from 1.3 to 4.6, 3.5 to 6.7, and 4.3 to 5.6 %COV, respectively, which are well within the qualification criterion.
2. Angular Flow—The purpose of this test is to determine whether the air velocity vector is aligned with the sampling nozzle. The average flow angle relative to the nozzle axis should not exceed 20°. The

(a) Title 40 of the Code of Federal Regulations (CFR), Part 61, National Emissions Standards for Hazardous Air Pollutants (NESHAP), Subpart H, *National Emission Standard For Emissions of Radionuclides other than Radon from Department of Energy Facilities*.

flow angle measurements for each of the LB-C2, LV-S1, and LB-S2 scale models ranged from 2.5 to 10.6, 4.8 to 10.9, and 2.3 to 11.6 degrees, respectively, which are well within the qualification criterion.

3. Uniform Concentration of Tracer Gases—A uniform contaminant concentration in the sampling plane enables the extraction of samples that represent the true concentration. The two qualification criteria are that 1) the %COV of the measured tracer-gas concentration is ≤ 20% across the center two-thirds of the duct cross-section and 2) the gas concentration at any of the measurement points cannot deviate from the overall mean concentration of all of the measurement points by > 30%. The gas tracer uniformity measurements for each of the LB-C2, LV-S1, and LB-S2 scale models ranged from 1.5 to 5.8, 1.4 to 9.0, and 0.5 to 2.1 %COV, respectively, which were well within the qualification criterion. The absolute value of percent maximum deviation from the mean ranged from 4.7 to 13.2, 2.5 to 21.0, and 1.0 to 5.1 for the LB-C2, LV-S1, and LB-S2 scale models, respectively, which were also within the qualification criterion.
4. Uniform Concentration of Tracer Particles—Uniformity in contaminant concentration at the sampling probe was further demonstrated using tracer particles large enough to exhibit inertial effects. Particles of 10-μm aerodynamic diameter were used. The qualification criterion is that the %COV of particle concentration is ≤ 20% for the measurement points in the center two-thirds of the duct at the sampling probe location. The particle tracer uniformity measurements for each of the LB-C2, LV-S1, and LB-S2 scale models ranged from 3.2 to 13.5, 2.0 to 7.5, and 3.3 to 10.9 %COV, respectively, which are within the qualification criterion.

Based on these scale model tests, the locations proposed for the air sampling probes in each of the three Group 5-6 stacks meet the requirements of the ANSI/HPS N13.1-1999 standard. Additional velocity uniformity and flow angle tests on the actual stacks will be necessary during cold-startup to confirm the validity of the scale model results in representing the actual stacks. Guidance on those tests is given in the conclusions of the report (Section 5).

Acronyms

acfm	actual cubic feet per minute
AD	aerodynamic diameter
ANOVA	analysis of variance
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
BNI	Bechtel National, Inc.
CFR	Code of Federal Regulations
DOE	U.S. Department of Energy
DV	hydraulic diameter × mean velocity
EPA	U.S. Environmental Protection Agency
HDI	"How Do I…?"
HEPA	high-efficiency particulate air (filter)
HPS	Health Physics Society
LB-C2	WTP laboratory zone C2 (non-process) ventilation system exhaust stack
LB-S2	WTP laboratory zone C5 (process) ventilation system exhaust stack
LV-S1	WTP low activity waste zone C3 (non-process) ventilation system exhaust stack
NESHAP	National Emissions Standards for Hazardous Air Pollutants
OPC	optical particle counter
%COV	percent coefficient of variation
PNNL	Pacific Northwest National Laboratory
QA	quality assurance
RMS	root mean square
scfm	standard cubic feet per minute
sfpm	standard feet per minute
SF_6	sulfur hexafluoride
TI	test instruction
WTP	Hanford Tank Waste Treatment and Immobilization Plant
WTPSP	Waste Treatment Plant Support Program

Acknowledgments

Preparing, executing, and post-processing these scale model measurements involved a number of Pacific Northwest National Laboratory staff. We would like to particularly acknowledge the support of our quality engineer, Kirsten Meier, and the administrative support from Andrea Boehler, Chrissy Charron, and Mona Champion. We would also like to express our appreciation to scientific staff members Ernest Antonio, Victor Morris, Mikhail Pekour, Yin-Fong Su, and Xiao-Ying Yu and student staff members Donna Trott and Brian Smith who conducted measurements under a variety of weather conditions. Additionally, Carmen Arimescu, Roseanne Aaberg, and J. Matthew Barnett provided technical reviews. Wayne Cosby provided editorial support for this report.

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Contents

Figures

Tables

1.0 Introduction

The purpose of this series of scale model tests is to document the extent to which the current Bechtel National, Inc. (BNI) designs for the LB-C2, LB-S2, and LV-S1 air exhaust stacks in the Hanford Tank Waste Treatment and Immobilization Plant (WTP) meet the applicable regulatory criteria governing such effluent monitoring systems. The emissions from these air exhaust stacks may exceed the 0.1-millirem per year threshold limit given in Title 40 of the Code of Federal Regulations (CFR), Part 61, National Emissions Standards for Hazardous Air Pollutants (NESHAP), Subpart H, *National Emission Standard For Emissions of Radionuclides other than Radon from Department of Energy Facilities*. The NESHAP rule requires that a sampling probe be located in the exhaust stack according to the criteria of the American National Standards Institute/Health Physics Society (ANSI/HPS) N13.1-1999, *Sampling and Monitoring Releases of Airborne Radioactive Substances from the Stack and Ducts of Nuclear Facilities*. The capability of the sampling probe locations to meet this standard has been demonstrated with a series of tests on scale models as described in the standard. These data will be used by BNI as input to the air discharge permitting process before WTP cold commissioning. These three stacks were tested together as a group (Test Group 5-6) because the common factor in their design is that the last significant flow disturbance upstream of the air sampling probe is a reduction in duct diameter.

This work is performed as part of the River Protection Project—Waste Treatment Plant Support Program under Contract No. DE-AC05-76RL01830 according to the statement of work issued by BNI, 24590-QL-SRA-W000-00101, N13.1-1999 Stack Monitor Scale Model Testing and Qualification, Revision 1, 09/12/2007 and Work Authorization 09 of Memorandum of Agreement 24590-QL-HC9-WA49-00001. The internal Pacific Northwest National Laboratory (PNNL) project for this task is 53024, *Work for Hanford Contractors Stack Monitoring*.

PNNL personnel conducted scale model tests during 2009 and 2010. No BNI personnel were directly involved in the tests. The BNI WTP point of contact and facility engineers provided the most current engineering input to support PNNL's tests. BNI retains responsibility for the technical design of the stack discharge and air monitoring systems.

1.1 Qualification Criteria

The qualification criteria for the location of a stack air monitoring probe are taken from ANSI/HPS N13.1-1999 and are paraphrased as follows:

1. Uniform Air Velocity—It is important that the gas velocity across the stack cross-section where the sample is extracted be fairly uniform. Consequently, the velocity is measured at several discrete points in the duct cross-section at the proposed location of the sampling nozzle. The uniformity is expressed as the variability of the measurements about the mean. This is expressed using the percent coefficient of variation (%COV),[(a)] which is the standard deviation divided by the mean and expressed as a percentage—the lower the %COV value, the more uniform the velocity. The qualification criterion is that the %COV of the air velocity must be ≤ 20% in the center two-thirds of the duct cross-section where the sampling probe is to be located.

(a) *Coefficient of variation* is considered "dated" terminology. The modern terminology is *percent relative standard deviation*. However, because the standard uses the older terminology, it will likewise be used here.

2. Angular Flow—Sampling nozzles are typically aligned with the axis of the stack. If the air travels through the stack in cyclonic fashion, the air velocity vector approaching a sampling nozzle could be sufficiently misaligned with the nozzle to impair the extraction of particles. Consequently, the flow angle is measured in the duct at the proposed location of the sampling probe. The average of the flow angle measurements (made at the same grid of points as the velocity measurements) should not exceed 20° relative to the sampling nozzle axis.
3. Uniform Concentration of Tracer Gases—A uniform contaminant concentration in the sampling plane enables the extraction of samples that represent the true concentration within the duct. The uniformity of the concentration is first tested with a tracer gas to represent gaseous effluents. The fan is a good mixer, so injecting the tracer downstream of the fan provides worst-case results. The qualification criteria are that 1) the %COV of the measured tracer gas concentration is ≤ 20% across the center two-thirds of the duct cross-section at the sampling location and 2) the concentrations at all the measurement points cannot deviate from the mean by > 30%.
4. Uniform Concentration of Tracer Particles—The second set of tests addressing contaminant concentration uniformity at the sampling position uses tracer particles large enough to exhibit inertial effects. Tracer particles of 10-μm aerodynamic diameter (AD) are used by default unless it is known that larger contaminant particles will be present in the airstream. The qualification criterion is that the %COV of particle concentration is ≤ 20% across the center two-thirds of the duct at sampling location.

Tests to determine if Criteria 1 through 4 were met were conducted on the three scale models of the Group 5-6 stacks (LB-C2, LB-S2, and LV-S1) at several locations along the exhaust duct. By conducting tests on scale models of the exhaust systems, the designed air sampling locations can be qualified before cold commissioning, and compensatory measures could be made in the design if testing results were not satisfactory. All of the tracer concentration, velocity, and flow angle measurements are made using the same grid of points in a given cross-section of the duct. The ANSI/HPS N13.1-1999 standard sets additional qualification criteria for the use of a scale model as a substitute for the actual stack.

- The scale model and its sampling location must be geometrically similar to the actual stack.
- The product of the hydraulic diameter and the mean velocity (DV) for the scale model must be within a factor of six of the DV for the actual stack.
- The Reynolds number for the actual and model stacks must be > 10,000.

The scale model results are considered valid if it is further shown that:

- The velocity profile in the actual stack meets the uniformity criterion (%COV ≤ 20%).
- The velocity uniformity COV values for the actual and model stacks agree within 5 %COV.
- The flow angle criterion (with a mean value less than or equal to 20°) is met.

The tests to determine the validity of the scale model testing will be performed during cold startup testing on the actual WTP stacks under separate test plans. The scale model testing conducted, as well as the results of these tests, is described in subsequent sections of this report.

2.0 Group 5-6 Stacks

2.1 Stack Geometry

Group 5-6 consists of three different stacks (LB-C2, LB-S2, and LV-S1) that share the feature that each has a reduction in duct diameter upstream of the sampling location. Figure 2.1 through Figure 2.3 show the layout for each of the three stack designs. Figure 2.4 through Figure 2.6 show photos of the scale models for each of the three stack designs. Each of the photos nominally matches the perspective shown in the stack layout drawings.

Duct heaters were installed for the LB-C2 and LV-S1 models to facilitate cold-weather testing. The LV-S1 stack also included a mixing box between the heaters and the fans to allow air flow through both high-efficiency particulate air (HEPA) filters to supply single-fan operations. Without the mixing box, the HEPA filters limited the airflow in the stack, and sufficient flow was not achieved. (This should be common practice for tests of future models.)

For each of the stacks, Test Port 2 represents the planned location for operational stack sampling according to the current WTP BNI designs. The distance from the end of the reducer to the center of Test Port 2 was approximately 13.3, 25.0, and 12.4 duct diameters for the LB-C2, LB-S2, and LV-S1 models respectively. Test Ports 1 and 3 are located approximately five duct diameters upstream and downstream to allow some flexibility in testing and confirmation of trends in the results. Other ports are also located for additional testing. At each fan outlet, control and backdraft dampers were installed as indicated in the WTP BNI design documents.

The ratio of the prototype dimensions to the scale model dimensions varies with each system. Each scale model was constructed with a duct diameter of 12 inches (after the reducer) for convenience and to maintain the ability to re-use the duct sections for subsequent stack designs. Table 2.1 lists the final diameter of the actual stack with the scaling factor for the 12-inch, scale model diameter. The calculations of the key scale model dimensions were performed in spreadsheets written for this purpose and were verified and validated in accordance with appropriate quality assurance (QA) procedures. ANSI/HPS N13.1-1999 requires that the models be geometrically similar to the actual stacks. Acceptable deviations in key dimensions of the scale model arising from scaling and fabrication errors are within about ± 5% for cross-sectional dimensions and about 25% of a duct diameter in overall length between the sampling point and the flow disturbances. These deviations would have less impact on the test results than the normal standard deviation of repeat tests. However, to minimize the deviations due to construction, the construction specification called for a tolerance of ± $^1/_8$-inch per 10 feet parallel to the direction of flow and ± $^1/_8$-inch for cross-sectional dimensions. This was not always achieved in actual fabrication. For example, the 12-inch duct diameter at a test port on the LB-C2 scale model range from 11.78 to 11.97 inches because of distortions created in fabrication. The key scale model dimension for the as-built scale models were measured and recorded by testing staff. Duct size at a test port was listed on the data sheets.

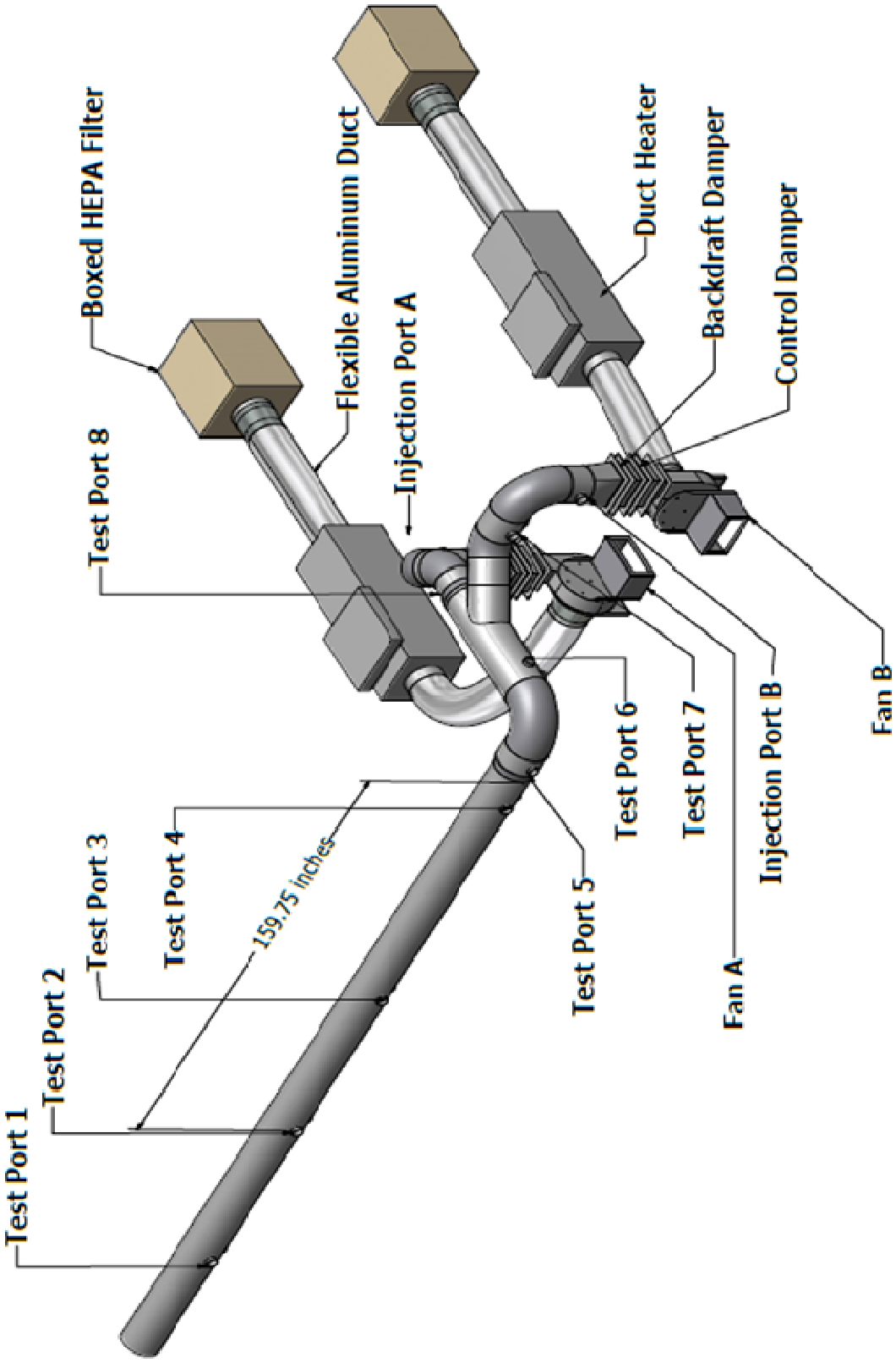

Figure 2.1. Layout of the LB-C2 Test System

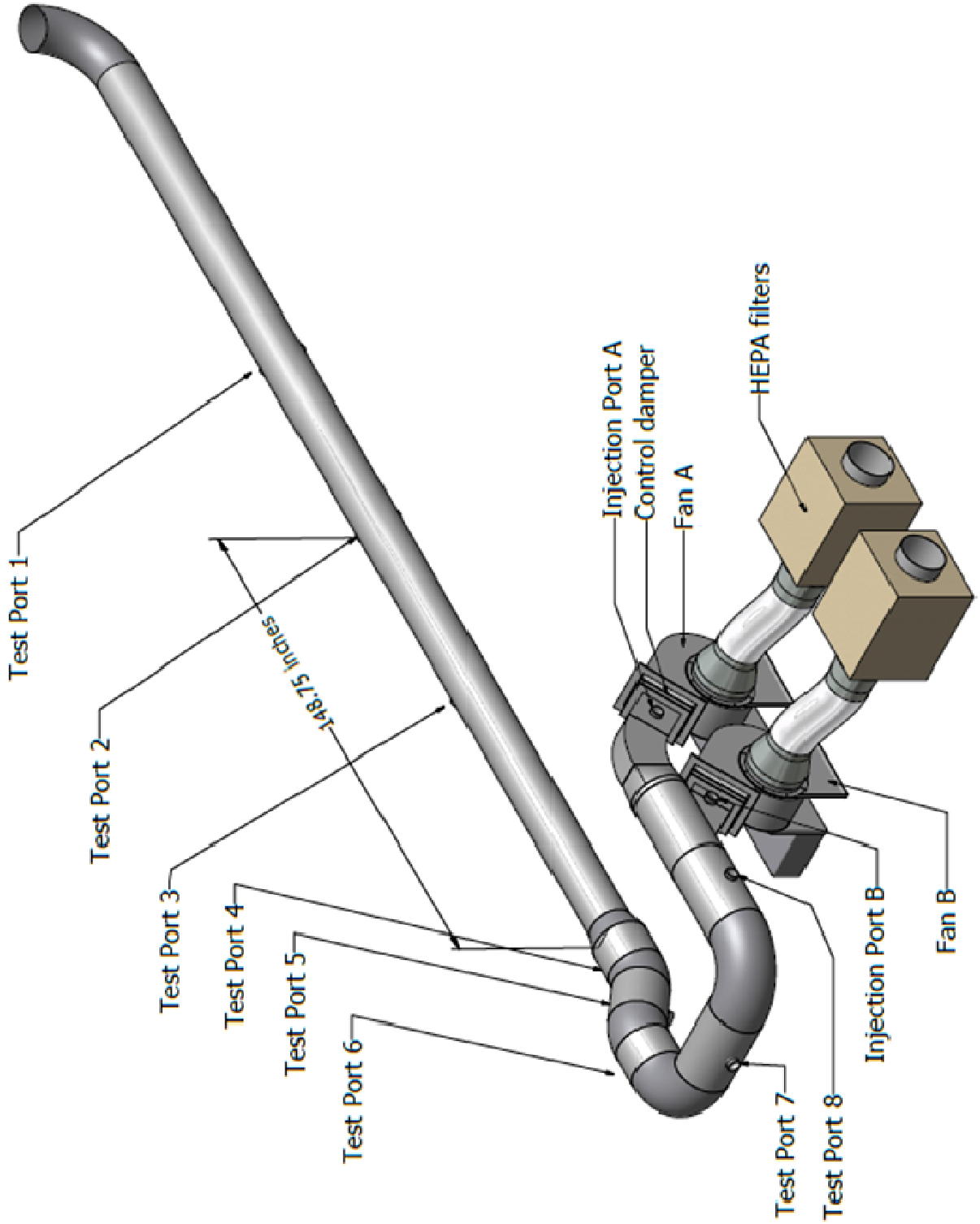

Figure 2.2. Layout of the LV-S1 Test System

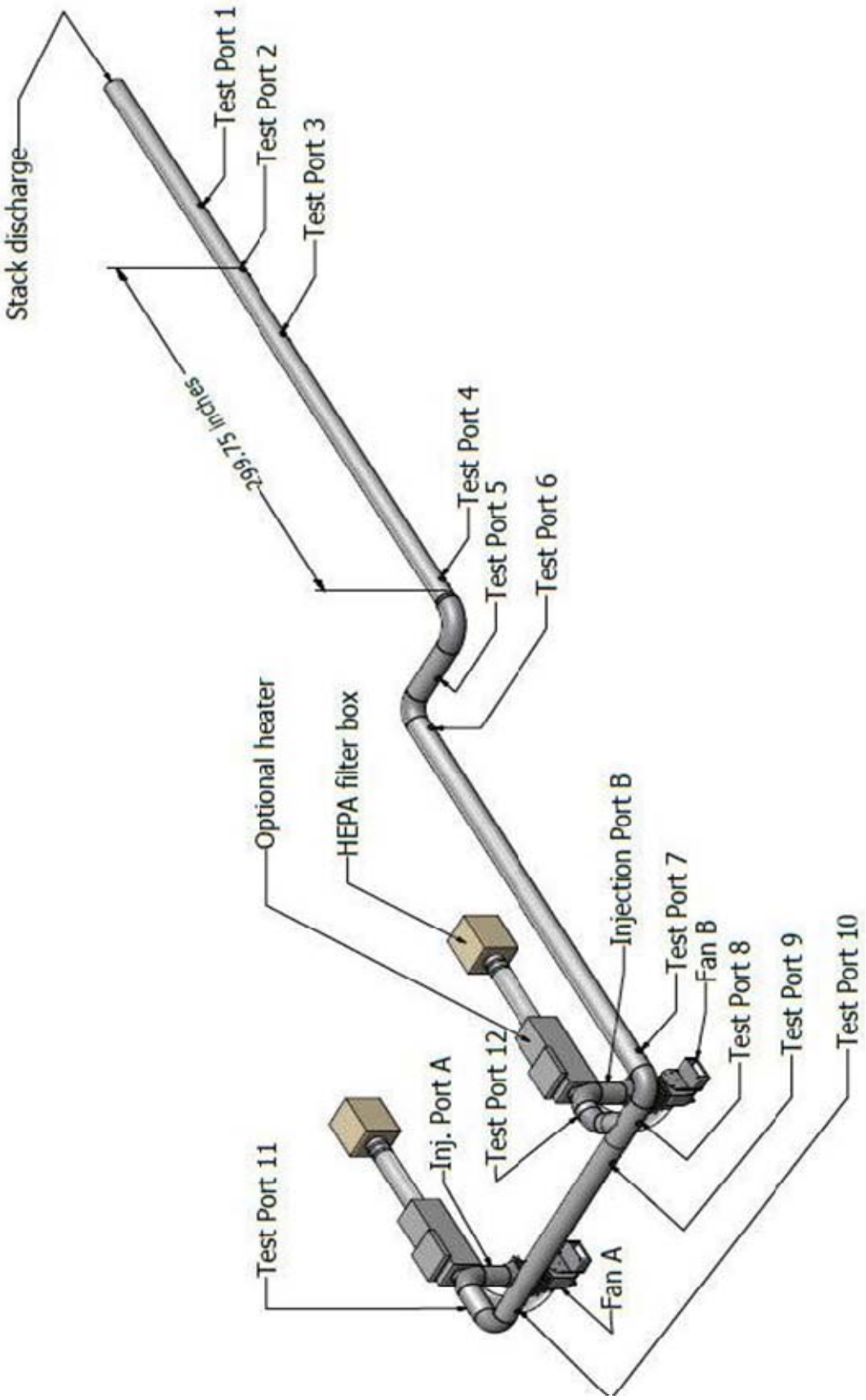

Figure 2.3. Layout of the LB-S2 Test System

Figure 2.4. Photo of the LB-C2 Test System

Figure 2.5. Photo of the LV-S1 Test System

Figure 2.6. Photos of the LB-S2 Test System: (a) Upstream Portion of Stack with Fans; (b) Downstream Portion of Stack with Sampler Test Ports

Table 2.1. Scaling Factor for 12-inch-Diameter Scale Model Stack

	Actual Stack Diameter	Scaling Factor
LB-C2	48 in.	4.0
LV-S1	48 in.	4.0
LB-S2	28 in.	2.3

2.2 Stack Flows

Tests of scale model stacks were conducted at flow rates that bracket the range of expected normal and accident flow rates and operating configurations. Various combinations of flow rates and operating fans were tested. For the maximum flow rate, it was assumed that a new system with clean ventilation filters may operate at 15% above normal flow. Similarly, it was assumed that, for systems where the number of operating fans will be constant, the low flow rate may be 30% below normal flow. Therefore, the target flow rates for the scale model tests were between 70% and 115% of the normal flow.

Additional considerations come from the ANSI/HPS N13.1-1999 standard. The standard requires that the scale model's DV be within a factor of six of the actual stack. For stacks with a circular cross-section, this is equivalent to requiring that the ratio of flow rate to stack diameter be within a factor of six of the actual stack. The standard also requires that the Reynolds number for the prototype and model stacks must both exceed 10,000.

The WTP LB-C2 air exhaust system is equipped with two fans capable of 37,000 scfm (standard cubic feet per minute) of flow each. However, the design flow rate is 35,450 scfm with both fans operating, and the planned maximum flow rate is 40,400 scfm. The speed of both fans will be controlled with variable frequency drives to achieve the target flow rate.

There are two fans available to power the WTP LV-S1 exhaust system of the low-activity waste vitrification facility. (This system exhausts the air from the C3 ventilation system and is sometimes denoted as either the LV-C3 or LAW-C3 system.) Only one fan will be operated at a time, and one will be on standby. Each fan is capable of providing the design flow rate of 40,000 scfm by itself. Each fan is equipped with an adjustable-speed drive to compensate for filter loading and pressure variations.

Two fans are available for the LB-S2 exhaust system, which exhausts air from the C5 ventilation system in the laboratory facility. (This stack is also known as the LB-C5 stack.) Only one fan will be operated at a time, and one will be on standby. Each fan is capable of providing the design flow rate of 14,800 scfm by itself. Each fan is equipped with an adjustable-speed drive to compensate for filter loading and pressure variations.

Table 2.2 lists the flow conditions for the actual stack as well as the scale model stack. The minimum air flow (in scfm) and air velocity (in standard feet per minute, sfpm) to achieve the assumed minimum and maximum actual stack flow are listed. One of the qualification criteria listed in Section 1 was that the Reynolds number for both the actual and scale model stack must be greater than 10,000. Therefore, the Reynolds number for the actual and scale model stacks at the minimum and maximum flow rates are included in Table 2.2. The conditions prescribed for these scale model tests fulfill the criterion of a Reynolds number greater than 10,000.

Another qualification criterion listed in Section 1 pertains to the DV in the scale model relative to the stack. Table 2.3 lists the DV values for the stack as well as the DV values that are acceptable for the scale model. This minimum flow for the model is selected to be the lower boundary so the DV product is within a factor of 6 (i.e., $^1/_6$) of the DV product for the actual stack.

Table 2.2. Summary of Flow Parameters for Scale Model Stacks

	Air Flow (scfm)		Air Velocity (sfpm)		Reynolds Number	
Fan(s)–Flow	Actual Stack	Scale Model Minimum	Actual Stack	Scale Model Minimum	Actual Stack	Scale Model Minimum
LB-C2						
Two fans—max flow	40,400	1683	3215	2143	1.4E+06	2.3E+05
Single fan—min flow	~20,000	~833	~1592	~1061	~6.7E+05	~1.1E+05
LV-S1						
Single fan—115% flow	46,000	1917	3661	2440	1.5E+06	2.5E+05
Single fan—70% flow	28,000	1167	2228	1485	9.2E+05	1.5E+05
LB-S2						
Single fan—115% flow	17,020	1216	3980	1548	9.8E+05	1.6E+05
Single fan—70% flow	10,360	740	2423	942	5.9E+05	9.8E+04

Table 2.3. Summary of DV values for Scale Model Stacks

	DV		
Fan(s)—Flow	Actual Stack	Scale Model Minimum	Scale Model Maximum
LB-C2			
Two fans—max flow	1.29E+04	2.14E+03	7.72E+04
Single fan—min flow	6.37E+03	1.06E+03	3.82E+04
LV-S1			
Single fan—115% flow	1.46E+04	2.44E+03	8.79E+04
Single fan—70% flow	8.91E+03	1.49E+03	5.35E+04
LB-S2			
Single fan—115% flow	9.29E+03	1.55E+03	5.57E+04
Single fan—70% flow	5.65E+03	9.42D+02	3.39E+04

3.0 Testing Methods

The testing methods were based on the requirements of ANSI/HPS N13.1-1999. A test plan, TP-RPP-WTP-594, *Scale Model Testing the Waste Treatment Plant LB-C2, LB-S2, and LV-S1 (Test Group 5-6) Stack Air Sampling Positions*, was prepared by PNNL and approved by BNI. This plan referenced the use of PNNL procedures, which define how the test should be conducted in general. A test instruction (TI) was prepared for each test type and for each scale model stack. These contain specific instructions pertaining to the tests that are not addressed in the general procedures. Such information includes the following:

- Layout of measurement points
- Location of tracer injection points
- List of equipment and instrumentation
- Safety requirements
- List of test runs
- Test description and measurement data sheets with hand entries
- Table of preliminary results.

Because the final data sheets and a description of the test methods are included in this report, the TIs are not included here. The QA program that is implemented for this project is described in Section 3.1 of this report. A summary of the stack testing methods used for each of the four test types is presented in Section 3.2.

3.1 Quality Assurance

The PNNL QA program is based on the requirements defined in the U.S. Department of Energy Order 414.1C, *Quality Assurance,* and 10 CFR 830, *Energy/Nuclear Safety Management*, and Subpart A—*Quality Assurance Requirements* (a.k.a., the Quality Rule). PNNL has chosen to implement the following consensus standards in a graded approach:

- ASME NQA-1-2000, *Quality Assurance Requirements for Nuclear Facility Applications*, Part I, "Requirements for Quality Assurance Programs for Nuclear Facilities" (ASME 2001).
- ASME NQA-1-2000, Part II, Subpart 2.7, *Quality Assurance Requirements for Computer Software for Nuclear Facility Applications* (ASME 2001).
- ASME NQA-1-2000, Part IV, Subpart 4.2, *Graded Approach Application of Quality Assurance Requirements for Research and Development* (ASME 2001).

The procedures necessary to implement the requirements are documented through PNNL's "How Do I…?" (HDI), which is a system for managing the delivery of laboratory-level policies, requirements, and procedures.

The Waste Treatment Plant Support Program (WTPSP) implements an NQA-1-2000 QA program, using a graded approach presented in NQA-1-2000, Part IV, Subpart 4.2. The WTPSP QA manual (QA-WTPSP-002) describes the technology life cycle stages under the WTPSP QA plan (QA-WTPSP-

0001). The technology life cycle includes the progression of technology development, commercialization, and retirement in process phases of basic and applied research and development (R&D), engineering and production, and operation until process completion. The life cycle is characterized by flexible and informal QA activities in basic research, which becomes more structured and formalized through the applied R&D stages.

- BASIC RESEARCH—Basic research consists of research tasks that are conducted to acquire and disseminate new scientific knowledge. During basic research, maximum flexibility is desired to allow the researcher the necessary latitude to conduct the research.
- APPLIED RESEARCH—Applied research consists of research tasks that acquire data and documentation necessary to confirm the satisfactory reproducibility of results. The emphasis during this stage of a research task is on achieving adequate documentation and controls necessary to be able to reproduce results.
- DEVELOPMENTAL WORK—Development work consists of research tasks moving toward technology commercialization. These tasks still require a degree of flexibility, and there is still a degree of uncertainty that exists in many cases. The role of quality on development work is to make sure that adequate controls exist to support movement into commercialization.
- RESEARCH AND DEVELOPMENT SUPPORT ACTIVITIES—Support activities are those that are conventional and secondary in nature to the advancement of knowledge or development of technology, but allow the primary purpose of the work to be accomplished in a credible manner. An example of a support activity is controlling and maintaining documents and records. The level of quality for these activities is the same as for developmental work.

The work described in this report has been completed under the QA Technology level of Development Work. WTPSP addresses internal verification and validation activities by conducting an Independent Technical Review of the final data report in accordance with WTPSP's procedure QA-WTPSP-601, "Document Preparation and Change." This review verifies that the reported results are traceable, that inferences and conclusions are soundly based, and the reported work satisfies the Test Plan objectives. Appendix E lists the reviewed test plan, test instructions, and calculation packages used for the tests documented in this report.

3.2 Stack Tests

The tests described in the following sub-sections were conducted under flow conditions between 70% and 115% of the design flow condition designed for each stack, which were listed in Table 2.2. The test matrix included with the test plan described the minimum number of tests that were planned for each stack. The actual number of tests typically differed from the test plan because tests were added to confirm results or to confirm trends in the results across different ports.

Before conducting the tests to determine whether the four qualification criteria described in Section 1.1 were met for each stack, two other measurement sets were made. First, the major features of the stack were measured. The longitudinal distance from the fans to the bends, duct reducers, and ports were determined in addition to the duct diameter at each measurement port. The second set of preliminary measurements determined the fan frequency settings needed to achieve the desired flow rates. For these measurements, the location within the duct cross-section with velocity measurements closest to the mean velocity was determined at Port 2. Then, velocity measurements were made at this single

measurement point at 5-Hz increments in the fan frequency setting. By developing a frequency vs. velocity relationship for the scale model stack, the frequency setting needed to achieve the 70% and 115% flow conditions could be pre-determined.

Measurements were made at specific locations within the duct for each of the four qualification criteria tests described in the following sub-sections. The number and distance between measurement points was based on the U.S. Environmental Protection Agency (EPA) procedure 40 CFR 60, Appendix A, Method 1, for circular stacks. For a 12- to 24-inch duct diameter, eight traverse points are required at the relative positions shown in Figure 3.1. Measurements were also made at the center point. In lieu of making the two measurement points nearest to the walls at 3.2% of the duct diameter from the duct walls, the minimum distance from the wall was set to 0.5 inch. The measurement point closest to the port was Point 1, while the point farthest from the port was Point 8.

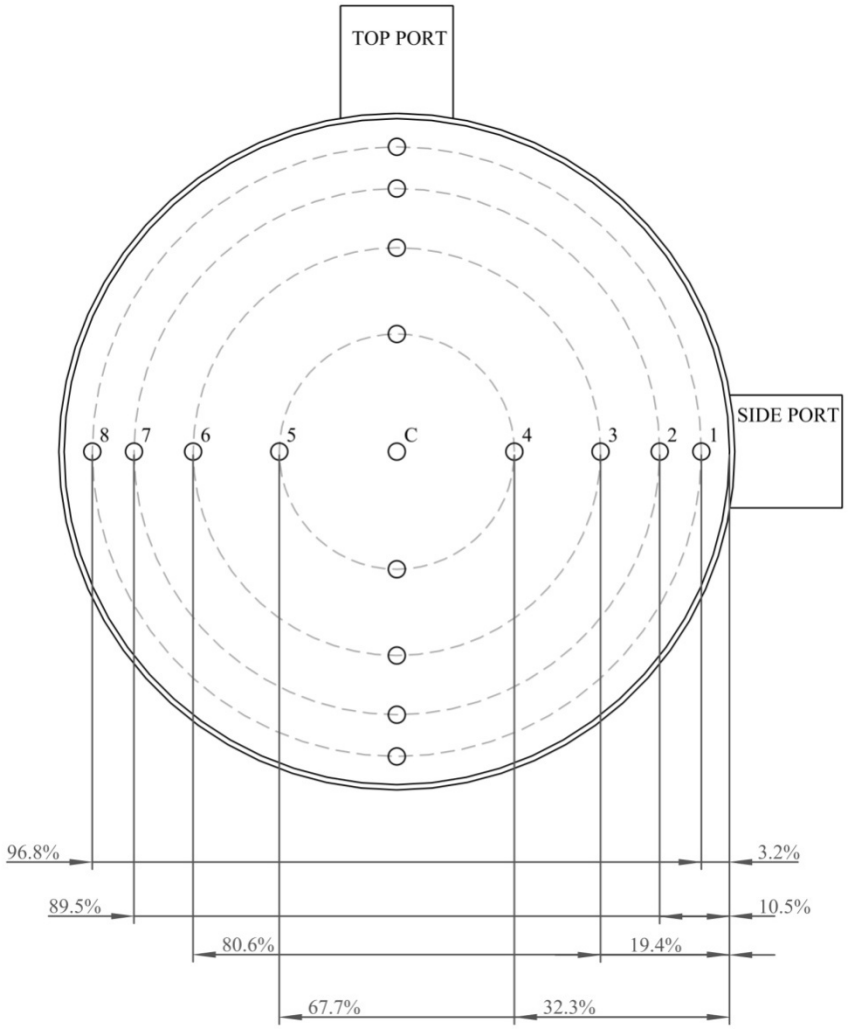

Figure 3.1. Cross-Section of the Duct at the Testing Ports with Measurement Points

3.2.1 Velocity Uniformity

The uniformity of air velocity at the stack monitoring location indicates whether the momentum in the stack is well-mixed. The method used to conduct the velocity uniformity tests was based on 40 CFR 60, Appendix A, Method 1. The criterion for qualification from the velocity uniformity test is that the %COV should be less than 20% in the center two-thirds of the duct (measurement points 2-7).

For each run, three air velocity readings were obtained at each of the measurement points across the cross-section of the duct. The measured velocity was the average of the three readings. The measured velocity for each point was used to determine the mean and standard deviation of the velocity across the cross-sectional plane. The %COV (also known as the percent relative standard deviation) was calculated as 100 times the standard deviation divided by the mean.

Air velocity measurements were made using one of two instruments. A standard Pitot tube connected to a calibrated electronic manometer (Solomat, Zephyr, Norwalk, CT) was used for two of the stacks. Alternately, a handheld thermal anemometer (TSI, Model 8360, Shoreview, MN) was used. Duct air temperature measurements were also made with the handheld thermal anemometer. Figure 3.2 shows the equipment used for this test. The standard Pitot tube was oriented within the duct so that the tip pointed into the flow. Although the principle of operation is different between these two instruments, they were used with up-to-date calibrations and no instrument-related biases were expected in the testing results. The procedure EMS-JAG-04 and the test instructions TI-RPP-WTP-676, TI-RPP-WTP-689, and TI-WTPSP-642 were followed to conduct this test for each of the three scale models.

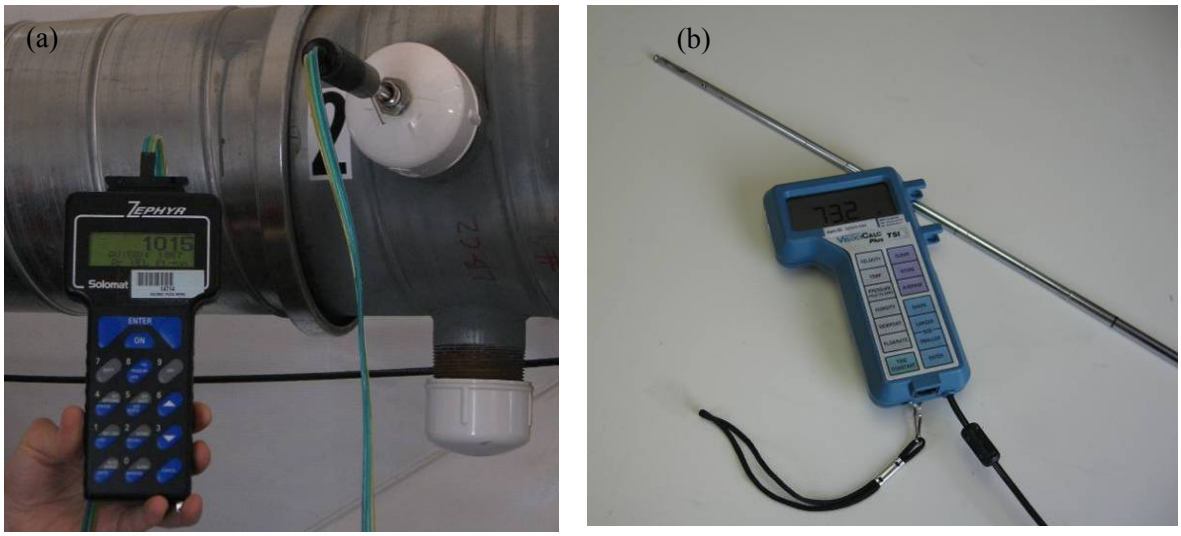

Figure 3.2. Equipment Used for the Velocity Uniformity Test (a) standard Pitot Tube Connected to the Solomat Zephyr Electronic Manometer, and (b) Thermal Anemometer

3.2.2 Flow Angle

The air velocity vector approaching the sample nozzle should be aligned with the axis of the nozzle within an acceptable range so that the sample extraction performance is not degraded. The test method is

based on 40 CFR 60, Appendix A, Method 1, Section 11.4, "Verification of the Absence of Cyclonic Flow." The term "flow angle" refers to the angle between the velocity vector of the flow in the duct and the axis of the sampling nozzle. For the stack testing activities, the flow angle was measured at a grid of nine points across two axes in a cross-section of the duct (see Figure 3.3). The qualification criterion for the flow angle test is that the average angle should not exceed 20°.

The flow angle measurements were made using an S-type Pitot tube (Dwyer Instruments, 160S-36, Michigan City, IN) attached by flexible tubing to a slant-tube manometer (Dwyer Instruments, 400-5) and an angle-indicating device attached to the sampling port as shown in Figure 3.3. For this test, the S-type Pitot tube was rotated so that the planes of the two openings at the tip of the tube were parallel to the flow in the duct. The Pitot tube is considered perpendicular to the flow in this position. The metal plate and pointer in Figure 3.3 is the angle-indicating device. It has markings at every degree from -30 degrees to +30 degrees. When the pressures on both tubes of the S-type Pitot tube were equal (as indicated by the manometer), the Pitot tube was perpendicular to the flow. The measured flow angle for each point is the average of the three readings. These measured values are used to calculate the mean absolute value of the flow angle across the duct. The procedure EMS-JAG-05 and the test instructions TI-RPP-WTP-677, TI-RPP-WTP-689, and TI-WTPSP-018 were used to conduct this test for each of the three scale models.

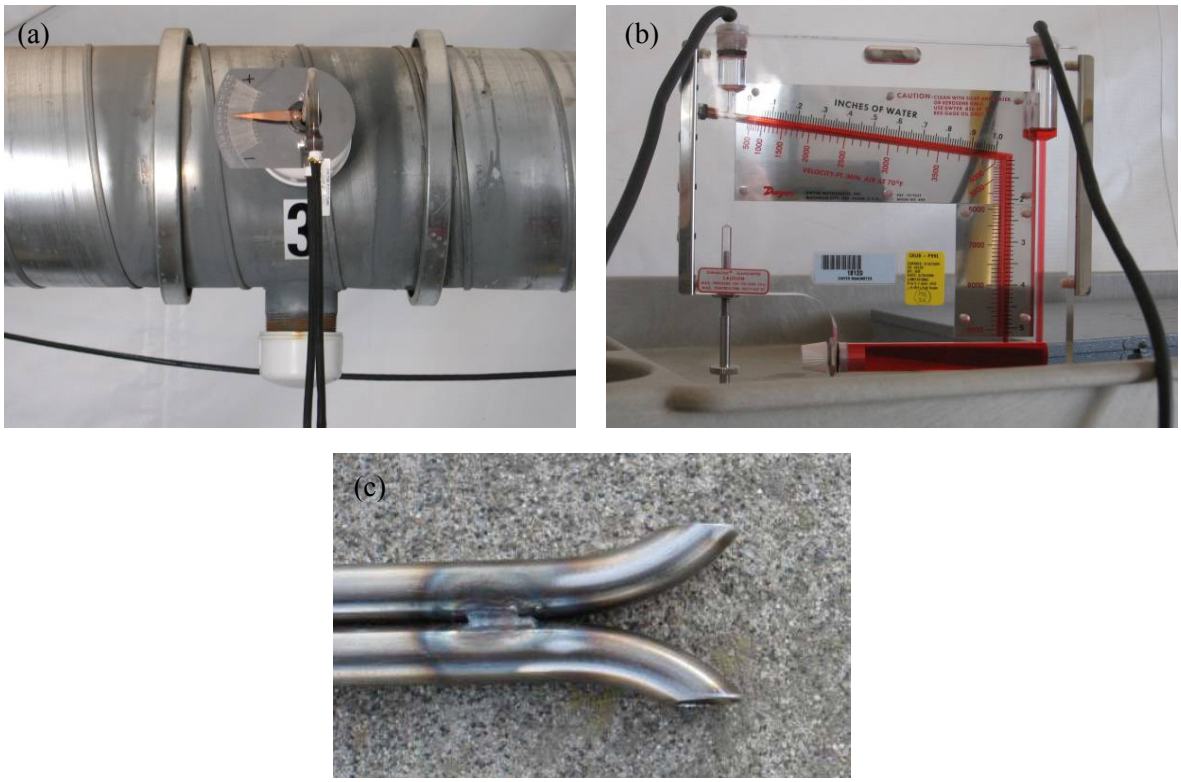

Figure 3.3. Equipment Used for the Flow Angle Test (a) S-type Pitot Tube Inserted in a Measurement Port with the Protractor Plate, (b) Slant-Tube Manometer, and (c) Openings at Tip of S-Type Pitot Tube

3.2.3 Gaseous Tracer Uniformity

The gaseous contaminant concentration uniformity was demonstrated using the tracer gas sulfur hexafluoride (SF_6). A compressed gas cylinder and a flow controller were used to deliver a constant stream of SF_6 into the duct. The gaseous tracer was typically injected into the duct at a point just downstream of the fans. Figure 3.4 shows the injection locations with an injection probe positioned in the port. For separate test runs, the injection probe is usually positioned at five different locations through the port: the centerline and four positions near the corners if the duct is rectangular, or near the wall if the duct is circular. For some tests, just the centerline position is used.

For each test run, the tracer concentration was read three times at each of the measurement points across the duct. The measured concentration for each point is the average of the three readings. These measured concentrations are used to calculate the overall mean, standard deviation, and %COV. These calculations are also performed just for the measurement points in the center two-thirds of the duct. The criteria for qualification for the gaseous tracer test are that 1) the %COV should be $\leq 20\%$ within the center two-thirds of the duct, and 2) the concentration at any measurement point should not deviate from the overall mean by more than 30%.

A photoacoustic gas analyzer (Brüel & Kjær, Model 1302, Ballerup, Denmark) was used to measure tracer gas concentrations. The concentration variation is the important result for this test, so calibration bias is not important in the test results. However, the analyzer response was checked with calibration standards before and after conducting the test series (as well as weekly during the test series) to verify an adequate instrument response. The response was considered acceptable if the concentration from the instrument was within 10% of the calibration standard.

Figure 3.4. Equipment Used for the Gaseous Tracer Injection

A simple probe was used to extract the sample and deliver it to the gas analyzer. A small pump drew air from within the stack through the probe. The gas analyzers then sampled the air from the sample line for analysis. Figure 3.5 shows the equipment setup for this test. The procedure EMS-JAG-01 and the test instructions TI-RPP-WTP-678, TI-RPP-WTP-690, and TI-WTPSP-020 were used to conduct this test for each of the three scale models.

Figure 3.5. Equipment Used for the Gaseous Tracer Sampling (a) Simple Sampling Probe Installed in a Port, (b) Gas Analyzer, and (c) Sampling Pump

3.2.4 Particle Tracer Uniformity

The uniformity of the particulate contaminant concentration was demonstrated using polydisperse pump oil particles as a particle tracer. Vacuum pump oil was drawn into a spray nozzle (driven by compressed air) housed in a plastic chamber. These aerosol particles were injected into the duct air at an injection point downstream of the fans as shown in Figure 3.6. Figure 3.6 shows the equipment setup for an aerosol injection in the LB-C2 scale model stack. The plastic chamber and spray nozzle assembly is also referred-to as the aerosol generator. The aerosol was injected at the centerline of the duct, and this test was repeated to gain some sense of the variability of the results.

The concentration of the particles is measured at the sampling grid points with a calibrated optical particle counter (OPC, Met-One Model A2408, Grants Pass, OR). A simple probe was used to extract the sample and deliver it to the OPC. Figure 3.7 shows the sampling setup with the simple probe connected to the OPC. The particle counter is in its normal "horizontal" position. Typical measurements were made with a single instrument, but the figure illustrates the OPC orientation for the side and bottom ports if different probes are used. Figure 3.8 shows the two types of sampling probes used. The OPC sorts the particles into six size channels. As mentioned in Section 1.1, the particles of interest have an AD of 10 μm. Therefore, only data in the 9- to 11-μm channel of the OPC were used.

The particle concentration was read three times at each of the measurement points across the cross-section of the duct. The measured concentration for each point is the average of the three readings. From these measurements, the overall mean standard deviation, and %COV were calculated for all of the points and also just for those within the center two-thirds of the duct. The qualification criterion for the particle

tracer test is that the %COV should be less than or equal to 20% within the center two-thirds of the duct. The procedure EMS-JAG-02 and the test instructions TI-RPP-WTP-679, TI-RPP-WTP-691, and TI-WTPSP-021 were used to conduct this test for each of the three scale models.

Figure 3.6. Equipment Used for the Particle Injection (LB-C2)

Figure 3.7. Particle Counters Used for the Particle Sampling

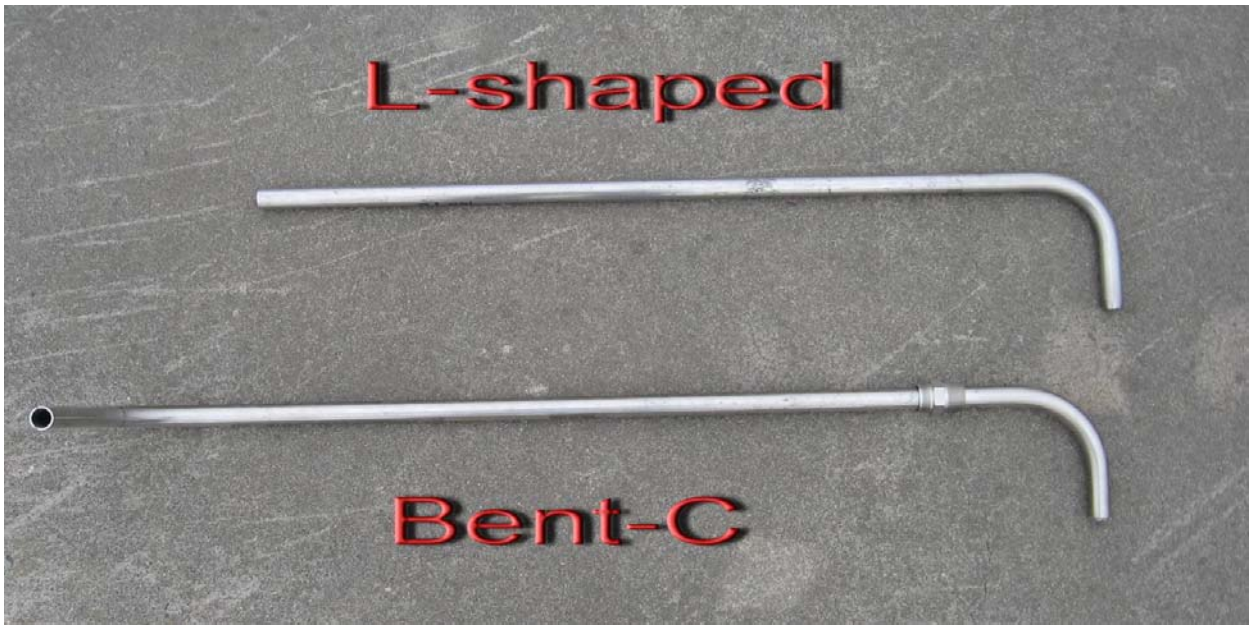

Figure 3.8. Probes Used for the Particle Sampling

4.0 Stack Testing Results

This section summarizes the results of the stack testing activities for the three scale model stacks in Group 5-6 (LB-C2, LV-S1, and LB-S2). Two kinds of results are presented in this section. The primary, reportable results are the data and data calculations to confirm that the requirements of the ANSI/HPS N13.1-1999 standard have been met. Independent reviews were performed to verify the data transcription and calculations. These calculations were performed using Excel (2003) and documented in Computational Computer Program (CCP) packages in accordance with WTPSP procedures (see Appendix E). The final data sheets are included in Appendices A through C. Tables summarizing the results of tests for each scale model are presented in subsections of this section.

Secondary statistical evaluations of the data were performed using the Minitab software (Minitab 2010). These secondary evaluations of the data are described subsequently. The results of these secondary evaluations do not relate to meeting the requirements of the ANSI/HPS N13.1-1999 standard, and hence they are not "reportable results". They are provided for information only. Therefore, these secondary results and the Minitab software and calculations are not subject to the WTPSP Software Configuration Management Program.

The results from the Group 5-6 model tests were statistically analyzed to assess whether the variables varied in testing (discussed in the following subsections) have statistically significant individual effects and interactive effects on the test responses of interest. Two test variables interact if the effect on the response of one variable depends on the level of the second variable. If the effect on the response of one test variable does not change much for different levels (i.e., values) of the other variable, then they do not have an interactive effect on the response. The test responses statistically analyzed include Flow Angle, Velocity %COV, Gas Tracer %COV, Gas Tracer Max %Deviation, and Particle Tracer %COV.

A statistical analysis of variance (ANOVA) using general linear model methods (Rencher and Schaalje 2008) was performed using the Minitab (2010) software for each of the test responses. ANOVA is a statistical method that assesses whether the effects of test variables and their interactions are statistically significant compared to the inherent testing and measurement uncertainty in the data. The statistical ANOVA for each response variable was performed on a subset of the data for Test Ports 1, 2, and 3 because those test ports cover the range of possible sampling probe locations. Further, those test ports have sufficient test and replicate data that support statistically assessing the individual and interactive effects of the test variables.

For each test response, a summary table and graph of the test response values (e.g., %COV) for Test Ports 1, 2, and 3 are given. Each graph shows the response values on the y-axis; Test Ports 1, 2, and 3 on the x-axis; and the other test variable (fans, fan-injection port, or fan-%flow-injection port) with different plotting symbols and colors. For test combinations with replicate tests, the average response values for the replicates of each test were calculated. Lines connecting the average results at specific test combinations for Test Ports 1, 2, and 3 are shown in the graphs. If the lines are roughly parallel for the values of the other test variable, then the two test variables do not interact. This provides an easy graphical way to subjectively assess interactive effects of the two test variables on a test response. Meanwhile, the ANOVA provides for objectively assessing whether the individual or interactive effects of test variables are statistically significant.

4.1 LB-C2 Stack Results

Data tables, data plots, summary tables of the data for Test Ports 1, 2, and 3, and results of statistical analyses for LB-C2 flow angle, velocity, gas tracer, and particle tracer test results are presented in the following subsections. Some test combinations were replicated (performed more than once at different times) to quantify the testing and measurement uncertainty in response values. The replicate-test uncertainties (standard deviations) are summarized in Table 4.1. Hence, the standard deviations in Table 4.1 are estimates of the uncertainty in individual test results listed in this report.

Table 4.1. Testing and Measurement Uncertainties in Response Values Estimated from Replicate Tests with the LB-C2 Model

Response	DF[(a)]	Standard Deviation[(b)]
Velocity %COV	7	0.44
Flow Angle (degrees)	16	1.58
Gas Tracer %COV[(c)]	8	0.62
Gas Tracer %MaxDev[(c)]	8	1.60
Particle Tracer %COV[(d)]	6	2.85
	5	1.47

(a) DF = degrees of freedom associated with replicate sets used to estimate a pooled standard deviation—the larger the DF, the better the estimate of testing and measurement uncertainty.
(b) These standard deviations are "pooled" over all replicate sets for a given response, assuming that the uncertainty in testing and measurement is the same for every test combination.
(c) Based on measurements at the center of the cross section.
(d) Results for DF = 6 include a potentially outlying replicate value. That value was removed to yield the DF = 5 results.

4.1.1 LB-C2 Velocity Uniformity

The initial test to determine the fan frequency setting for the LB-C2 model is included in Appendix A, Subsection A.1. Table 4.2 lists the results for the velocity uniformity tests performed on the scale model LB-C2 stack. In all cases for Test Ports 1, 2, and 3, the results were well within the criterion of %COV values ≤ 20%. The flow through the stack ranged from 876 acfm (actual cubic feet per minute) to 2094 acfm (which corresponds to velocities of 1139 to 2177 fpm) with one and two operating fans, respectively. Table 2.2 lists the desired range of minimum scale model flow rates as 833 to 1683 scfm (or 1061 to 2143 sfpm), so the measurement ranges matched fairly well with the desired minima. With these flow conditions, the scale model meets both the Reynolds number and DV criteria required to represent the actual stack with one or two operating fans. The completed data sheets from these tests are available in Appendix A, Subsection A.2.

Tests near bends in the duct using a Pitot tube results in measurements with a higher degree of error due to the fact that the velocity vector is not aligned with the axis of the Pitot tube. As a result, the thermal anemometer, which is less sensitive to the direction of the local velocity vector, was used for these port positions. Runs VT-19 and VT-22 in Table 4.2 used the Pitot tube too close to a bend; therefore these data will not be included in susbsequent analyses.

Table 4.3 summarizes the %COV results at the three test ports bracketing the planned sampling location (i.e., Test Port 2) and each of the three fan operating conditions. Figure 4.1 shows a plot of the data for Test Ports 1, 2, and 3, with Velocity %COV on the y-axis, Test Port on the x-axis, and Fans with different plotting symbols and colors. The patterns of black, red, and blue lines for Fan A, Fan B, and Both Fans are noticeably non-parallel, suggesting an interactive effect of Test Port and Fans on Velocity %COV. The statistical ANOVA confirmed that the interaction is highly significant (~ 97% confidence). The effects of Test Port (averaged over Fans) and Fans (averaged over Fans) on Velocity %COV were both statistically significant (~99% and ~97% confidence, respectively). However, the nature of the effect of each variable depends on the levels of the other variable because of the significant interaction. Regardless, because the Velocity %COV values for Test Ports 1, 2, and 3 are far below the qualification criterion of 20%, statistically significant effects of the test variables on Velocity %COV are not of practical significance.

Table 4.2. Summary of LB-C2 Velocity Uniformity Tests

Operating Fan(s)	Test Port	Run No.	Flow (acfm)	Velocity (fpm)	%COV
A	1	VT-11	986	1282	4.6
		VT-7	990	1287	4.2
		VT-9	996	1295	4.1
	2	VT-8	991	1309	3.6
	3	VT-10	992	1303	1.3
B	1	VT-12	964	1254	1.9
	2	VT-13	981	1297	2.4
	3	VT-16	929	1221	1.9
		VT-15	971	1276	2.5
		VT-14	997	1309	1.6
Both	1	VT-2	1938	2520	3.4
	2	VT-3	1788	2362	3.1
		VT-17	1815	2397	4.2
		VT-5	1872	2472	3.3
		VT-6	1875	2477	3.2
	3	VT-4	1914	2515	2.0
	4	VT-18	1892	2472	13.5
	5	VT-21	2094	2177	29.1
	6	*VT-22*	*1600*	*1671*	*40.2*
	7	VT-23	918	1175	33.7
	8	*VT-19*	*500*	*651*	*140.6*
		VT-20	876	1139	23.0

Note 1: Individual or replicate sets of tests are alternately shaded and unshaded.
Note 2: Italicized tests have been excluded in subsequent analyses.

The air sampling probe for the LB-C2 stack can be placed anywhere between the Port 1 and Port 3 positions to meet the velocity uniformity criterion. The results for Test Ports 4, 5, 7, and 8 in Table 4.2

show the effect of proximity to a duct reducer and 90° bends. Locating sampling probes near bends would be unsatisfactory.

4.1.2 LB-C2 Flow Angle

Table 4.4 lists the results for the flow angle tests performed on the scale model LB-C2 stack. The results for all tests were well within the criterion of flow angle values ≤ 20°. Typical results were between 3 and 7 degrees for the ports that were measured. Operational problems during two test runs (FA-1 and FA-4) prompted them to be excluded from further analysis, and repeat tests were performed. Table 4.5 summarizes the flow angle results at Test Ports 1, 2, and 3 for each of the three fan conditions.

Table 4.3. LB-C2 Velocity Uniformity (%COV) at Three Test Ports as a Function of Operating Fan

Test Port	Fan A	Fan B	Both
1	4.27	1.87	3.43
2	3.62	2.42	3.48
3	1.32	2.01	2.00

Note: Table entries for a specific combination of Test Port and Fan are average results from multiple tests when available; otherwise, the entries are the results from single tests. Although averaging is not the traditional statistical way to combine %COV values, it suffices for data summary purposes.

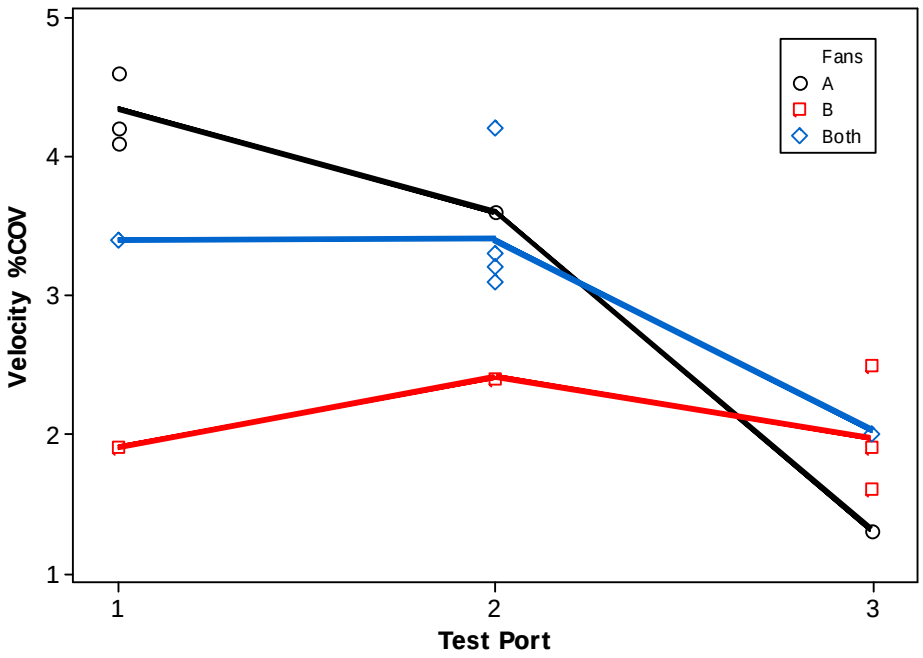

Figure 4.1. Plot of Velocity %COV Versus Test Port and Fans for the LB-C2 Model. Lines connect the averages of replicate values or the single value (for tests that were not replicated).

Figure 4.2 shows a plot of the data for Test Ports 1, 2, and 3, with Flow Angle on the y-axis, Test Port on the x-axis, and Fans with different plotting symbols and colors. The pattern of black lines (Fan A) is different than the roughly parallel patterns for the red lines (Fan B) and blue (Both Fans) lines. This indicates some interactive effect of Test Ports and Fans on Flow Angle. However, because it mainly occurred for Fan A, the interaction was not strong enough to be statistically significant in the ANOVA. The effect of Fans (averaged over Test Ports 1, 2, and 3) on Flow Angle was statistically significant (> 99% confidence). The effect of Test Port (averaged over Fans) on Flow Angle was not statistically significant, which is a result of the opposite effect pattern for Fan A compared to the patterns for Fan B and Both Fans. Although statistically significant, the test variable effects on Flow Angle are not of practical significance given that the results for Test Ports 1, 2, and 3 were well below the qualification criterion of 20°.

Table 4.4. Summary of LB-C2 Flow Angle Tests

Operating Fan(s)	Test Port	Run No.	Approximate Air Velocity (fpm)	Mean Absolute Flow Angle (°)
A	1	FA-8	1380	10.6
		FA-27	1670	5.6
	2	FA-9	1430	5.0
		FA-26	1740	4.8
	3	FA-10	1360	5.7
		FA-11	1340	9.8
		FA-12	1360	7.2
		FA-13	1380	6.0
		FA-25	1630	7.0
B	1	FA-17	1190	5.4
		FA-18	1160	2.8
		FA-20	1520	2.5
		FA-21	1170	2.9
		FA-28	1410	4.4
	2	FA-16	1290	3.4
	3	FA-15	1310	3.9
Both	1	*FA-1*	*2550*	*3.0*
		FA-2	2910	5.1
		FA-19	3510	2.9
		FA-22	3620	5.6
	2	FA-3	2550	6.8
		FA-4	*2740*	*5.6*
		FA-5	2750	5.0
		FA-23	3410	3.4
		FA-24	3410	5.3
	3	FA-6	2750	4.0
		FA-14	2720	3.8
	4	FA-7	2750	2.3

Note 1: Individual or replicate sets of tests are alternately shaded and unshaded.
Note 2: Italicized tests have been excluded in subsequent analyses.

Table 4.5. LB-C2 Flow Angle (°) at Three Test Ports as a Function of Operating Fan

Test Port	Fan A	Fan B	Both
1	8.08	3.59	4.51
2	4.90	3.41	5.12
3	7.16	3.91	3.93

Note: Table entries for a specific combination of Test Port and Fan are average results from multiple tests when available; otherwise, the entries are the results from single tests.

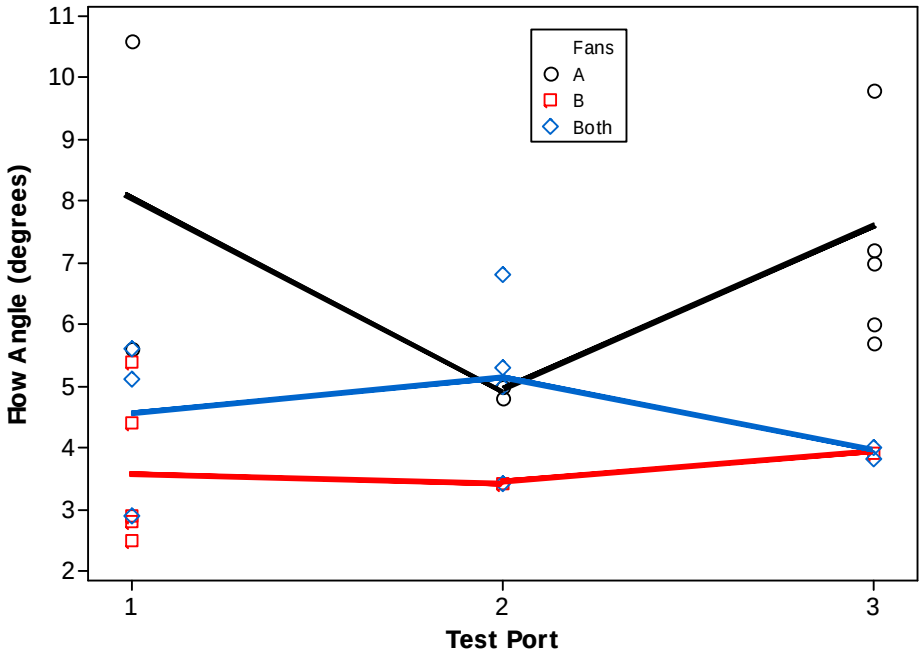

Figure 4.2. Plot of Flow Angle (Degrees) Versus Test Port and Fans for the LB-C2 Model. Lines connect the averages of replicate values or the single value (for tests that were not replicated).

The results for the three ports meet the test criteria and are fairly similar to each other, indicating that the sampling probe could be located at any location along this section of duct from the perspective of the flow angle criterion. The completed data sheets from these two tests are available in Appendix A, Subsection A.3.

4.1.3 LB-C2 Gaseous Tracer Uniformity

During the gas tracer testing, the response of the gas analyzers was checked against calibration standards of appropriate concentrations, and the results met the requirements of the procedure. Table 4.6 lists the results for the gaseous tracer uniformity tests performed on the scale model LB-C2 stack for the

three test ports and the tracer injection at the fan outlets. In all cases, the results were well within the criteria of %COV values ≤ 20% and absolute values of maximum deviation ≤ 30%.

Table 4.7 and Table 4.8 summarize the gas tracer uniformity results at Test Ports 1, 2, and 3 for each of the three Fan conditions. The completed data sheets from these tests are available in Appendix A, Subsection A.4. The gas tracer uniformity results for LB-C2 are discussed further in Sections 4.1.3.1 to 4.1.3.3.

Table 4.6. Summary of LB-C2 Gas Tracer Uniformity Tests at Test Ports 1, 2, and 3

Operating Fan(s)	Injection Port & Location	Test Port	Run No.	Velocity at Center (fpm)	%COV	Abs % Max Dev. from Mean
A	A Center	1	GT-10	1365	3.2	6.5
		2	GT-11	1360	2.9	5.2
		3	GT-9	1310	1.6	4.9
			GT-13	1340	2.3	4.7
			GT-14	1370	2.6	7.3
B	B Center	1	GT-17	1285	2.9	4.9
			GT-18	1265	2.3	4.8
			GT-19	1260	2.5	6.0
		2	GT-16	1295	2.4	7.0
		3	GT-15	1285	3.4	6.0
Both	A Center	1	GT-1	2800	5.0	8.6
		2	GT-2	2735	4.4	9.4
			GT-3	2765	4.1	10.2
			GT-12	2650	3.9	8.0
	A East	2	GT-5	2740	3.7	5.7
	A Far	2	GT-6	2720	5.8	13.2
			GT-23	2760	4.2	9.0
			GT-24	2620	3.8	8.6
	A Near	2	GT-7	2730	1.5	7.9
	A West	2	GT-4	2680	4.3	8.3
	B Center	2	GT-20	2755	2.3	7.0
	B Far	2	GT-22	2490	3.9	6.6
	B Near	2	GT-21	2785	3.2	5.8
	A Center	3	GT-8	2840	2.1	6.5

Note: Individual or replicate sets of tests are alternately shaded and unshaded.

Table 4.7. LB-C2 Gas Tracer Uniformity (%COV) at Three Test Ports as a Function of Operating Fan, Injection Port, and Injection Location

		Fan A	Fan B	Both Fans	
Test Port	Injection Location	Exit Fan A	Exit Fan B	Exit Fan A	Exit Fan B
1	Center	3.2	2.6	5.0	—
2	Center	2.9	2.4	4.1	2.3
	East	—	—	3.7	—
	Far	—	—	4.6	3.9
	Near	—	—	1.5	3.2
	West	—	—	4.3	—
3	Center	2.2	3.4	2.1	—

Note: Table entries for a specific combination of test variables are average results from multiple tests when available; otherwise, the entries are the results from single tests. Although averaging is not the traditional statistical way to combine %COV values, it suffices for data summary purposes.

Table 4.8. LB-C2 Gas Tracer Percent Maximum Deviation from Mean at Three Test Ports as a Function of Operating Fan, Injection Port, and Injection Location

		Fan A	Fan B	Both Fans	
Test Port	Injection Location	Exit Fan A	Exit Fan B	Exit Fan A	Exit Fan B
1	Center	6.5	5.2	8.6	—
2	Center	5.2	7.0	9.2	7.0
	East	—	—	5.7	—
	Far	—	—	10.3	6.6
	Near	—	—	7.9	5.8
	West	—	—	8.3	—
3	Center	5.6	6.0	6.5	—

Note: Table entries for a specific combination of test variables are average results from multiple tests when available; otherwise, the entries are the results from single tests.

4.1.3.1 Gas Tracer %COV Results for LB-C2

Figure 4.3 shows a plot of the data for Test Ports 1, 2, and 3, with Gas Tracer %COV on the y-axis, Test Port on the x-axis, and the combined varible Fans-Injection Port_Location with different plotting symbols and colors. Lines connect the individual or average Gas Tracer %COV results across Tests Ports 1, 2, and 3 for the three primary test conditions: "Fan A-Injection Port A_Center" (black lines), "Fan B-Injection Port B_Center" (red lines), and "Both Fans-Injection Port A_Center" (blue lines). The Gas Tracer %COV values for several test conditions using Test Port 2, Both Fans, and Injection Ports A and B at other locations in the duct cross-section are also plotted as individual points. Note that the Both-A_Far and Both-A_Near data points have, respectively, the largest and smallest Gas Tracer %COV values in Figure 4.3. This suggests that the location of injection in the model cross-section has a large effect on Gas Tracer %COV. Still, the Gas Tracer %COV results for Test Ports 1, 2, and 3 are all well below the limit of 20 %COV.

The patterns of black, red, and blue lines for the three primary test conditions are noticeably non-parallel, suggesting an interactive effect of Test Port and Fans-Injection Port on Gas Tracer %COV. The statistical ANOVA confirmed that the interaction is highly significant (~ 99% confidence). The effects of Test Port (averaged over Fans-Injection Port) and Fans-Injection Port (averaged over Test Port) on Gas Tracer %COV are both statistically significant (each with ~98% confidence). However, the nature of the effect of each variable depends on the levels of the other variable because of the significant interaction. Regardless, because the Gas Tracer %COV values for Test Ports 1, 2, and 3 are far below the qualification criterion of 20%, statistically significant effects of the test variables on %COV are not of practical significance.

4.1.3.2 Gas Tracer Maximum Percent Deviation Results for LB-C2

Figure 4.4 shows a plot of the data for Test Ports 1, 2, and 3, with the absolute values of gas tracer percent maximum deviation (Gas Tracer %MaxDev) on the y-axis, Test Port on the x-axis, and the combined variable Fans-Injection Port_Location with different plotting symbols and colors. Lines connect the individual or average Gas Tracer %MaxDev results across Tests Ports 1, 2, and 3 for the primary three test conditions: "Fan A-Injection Port A_Center" (black lines), "Fan B-Injection Port B_Center" (red lines), and "Both Fans-Injection Port A_Center" (blue lines). The Gas Tracer %MaxDev values for several test conditions using Test Port 2, Both Fans, and Injection Ports A and B at other locations in the model cross-section are also plotted as individual points. Some non-parallel patterns of black, red, and blue lines in Figure 4.4 would typically suggest an interactive effect of Test Port and Fans-Injection Port. However, statistical ANOVA showed that the interactive effect of these two variables on Gas Tracer %MaxDev is not statistically significant. Further, the Test Port variable did not have a statistically significant effect on Gas Tracer %MaxDev, whereas the Fan-Injection Port variable did have a statistically significant effect (~ 94% confidence). Regardless, because the Gas Tracer %MaxDev values for Test Ports 1, 2, and 3 are far below the qualification criterion of 30%, the statistically significant effect of one test variable on %MaxDev is not of practical significance.

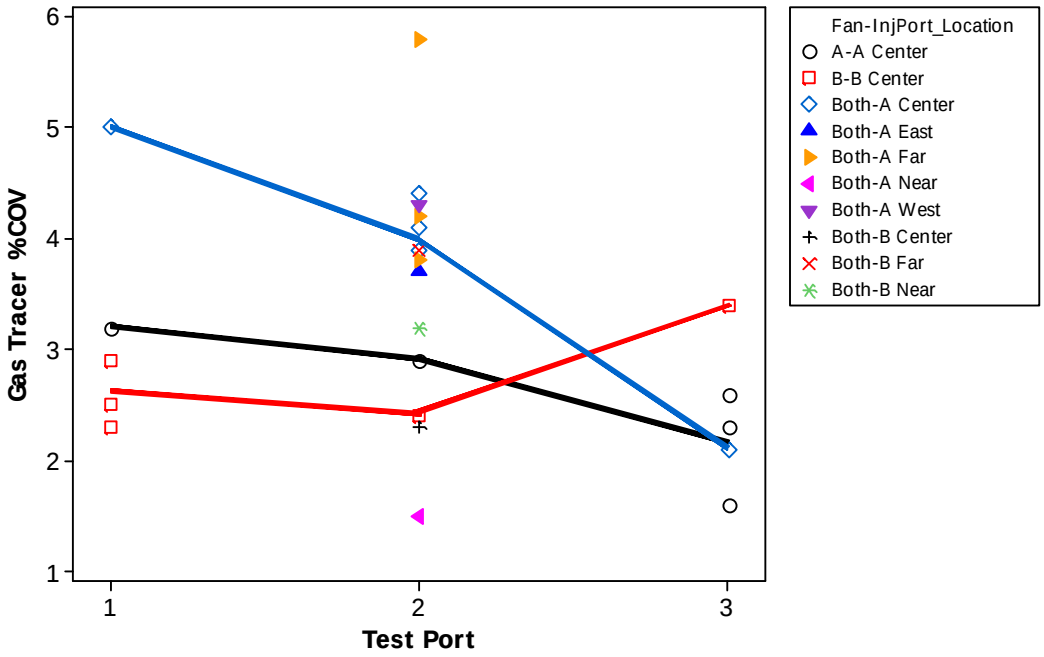

Figure 4.3. Plot of Gas Tracer %COV Versus Test Port and Fans-Injection Port_Location for the LB-C2 Model. Lines connect the averages of replicate values or the single value (for tests that were not replicated). The average for Both Fans at Test Port 2 used only the data from injections at the center of Injection Port A (Both-A).

4.1.3.3 Tests with Other Injection Ports and Test Ports for LB-C2

To illustrate how gas-tracer uniformity is affected by proximity to features that change the airflow, test runs were also performed at the other test ports while the tracer injection continued along the centerline of the duct just downstream of the fans and dampers. The results are listed in Table 4.9. (Run GT-33 was omitted from this analysis because the average tracer gas concentration was too low relative to the background level.)

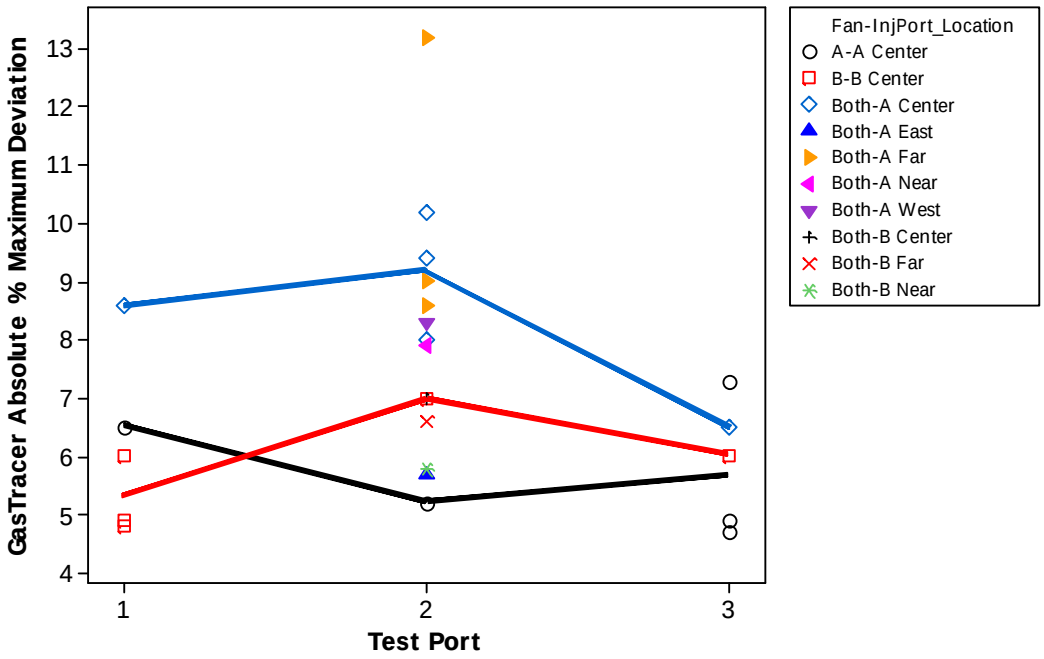

Figure 4.4. Plot of Gas Tracer % Maximum Deviation Versus Test Port and Fans-Injection Port_Location for the LB-C2 Model. Lines connect the averages of replicate values or the single value (for tests that were not replicated). The average for Both Fans at Test Port 2 used only the data from injections at the center of Injection Port A (Both-A).

Table 4.9. Summary of LB-C2 Gas Tracer Uniformity Tests at Test Ports 4 through 8

Operating Fan(s)	Injection Port & Location	Test Port	Run No.	%COV	Abs % Max. Dev. from Mean
Both	A Center	4	GT-30	9.3	22.4
		5	GT-41	24	56.3
		6	GT-32	77	117
	B Center	7	GT-34	89	200
	A Center	8	GT-31	40	85.7

A few additional tests, in combination with those in Table 4.6, were analyzed to investigate how far upstream the tracer injection port would have to be installed on the actual stack such that its location does not significantly impact the gas tracer mixing results at the sampling port. The runs performed at Test Port 2, with both fans operating, are listed in Table 4.10. The percent maximum deviation results are plotted in Figure 4.5. The same pattern occurred for the %COV results. Relatively small changes to the results occurred when the injection point was further upstream than the first bend (or Test Port 6). (Runs GT-35, GT-36, and GT-37 were omitted from this analysis because their average tracer gas concentrations were too low relative to the background level.)

Table 4.10. Summary of LB-C2 Gas Tracer Uniformity at Test Port 2

Operating Fan(s)	Injection Port & Location	Test Port	Run No.	%COV	Abs % Max. Dev. from Mean
Both	3 Near wall	2	GT-42	140	274
Both	4 Center	2	GT-28	6.8	12.6
Both	4 Near wall	2	GT-43	18.7	49.9
Both	5 Center	2	GT-29	4.9	11.0
Both	5 Near wall (side)	2	GT-39	15.9	37.2
Both	6 Center	2	GT-26	4.4	8.5
Both	7 Center	2	GT-27	2.2	4.8
Both	8 Center	2	GT-25	3.0	5.3
Both	A Center	2	GT-2	4.4	9.4
Both		2	GT-3	4.1	10.2
Both		2	GT-12	3.9	8.0
Both	A Far	2	GT-6	5.8	13.2
Both		2	GT-23	4.2	9.0
Both		2	GT-24	3.8	8.6
Both	A East	2	GT-5	3.7	5.7
Both	A Near	2	GT-7	1.5	7.9
Both	A West	2	GT-4	4.3	8.3
Both	B Center	2	GT-20	2.3	7.0
Both	B Far	2	GT-22	3.9	6.6
Both	B Near	2	GT-21	3.2	5.8

Note: Individual and replicate sets of tests are alternately shaded and unshaded.

4.1.4 LB-C2 Particle Tracer Uniformity

Table 4.11 lists the results for the particle tracer uniformity tests performed on the scale model LB-C2 stack. Tests were conducted with the two fans running separately and simultaneously. The completed data sheets from these tests are available in Appendix A, Subsection A.5.

As illustrated in Figure 3.7, different sampling probes were used for the side and bottom ports to connect to the input of the OPC. During some runs, either the output of the aerosol generator varied with time, or the response of the OPC changed as the instrument was moved from traversing the duct through the side to the bottom port of the sampling location. For Run PT-15, a spare OPC was set up to sample from a fixed position, through a different test port, during the entire run. The particle concentration data from this reference OPC at Port 2 had a 3.1 %COV compared to an 8.8 %COV (un-normalized) and a 4.7 %COV (normalized) concentration variability measured while traversing at Test Port 1. In this case, the output of the aerosol generator was quite constant. The meaning of "normalized" is described in the following paragraph.

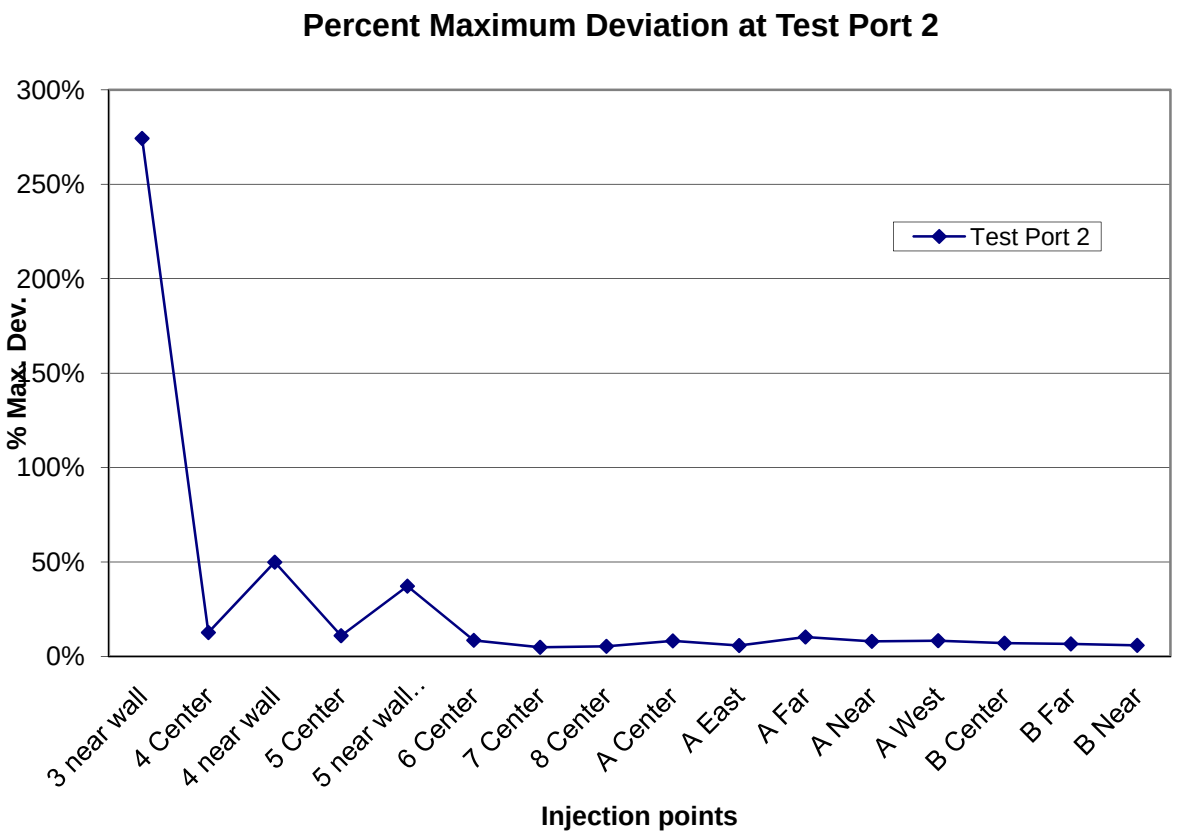

Figure 4.5. Percent Maximum Deviation of Gas Tracer from Mean for Test Port 2 of LB-C2 Model

A special test (described in Appendix D) showed that the measured particle concentration was usually higher through the bottom port. It also showed that the flow through the scale model and the aerosol generator output was fairly constant. A series of troubleshooting tests was unsuccessful in determining a consistent cause of this behavior. However, to mitigate errors, the concentration bias encountered between the two traverse directions at the measurement ports was removed by adjusting the data from the traverse with the lower concentration upward by a factor to match the concentrations at the center of the duct (the common point between the two traverses). These results were then termed "normalized." Table 4.11 shows the %COV values both with and without normalization (see Appendix D) applied. For tests where there was a large discrepancy between the concentrations measured by the two traverses, the %COV without normalization applied exceeds the qualification criterion. However, by normalizing the data, all cases meet the gas-tracer uniformity criterion of %COV ≤ 20%. Table 4.12 summarizes the average normalized results by test port and operating fan.

Figure 4.6 shows a plot of the data for Test Ports 1, 2, and 3, with Particle Tracer Normalized %COV on the y-axis, Test Port on the x-axis, and the combined variable Fans-Injection Port with different plotting symbols and colors. The patterns of black, red, and blue lines for "Fan A-Injection Port A_Center," "Fan B-Injection Port B_Center," and "Both Fans-Injection Port A_Center" are noticeably non-parallel, suggesting an interactive effect of Test Port and Fans-Injection Port on Particle Tracer %COV. An initial statistical ANOVA of the data did not find either of the two test variables or their interaction to have statistically significant effects. However, one of the three replicate results at the "Fan

A, Test Port 1" test combination may be an outlier (4.6 %COV versus 11.0 and 13.5 %COV). So, the statistical analyses were re-performed with that data point deleted. The resulting statistical analysis confirmed that the interaction of the Test Port and the Fans-Injection Port test variables is highly significant (~ 96% confidence). The effects of Test Port (averaged over Fans-Injection Port) and Fans-Injection Port (averaged over Test Port) on Particle Tracer %COV are both statistically significant (~96% and ~92% confidence, respectively). However, the nature of the effect of each variable depends on the levels of the other variable because of the significant interaction. Regardless, because the Particle Tracer %COV values for Test Ports 1, 2, and 3 are far below the qualification criterion of 20%, statistically significant effects of the test variables on Particle Tracer %COV are not of practical significance.

Table 4.11. Summary of LB-C2 Particle Tracer Uniformity Tests

Operating Fan(s)	Injection Port & Location	Test Port	Run No.	Velocity at Center (fpm)	Un-Normalized %COV	Normalized %COV
A	A Center	1	PT-11	1300	43.2	11.0
			PT-12	1349	44.6	4.6
			PT-13	1254	26.8	13.5
		2	PT-10	1289	6.7	3.5
		3	PT-5	1183	29.7	5.8
B	B Center	1	PT-15	1205	8.8	4.7
		2	PT-9	1178	9.6	8.8
		3	PT-6	1241	22.8	6.3
			PT-7	1242	6.3	6.4
			PT-8	1213	20.2	3.2
Both	A Center	1	PT-14	2260	21.1	12.2
		2	PT-1	2517	9.8	8.2
			PT-2	2509	10.4	7.7
			PT-3	2507	31.2	7.9
		3	PT-4	2579	12.2	7.3

Note: Individual and replicate sets of tests are alternately shaded and unshaded.

Table 4.12. LB-C2 Particle Tracer Uniformity (Normalized %COV) at Three Test Ports as a Function of Operating Fan

	Fan, Injection Port, and Injection Location		
Test Port	Fan A A Center	Fan B B Center	Both A Center
1	9.69	4.70	12.15
2	3.45	8.76	7.96
3	5.84	5.27	7.26

Note: Table entries for a specific combination of Test Port, Fan, and Injection Port are average results from multiple tests when available; otherwise, the entries are the results from single tests. Although averaging is not the traditional statistical way to combine %COV values, it suffices for data summary purposes.

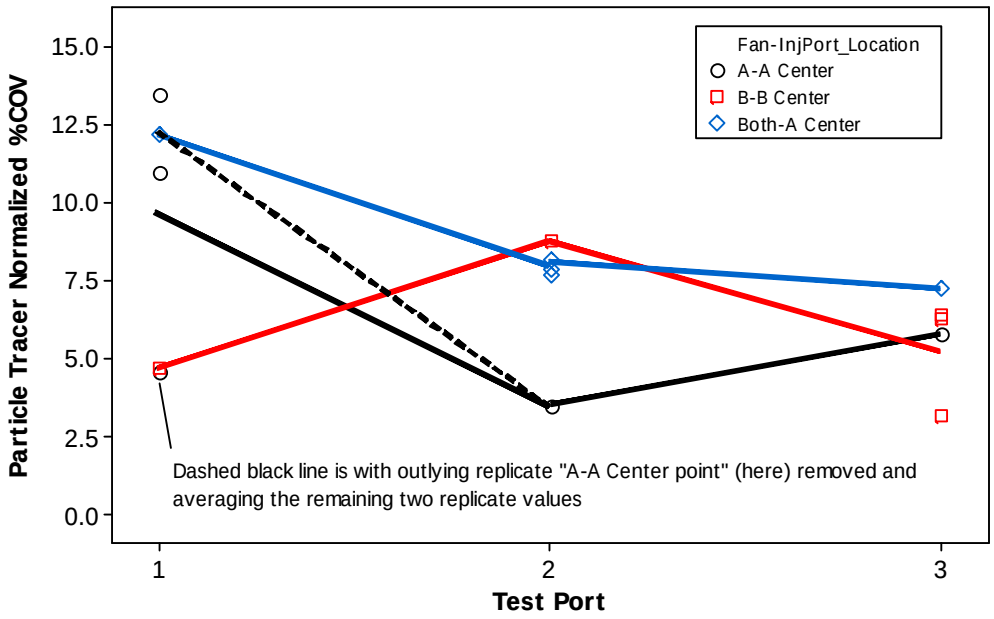

Figure 4.6. Plot of Particle Tracer Normalized %COV Versus Test Port and Fans-Injection Port_Location for the LB-C2 Model. Lines connect the averages of replicate values or the single value (for tests that were not replicated).

4.2 LV-S1 Stack Results

Data plots and results of statistical analyses for LV-S1 flow angle, velocity, gas tracer, and particle tracer test results are presented in the following subsections. Some test combinations were replicated (performed more than once at different times) to provide for quantifying the testing and response measurement uncertainty. The replicate-test uncertainties (standard deviations) are summarized in Table 4.13.

4.2.1 LV-S1 Velocity Uniformity

The initial test to determine the minimum fan frequency setting to achieve the 115% and 70% flow conditions for the LV-S1 model is included in Appendix B, Subsection B.1. Table 4.14 lists the results for the velocity uniformity tests performed on the scale model LV-S1 stack. In all cases, the results were well within the criterion of %COV values less than 20%. The flow through the stack ranged from 1204 acfm to 2293 acfm (which corresponds to velocities of 1582 to 2997 fpm). Table 2.2 lists the desired range as 1167 to 1917 scfm (or 1485 to 2440 sfpm), so the measurement ranges matched fairly well with the desired flow conditions. The first four runs (VT-1 through VT-4) were supposed to simulate the high flow condition (115% flow), but the flow rates were lower than desired. Those four runs were repeated as VT-12, VT-5, VT-6, and VT-7, respectively. Results from the first four tests have been excluded from summary tables and analyses. With these flow conditions, the scale model meets both the Reynolds number and DV criteria required to represent the actual stack. The completed data sheets from these tests are available in Appendix B, Subsection B.2.

Table 4.13. Testing and Measurement Uncertainties in Response Values Estimated from Replicate Tests with the LV-S1 Model

Response	DF[(a)]	Standard Deviation
Velocity %COV	10	0.59
Flow Angle Degrees	7	0.90
Gas Tracer %COV	7	0.51
Gas Tracer % MaxDev	7	1.68
Particle Tracer %COV[(b)]	7	1.60

(a) DF = degrees of freedom associated with replicate sets used to estimate a pooled standard deviation. The larger the DF, the better the estimate of testing and measurement uncertainty.

(b) These standard deviations are "pooled" over all replicate sets for a given response, assuming that the uncertainty in testing and measurement is the same for every test combination.

Table 4.15 summarizes the Velocity %COV results for Test Ports 1, 2, and 3 as a function of operating fan and flow condition. Figure 4.7 shows a plot of the data for Test Ports 1, 2, and 3, with Velocity %COV on the y-axis, Test Port on the x-axis, and "Fan-%Flow" with different plotting symbols and colors. The patterns of black, green, and blue lines for the "Fan A-115% Flow," "Fan B-115% Flow," and "Fan B-70% Flow" test combinations are close to being parallel, except for the change from Test Port 1 to Test Port 2 for "Fan B-70%Flow." This suggests that, overall, there is probably not an interactive effect of Test Port and Fan-%Flow on Velocity %COV. The statistical ANOVA confirmed that the interaction is not significant. However, the effects of Test Port (averaged over Fan-%Flow) and Fan-%Flow (averaged over Test Port) on Velocity %COV were statistically significant with ~90% and ~93% confidence, respectively. Regardless, because Velocity %COV values for Test Ports 1, 2, and 3 are far below the qualification criterion of 20%, statistically significant effects of the test variables are not of practical significance.

4.2.2 LV-S1 Flow Angle

Table 4.16 lists the results for the flow angle tests performed on the scale model LV-S1 stack. The results for all tests were well within the criterion of flow angle values ≤ 20°. Table 4.17 summarizes the LV-S1 flow angle results by fan and flow condition. The completed data sheets from these tests are available in Appendix B, Subsection B.3.

Figure 4.8 shows a plot of the data for Test Ports 1, 2, and 3, with Flow Angle on the y-axis, Test Port on the x-axis, and Fans-%Flow with different plotting symbols and colors. The pattern of black lines (Fan A-115% Flow) is different than the roughly parallel patterns for the green (Fan B-115% Flow) and blue (Fan B-70% Flow) lines. This indicates some interactive effect between Test Ports and Fan-%Flow on Flow Angle. Even though the interaction mainly occurred for Fan A and 115% Flow, the ANOVA showed that the interaction is statistically significant with a confidence level of ~ 93%. The effects of Test Port (averaged over Fan-%Flow) and Fan-%Flow (averaged over Test Port) on Flow Angle were statistically significant (~ 97% and ~98% confidence, respectively). However, the nature of the effect of each variable depends on the levels of the other variable because of the significant interaction. Also, all of the results were well below the ≤ 20° qualification criterion for this response.

Table 4.14. Summary of LV-S1 Velocity Uniformity Tests

Operating Fan(s)	Test Port	Flow Condition	Run No.	Flow (acfm)	Velocity (fpm)	%COV
A	1	115%	VT-19	2280	2995	5.9
			VT-20	2254	2961	5.5
			VT-21	2237	2940	5.4
	2	115%	VT-22	2293	2997	4.5
		70%	VT-18	1352	1768	3.5
			VT-24	1295	1692	3.7
	3	115%	VT-23	2202	2893	6.0
B	1	115%	*VT-1*	*1803*	*2356*	*3.3*
			VT-12	2119	2784	6.5
		70%	VT-13	1204	1581	4.3
	2	115%	*VT-2*	*1731*	*2263*	*4.0*
			VT-3	*1796*	*2347*	*3.7*
			VT-4	*1573*	*2055*	*7.7*
			VT-5	1955	2556	6.2
			VT-6	1934	2528	6.1
			VT-7	1930	2523	5.1
			VT-8	2081	2720	5.7
			VT-9	2100	2744	5.2
			VT-10	2090	2731	5.7
		70%	VT-14	1220	1595	4.8
	3	115%	VT-11	2162	2840	6.3
		70%	VT-15	1275	1676	6.4
			VT-16	1274	1674	4.7
			VT-17	1262	1658	6.7

Note 1: Individual and replicate sets of tests are alternately shaded and unshaded.
Note 2: Italicized tests have been excluded in subsequent analyses.

Table 4.15. LV-S1 Velocity Uniformity (%COV) at Three Test Ports as a Function of Fan and Flow Condition

Test Port	Fan A Flow Condition (%)		Fan B Flow Condition (%)	
	70	115	70	115
1	—	5.63	4.26	4.91
2	3.59	4.55	4.84	5.49
3	—	6.04	5.94	6.31

Note: Table entries for a specific combination of Test Port, Fan, and Flow Condition are average results from multiple tests when available; otherwise, the entries are the results from single tests. Although averaging is not the traditional statistical way to combine %COV values, it suffices for data summary purposes.

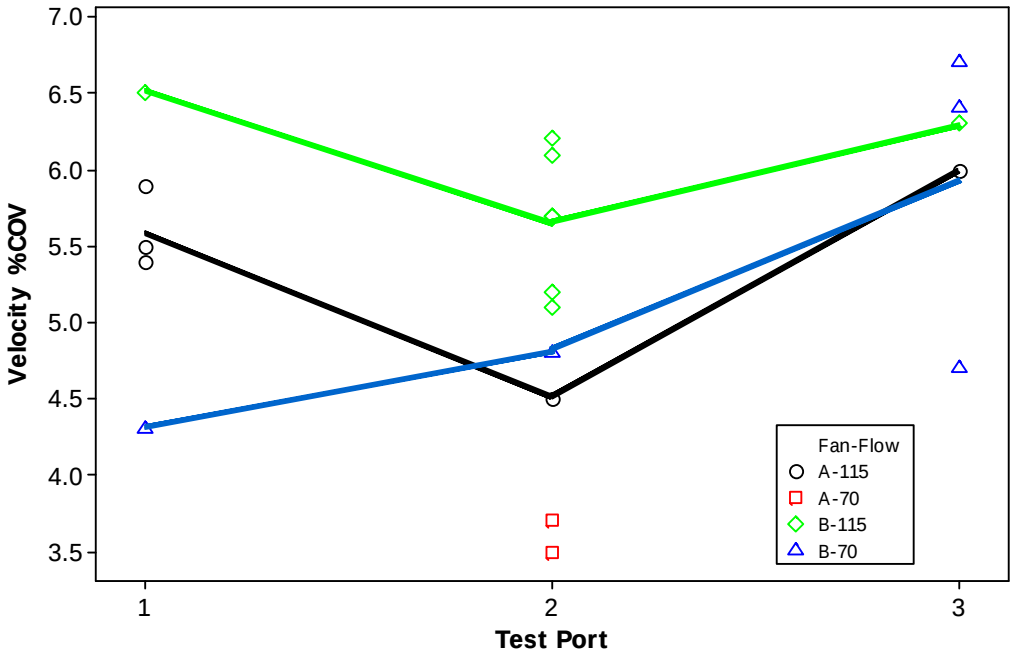

Figure 4.7. Plot of Velocity %COV Versus Test Port and Fan-% Flow for the LV-S1 Model. Lines connect the averages of replicate values or the single value (for tests that were not replicated).

4.2.3 LV-S1 Gaseous Tracer Uniformity

During the gas tracer testing, the response of the gas analyzers was checked against calibration standards of appropriate concentrations, and the results met the requirements of the procedure. Table 4.18 lists the results for all of the gaseous tracer uniformity tests performed on the scale model LV-S1 stack. In all cases for Test Ports 1 through 4, the results were well within the qualification criteria of %COV values less than 20% and absolute value of maximum deviation less than 30%. The criteria were only exceeded for test ports closer to the fans and immediately downstream of a change in flow direction (Test Ports 5 to 8, see Table 4.18). The completed data sheets are available in Appendix B, Subsection B.4. The gas tracer uniformity results for LV-S1 are discussed further in Sections 4.2.3.1 to 4.2.3.3. Table 4.19 summarizes the results at Test Ports 1, 2, and 3 for each operating fan and injection port combination, and shows that all results met the uniformity criteria.

Table 4.16. LV-S1 Flow Angle Results at Three Test Ports as a Function of Operating Fan and Flow Condition

Test Port	Operating Fan	Flow Condition	Run	Approx. Air Velocity (fpm)	Flow Angle (Degrees)
1	A	115%	FA-11	3140	7.9
			FA-12	3200	7.8
			FA-13	3000	6.4
	B	70%	FA-10	1700	5.2
		115%	FA-9	2980	8.4
2	A	70%	FA-16	1700	7.7
			FA-17	1870	8.7
		115%	FA-14	3090	4.8
	B	70%	FA-1	1816	8.5
		115%	FA-2	2440	10.8
			FA-3	3290	10.9
			FA-4	2980	9.0
3	A	115%	FA-15	3030	9.4
	B	70%	FA-5	1740	7.3
			FA-6	1740	8.1
			FA-7	1720	9.0
		115%	FA-8	2970	10.5

Note: Individual or replicate sets of tests are alternately shaded and unshaded.

Table 4.17. LV-S1 Average Flow Angle Results (°) at Three Test Ports as a Function of Operating Fan and Flow Condition

		Flow Condition (%)	
Test Port	Fan	70	115
1	A	—	7.35
	B	5.24	8.35
2	A	8.22	4.76
	B	8.48	10.25
3	A	—	9.41
	B	8.14	10.54

Note: Table entries for a specific combination of Test Port, Fan, and Flow Condition are average results from multiple tests when available; otherwise, the entries are the results from single tests.

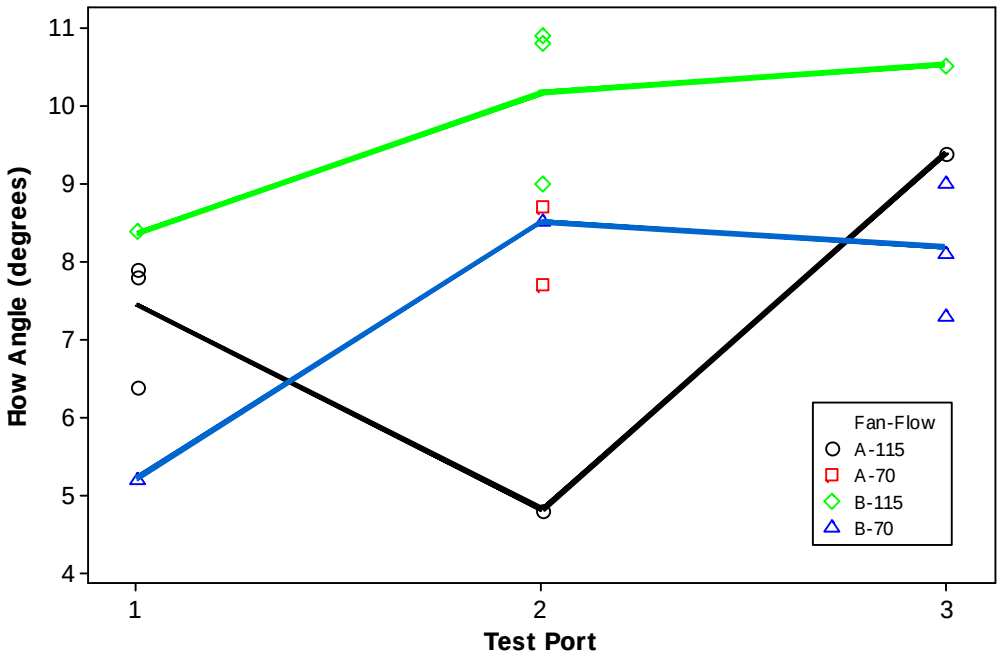

Figure 4.8. Plot of Flow Angle Degrees Versus Test Port and Fan-%Flow for the LV-S1 Model. Lines connect the averages of replicate values or the single value (for tests that were not replicated).

4.2.3.1 Gas Tracer %COV Results for LV-S1

Figure 4.9 shows a plot of the data for Test Ports 1, 2, and 3, with Gas Tracer %COV on the y-axis, Test Port on the x-axis, and the combined variable Fan-%Flow-Injection Port with different plotting symbols and colors. Lines connect the individual or average Gas Tracer %COV results across Tests Ports 1, 2, and 3 for the three primary test conditions: "Fan A-115% Flow-Injection Port A_Center" (black lines), "Fan B-115% Flow-Injection Port B_Center" (blue lines), and "Fan B-70% Flow-Injection Port B_Center" (purple lines). The Gas Tracer %COV values for several test conditions using Test Port 2, Fan B, 115% Flow, and Injection Port B at other locations in the duct cross-section are also plotted as individual points. Figure 4.9 shows that the location of injection in the model cross-section has a significant effect on Gas Tracer %COV.

The patterns of black, blue, and purple lines for the three primary test conditions are noticeably non-parallel, suggesting an interactive effect of Test Port and Fan-%Flow-Injection Port on Gas Tracer %COV. The statistical ANOVA confirmed that the interaction is significant (~ 98% confidence). The effect of Test Port (averaged over Fan-%Flow-Injection Port) on Gas Tracer %COV is statistically significant (~95% confidence), but the effect of Fan-Flow-Injection Port (averaged over Test Port) is not statistically significant. However, the nature of the effect of each variable depends on the levels of the other variable because of the significant interaction. Regardless of the statistically significant effects and the relatively large effect of injection location, the Gas Tracer %COV results for all tests at Test Ports 1, 2, and 3 are well below the qualification limit of 20 %COV.

Table 4.18. Summary of LV-S1 Gas Tracer Uniformity Tests at Test Ports 1, 2, and 3

Test Port	Operating Fan	Flow Condition (%)	Injection Port & Location	Run No.	%COV	Absolute % Max. Dev. from Mean
1	B	70	B Center	GT-20	1.6	3.2
	A	115	A Center	GT-9	2.2	4.5
				GT-10	2.3	5.4
				GT-11	2.4	4.7
	B	115	B Center	GT-1	2.4	6.0
2	B	70	B Center	GT-7	1.7	2.6
				GT-8	2.2	3.6
	A	115	A Center	GT-12	1.4	2.9
	B	115	B Center	GT-2	2.1	5.6
			B Bottom-Near	GT-14	4.3	7.3
			B Top-Near	GT-15	2.4	4.8
			B Top-Far	GT-16	3.3	6.6
			B Bottom-Far	GT-17	5.1	9.1
				GT-18	3.3	6.3
				GT-19	4.3	12.4
			8 Center	GT-21	3.3	5.6
			7 Center	GT-22	1.9	7.8
			6 Center	GT-23	3.1	6.5
			5 Center	GT-24	6.1	10.9
			4 Center	GT-25	9.0	21.0
3	B	70	B Center	GT-4	1.8	3.4
				GT-6	1.8	2.9
				GT-5	1.6	3.3
	A	115	A Center	GT-13	1.8	4.0
	B	115	B Center	GT-3	1.4	2.5
4	B	115	B Center	GT-26	2.8	10.0
5				GT-27	11.7	52.5
6				GT-28	29.3	72.6
7				GT-29	7.3	25.4
8				GT-30	75.7	238.0

Note: Individual and replicate sets of tests are alternately shaded and unshaded.

Table 4.19. Gas Tracer Uniformity Results for LV-S1 Test Ports 1, 2, and 3 as a Function of Fan, Injection Port and Injection Location in a Port

Test Port	Fan	Injection Port	Location of Injection	Flow Condition %	%COV	Absolute % Max. Dev. From Mean
1	A	A	Center	115	2.3	4.9
	B	B	Center	70	1.6	3.2
				115	2.4	6.0
2	A	A	Center	115	1.4	2.9
	B	B	Center	70	1.9	3.1
			Center	115	2.1	5.6
			Bottom-Near	115	4.3	7.3
			Top-Near	115	2.4	4.8
			Top-Far	115	3.3	6.6
			Bottom-Far	115	4.2	9.3
3	A	A	Center	115	1.8	4.0
	B	B	Center	70	1.7	3.2
				115	1.4	2.5

Note: Table entries for a specific combination of test variables are average results from replicate tests when available; otherwise, the entries are the results from single tests. Although averaging is not the traditional statistical way to combine %COV values, it suffices for data summary purposes.

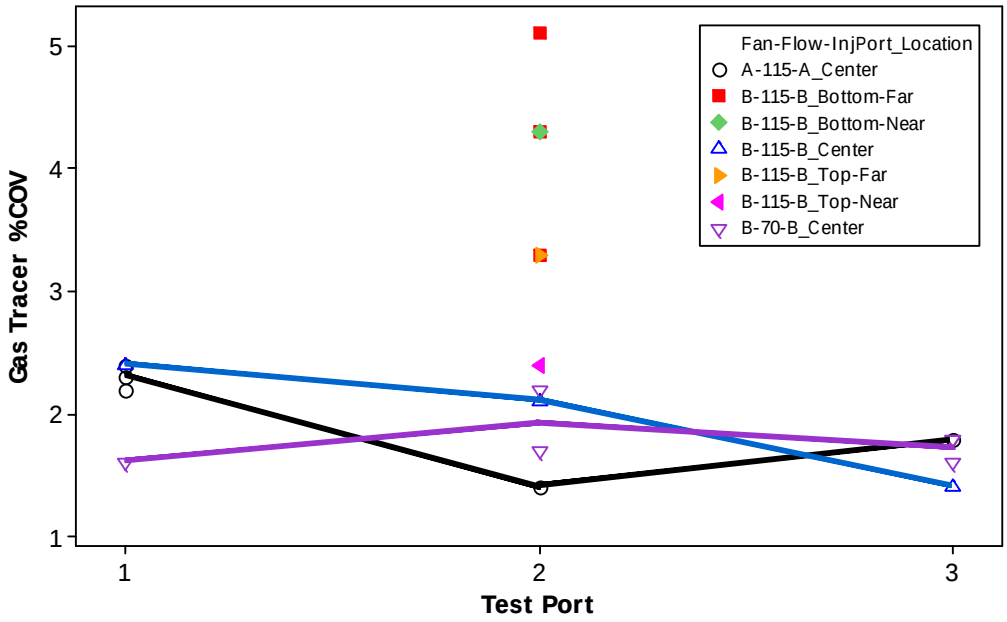

Figure 4.9. Plot of Gas Tracer %COV Versus Test Port and Fans-%Flow-Injection Port_Location for the LV-S1 Model. Lines connect the averages of replicate values or the single value (for tests that were not replicated). The average for the test combination with Fan B-115%Flow-Injection Port B at Test Port 2 used only the data from injections at the center of the cross section (B-115-B_Center). The results for other injection locations with that test combination are plotted as individual points.

4.2.3.2 Gas Tracer Maximum Percent Deviation Results for LV-S1

Figure 4.10 shows a plot of the data for Test Ports 1, 2, and 3, with the absolute values of gas tracer percent maximum deviation (Gas Tracer %MaxDev) on the y-axis, Test Port on the x-axis, and the combined variable "Fan-%Flow-Injection Port_Location" with different plotting symbols and colors. Lines connect the individual or average Gas Tracer %MaxDev results across Tests Ports 1, 2, and 3 for the primary three test conditions: "Fan A-115% Flow-Injection Port A_Center" (black lines), "Fan B-115% Flow-Injection Port B_Center" (blue lines), and "Fan B-70% Flow-Injection Port B_Center" (purple lines). The Gas Tracer %MaxDev values for several test conditions using Test Port 2, Fan B, 115% Flow, and Injection Port B at other locations in the model cross-section are also plotted as individual points. Figure 4.10 shows that the location of injection in the model cross-section has a significant effect on Gas Tracer %MaxDev.

The patterns of black, blue, and purple lines for the three primary test conditions are noticeably non-parallel, suggesting an interactive effect of Test Port and Fan-%Flow-Injection Port on Gas Tracer %MaxDev. The statistical analysis confirmed that the interaction is significant (~ 98% confidence). The average effects of Test Port and Fan-Flow-Injection Port on Gas Tracer %MaxDev are statistically significant, each with ~98% confidence. However, the nature of the effect of each variable depends on the levels of the other variable because of the significant interaction. Still, the effects of Test Port and Fan-%Flow-Injection Port appear to be small compared to the effect of where in the cross-section of the model the gas tracer is injected. Regardless of the statistically significant effects and the relatively large effect of injection location, the Gas Tracer %MaxDev results for all tests at Test Ports 1, 2, and 3 are well below the qualification limit of 30 %.

4.2.3.3 Tests with Other Injection Ports and Test Ports for LV-S1

Figure 4.11 is a plot of the results for each test port at the maximum flow rate and with the tracer injected at the discharge of Fan B. The maximum deviation from the mean and the %COV show very similar trends. It is not clear why Port 7 results departed from the trend.

Figure 4.12 is a plot of results at Test Port 2 with the tracer injection at various points. While there seemed to be a trend where the results improve with increasing distance or number of duct features upstream of the test port, that trend does not hold when the tracer is injected at the various positions in the transition from Fan B.

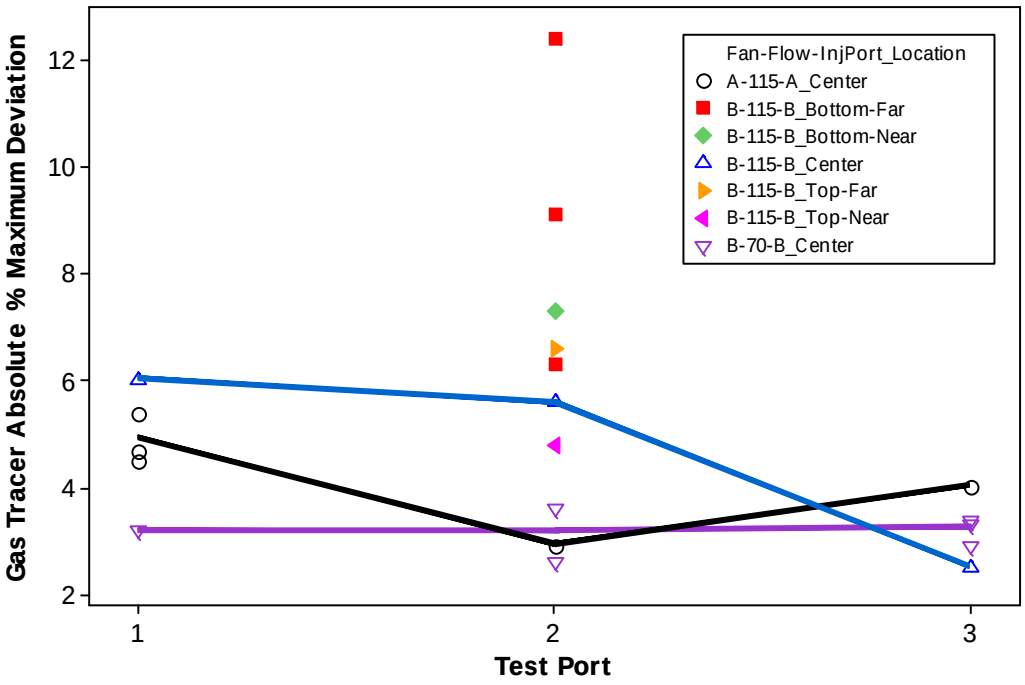

Figure 4.10. Plot of Gas Tracer % Maximum Deviation Versus Test Port and Fan-%Flow-Injection Port_Location for the LV-S1 Model. Lines connect the averages of replicate values or the single value (for tests that were not replicated). The average for Fan B-115% Flow at Test Port 2 used only the data from injections at the center of Injection Port B (B-115-B_Center).

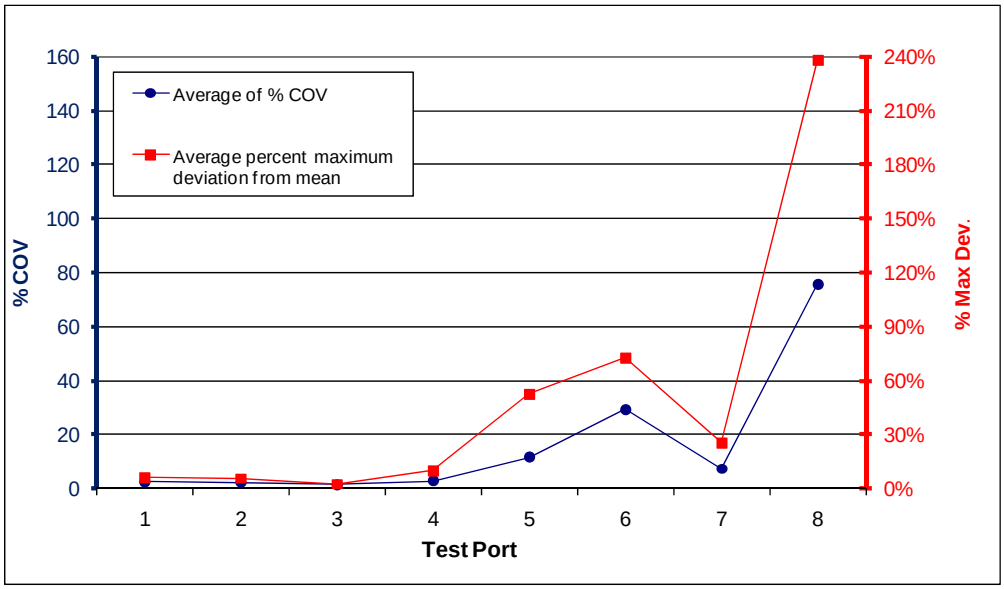

Figure 4.11. Results at Each Test Port of LV-S1 with Tracer Injection at Fan B. The %COV results in blue correspond to the left axis, while the % maximum deviation results in red correspond to the right axis.

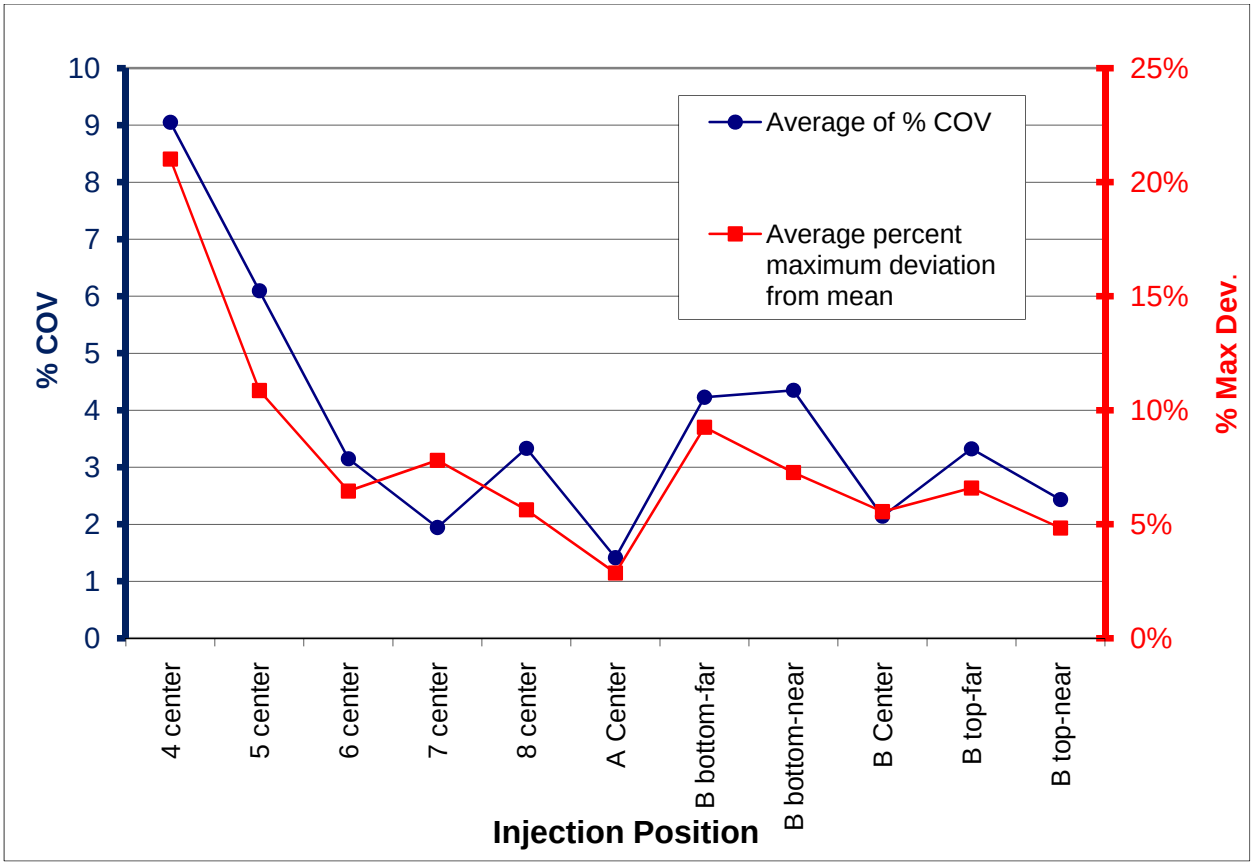

Figure 4.12. Results at Test Port 2 of LV-S1 with Various Injection Points. The %COV results in blue correspond to the left axis, while the % maximum deviation results in red correspond to the right axis.

4.2.4 LV-S1 Particle Tracer Uniformity

There were 20 particle tracer uniformity runs performed during January and February 2010. Starting with Run PT-5, a second OPC was used at a fixed location during the runs to track the output from the aerosol generator. It sampled from a different test port than the one being used for the test. Background particle counts were typically less than 0.1% or less of average concentration measured during a test run. All of the runs were made with the same L-shaped sampling probe, so the OPC orientation was changed when it was moved between the side and top ports.

As was observed in tests for the LB-C2 scale model, the instrument response would often change as it was moved between the top and side ports. This is illustrated in the plot of readings of the reference and measuring OPCs during Run PT-16 as shown in Figure 4.13. The aerosol generator output was measured at Port 1 and stayed within a narrow band. The concentration profiles for the six traverses (trials) are consistent in shape, but the response was clearly much lower for the top port as compared to the side port. This may have been caused by the change in the orientation of the particle counter or in the orientation of the longest part of the probe from vertical to horizontal. These data are well-suited for the normalization technique used (see Appendix D).

There were several instances where the aerosol generator output changed during a run. For example, Figure 4.14 shows that the concentration declined by nearly 50% during Run PT-17. Because the decline occurred while moving the OPC from the top to side port, the concentration profile during each traverse can be considered valid (the aerosol output was nearly constant for each traverse) and provides reasonable data when normalized. Again, data from these types of runs are handled well by the normalization technique (see Appendix D).

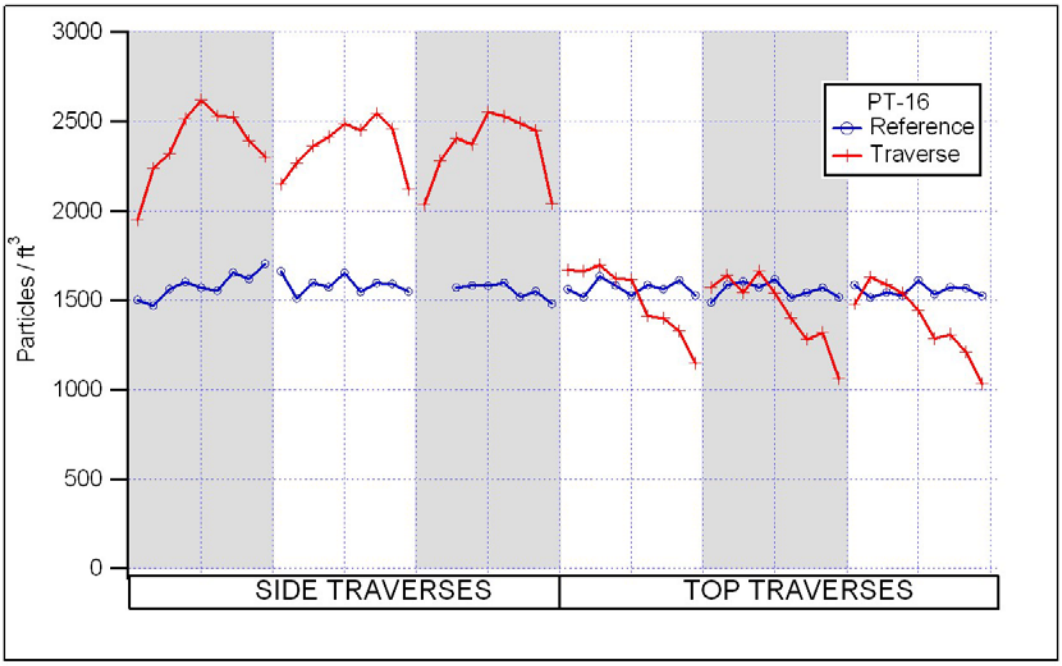

Figure 4.13. Particle Concentration During Run PT-16 of LV-S1

Figure 4.15 shows an example when the aerosol output changed during traverses, and a trend is exhibited for both OPCs in a way that could affect the uniformity data. This occurred during Runs PT-4, PT-10, and PT-19, and the data from these runs were not included in the evaluation of the stack aerosol mixing characterization. Although a reference OPC was not used during Run PT-2, the data showed similar characteristics of a drop in concentration during the traverses. Hence, the Run PT-2 data were also eliminated from analysis.

Table 4.20 lists the normalized and un-normalized %COV for each run. It also lists the mean particle concentrations measured via the side and top ports for each test port.

Table 4.21 summarizes the particle uniformity results for the LV-S1 scale model. In all cases, the uniformity criterion was met, and there was no apparent trend in the data. The completed data sheets from these tests are available in Appendix B, Subsection B.5.

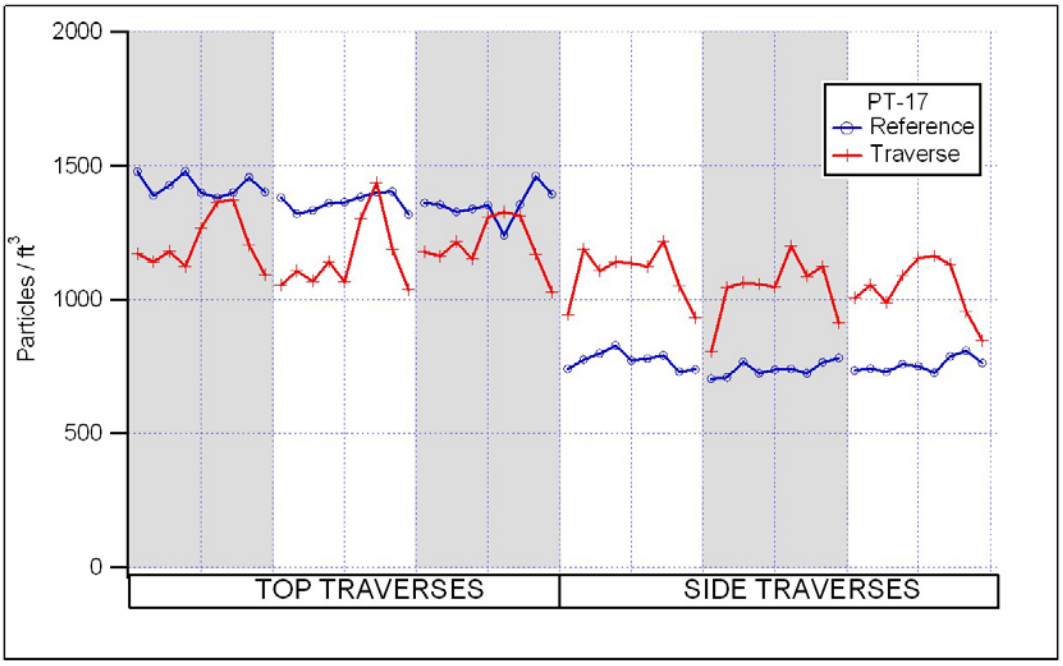

Figure 4.14. Particle Concentration During Run PT-17 of LV-S1

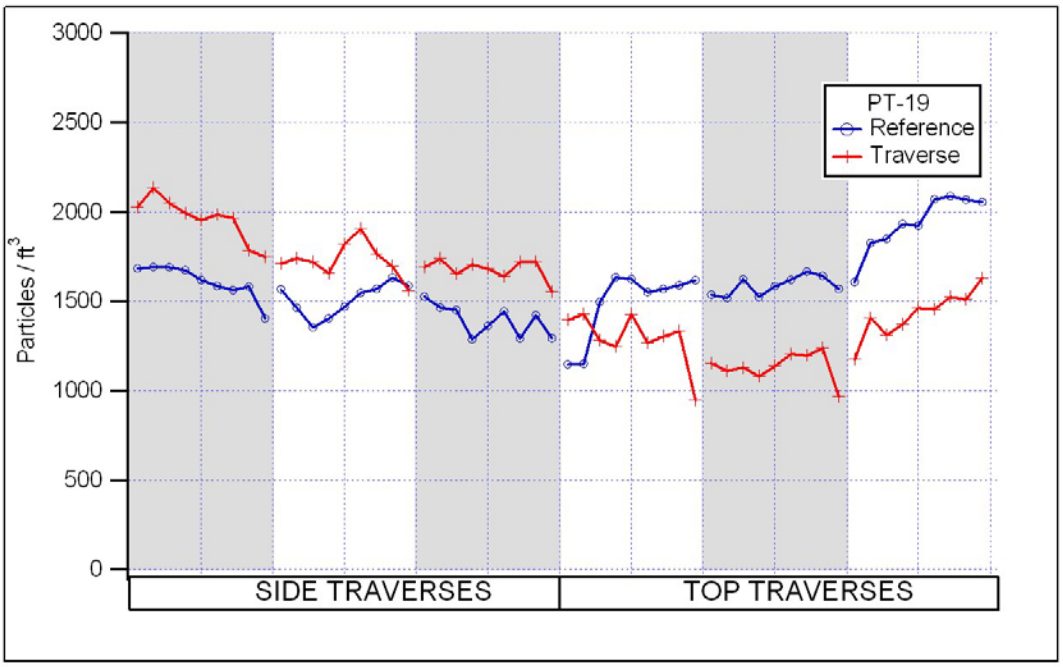

Figure 4.15. Particle Concentration Data During Run PT-19 of LV-S1

Table 4.20. Summary of Particle Tracer Uniformity Results for the LV-S1 Scale Model

Operating Fan(s)	Flow Condition (%)	Injection Port, Center	Test Port	Run No.	Non-normalized %COV	Normalized %COV	Mean Concentration (pt/ft^3) Side	Mean Concentration (pt/ft^3) Top
B	115	B	1	PT-1	8.6	7.5	1094	1199
		B	2	*PT-2*	*31.2*	*2.1*	*2421*	*1304*
				PT-3	13.1	2.6	1193	928
				PT-4	*38.4*	*4.5*	*1145*	*530*
				PT-10	*21.1*	*8.8*	*1162*	*799*
				PT-11	4.2	3.9	1110	1145
		B	3	PT-5	3.6	2.7	1354	1419
A	115	A	1	PT-13	22.4	3.5	3743	2425
				PT-14	12.8	5.3	3137	2492
				PT-15	20.0	6.5	1463	2113
		A	2	PT-17	8.1	6.1	1102	1221
				PT-18	6.5	5.5	1012	1087
		A	3	PT-16	26.1	7.5	2437	1482
B	70	B	1	PT-12	28.6	3.0	2857	1627
		B	2	PT-9	24.5	3.3	1730	2793
		B	3	PT-6	26.1	4.0	2238	3736
				PT-7	6.1	5.2	2896	2724
				PT-8	21.6	6.8	3148	4761
				PT-19	*17.1*	*3.3*	*1811*	*1306*
				PT-20	20.6	2.0	2971	1990

Note 1: Individual or replicate sets of tests are alternately shaded and unshaded.
Note 2: Italicized tests have been excluded in subsequent data analyses.

Table 4.21. Summary of Normalized %COV Results of Particle Uniformity for LV-S1 Test Ports 1, 2, and 3 as a Function of Flow Condition, Fan, andInjection Point at the Centerline Location

Test Port	Flow Condition (%)	Fan-Injection Port A-A Centerline	Fan-Injection Port B-B Centerline
1	70	—	3.0
	115	5.1	7.5
2	70	—	3.3
	115	5.8	3.3
3	70	—	4.5
	115	7.5	2.7

Note: Table entries are for specific combinations of Test Port, Fan, Injection Port and Flow Conditions are average results from replicate tests when available; otherwise, the entries are the results from single tests. Although averaging is not the traditional statistical way to combine %COV values, it suffices for data summary purposes.

Figure 4.16 shows a plot of the data for Test Ports 1, 2, and 3, with Particle Tracer %COV on the y-axis, Test Port on the x-axis, and the combined variable Fans-Injection Port with different plotting symbols and colors. The patterns of black lines (Fan A-115% Flow-Injection Port A) and blue lines (Fan B-70% Flow-Injection Port B) are roughly parallel, indicating little interaction between Test Port and the Fan-%Flow-InjPort variable for those two test conditions. The red lines (Fan B-115% Flow-Injection Port B) are noticeably non-parallel to the black and blue lines for Test Ports 1 and 2, and somewhat less so for Test Ports 2 and 3. This suggests "partial" interactive effect of Test Port and Fan-%Flow-InjPort on Particle Tracer %COV. Because of this partial and limited aspect of the interaction, the statistical ANOVA indicated that the interaction was not significant. The effects of Test Port (averaged over Fan-%Flow-InjPort) and Fan-%Flow-InjPort (averaged over Test Port) on Particle Tracer %COV were not statistically significant . However, the nature of the effect of Fan-%Flow-InjPort depends on the level of Test Port because of the partial interaction. Regardless, because the Particle Tracer %COV values for Test Ports 1, 2, and 3 are far below the qualification criterion of 20%, partial interactive effect of the test variables on Particle Tracer %COV is not of practical significance.

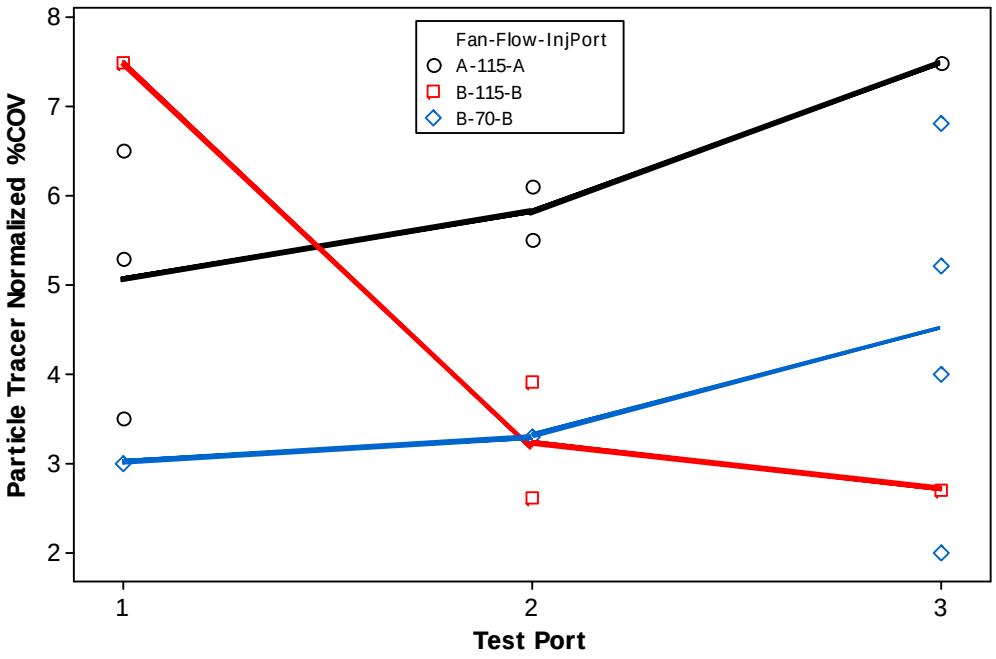

Figure 4.16. Plot of Normalized Particle Tracer %COV Versus Test Port and Fan-%Flow-Injection Port for the LV-S1 Model. Lines connect the averages of replicate values or the single value (for tests that were not replicated). Particles were injected at the center of the duct cross-section for all tests.

4.3 LB-S2 Stack Results

Data listings, data plots, and summary tables for LB-S2 flow angle, velocity, gas tracer, and particle tracer test results are presented in the following subsections. Some test combinations were replicated (performed more than once at different times) to provide for quantifying the testing and response

measurement uncertainty. The replicate-test uncertainties (standard deviations) are summarized in Table 4.22. Hence, the standard deviations in Table 4.22 are estimates of the uncertainty in individual %COV and %MaxDev test results listed in this report. Statistical analyses were not performed for the results in this section because of the limited number of tests performed.

4.3.1 Velocity Uniformity

The initial test to determine the fan frequency setting for the LB-S2 model to achieve the 115% and 70% flow condition is included in Appendix C, Subsection C.1. Eight velocity uniformity runs were planned and performed for the LB-S2 model. The first run was aborted because the minimum target velocity was not being achieved with a sufficient margin. Table 4.23 lists the results for all of the runs.

Table 4.24 lists the desired range of minimum flow conditions as 740 to 1216 scfm (942 to 1548 sfpm), and the measured flows bracket this range. With these flow conditions, the scale model meets both the Reynolds number and DV criteria required to represent the actual stack with one or two operating fans.

Table 4.22. Testing and Measurement Uncertainties in Response Values Estimated from Replicate Tests with the LB-S2 Model

Response	DF[(a)]	Standard Deviation[(b)]
Velocity %COV	3	0.48
Flow Angle, Degrees	2	1.90
Gas Tracer %COV	2	0.40
Gas Tracer %MaxDev	2	0.55
Particle Tracer %COV[(c)]	2	3.80

(a) DF = degrees of freedom associated with replicate sets used to estimate a pooled standard deviation. The larger the DF, the better the estimate of testing and measurement uncertainty.
(b) Based on measurements at the center of the cross section.
(c) These standard deviations are "pooled" over all replicate sets for a given response, assuming that the uncertainty in testing and measurement is the same for every test combination.

Table 4.23. LB-S2 Velocity Uniformity Results

Operating Fan	Test Port	Run No.	Flow Condition (%)	Flow (scfm)	Velocity (sfpm)	%COV
B	1	VT-6	115	1249	1618	6.6
		VT-9	70	762	986	5.5
A	2	VT-2	115	1188	1539	5.2
		VT-8		1182	1531	4.3
B	2	VT-3	115	1268	1642	5.4
		VT-4		1271	1645	5.3
		VT-5		1258	1629	5.6
B	3	VT-7	115	1239	1632	4.5

Note: Individual and replicate sets of tests are alternately shaded and unshaded.

Table 4.24 summarizes the results as %COV for the candidate sampling probe positions and the operating fans. All results were within the qualification criterion. The completed data sheets from these tests are available in Appendix C, Subsection C.2.

LB-S2 Flow Angle

Table 4.25 lists the results of the flow angle tests for the LB-S2 scale model. The qualification criterion of ≤ 20° was met in all cases. The largest result occurred with the single test at a low flow rate (fan setting). The completed data sheets from these tests are available in Appendix C, Subsection C.3.

4.3.2 LB-S2 Gaseous Tracer Uniformity

As planned, 17 test runs were conducted. Table 4.26 lists the test results for each run. There are no apparent trends, and all of the results are very low, which demonstrates excellent mixing at Test Port 2. This was expected, given the number of bends and duct runs between the injection and sampling points. The completed data sheets from these tests are available in Appendix C, Subsection C.4.

Table 4.24. LB-S2 Velocity Uniformity %COV by Test Port and Fan

Test Port	Fan A	Fan B
1	—	6.01
2	4.78	5.44
3	—	4.49

Note: Table entries for a specific combination of Test Port and Fan are average results from multiple tests when available; otherwise, the entries are the results from single tests. Although averaging is not the traditional statistical way to combine %COV values, it suffices for data summary purposes.

Table 4.25. LB-S2 Flow Angle Results for Test Port 2

Operating Fan	Flow Condition	Run No.	Approx. Air Velocity (fpm)	Mean Absolute Flow Angle (°)
B	115%	FA-2	1800	3.8
		FA-3	1800	2.3
A	115%	FA-1	1580	2.4
		FA-4	1730	5.9
	70%	FA-5	1010	11.6

Note: Individual and replicate sets of tests are alternately shaded and unshaded.

4.3.3 LB-S2 Particle Tracer Uniformity

Five particle tracer test runs were planned, and three were repeated. Run PT-1 used OPC SN 96258675 for the measurements. The rest of the runs used a newly rebuilt OPC (SN 96258674) for the measurements. As observed in most particle tracer tests, the tracer aerosol output can vary with time

during the run, and the OPC response can change when the instrument is reoriented. To track the output of the aerosol generator, the other OPC was used as the reference instrument sampling from a fixed position from another test port throughout the run.

Run PT-1 was repeated because the rebuilt OPC's readings were much higher than the readings from the other instrument, and the aerosol output climbed 26% during the run. Run PT-5 was also repeated to investigate the 64% drop in readings while the aerosol generator output remained constant. As a result, PT-1 and PT-5 were not used for data analyses.

Table 4.27 shows the particle tracer uniformity test results without and with normalization applied (see Appendix D). The normalized data show that the qualification criterion (≤ 20 %COV) is met for all of the runs. The completed data sheets from these tests are available in Appendix C, Subsection C.5.

For the first six runs, the measurement OPC was switched between the horizontal and vertical positions so the same sampling probe could be used for both the side and bottom test ports. As has been observed in other tests, the OPC response frequently changes as the instrument is re-oriented vertical-to-horizontal. To improve the test method, PT-5 was repeated as runs PT-7 and PT-8 with the orientation of the measurement OPC horizontal for both test ports. For run PT-7, this was accomplished by using the different sampling probes for each port (see Figure 3.8). For run PT-8, this was accomplished by removing the section of duct immediately downstream of the port and then using the same probe for both the vertical and horizontal directions as shown in Figure 4.17.

Table 4.26. Gas Tracer Results for Test Port 2 of LB-S2

Operating Fan	Flow Condition (%)	Injection Point	Run No.	%COV	Abs. % Max. Dev. from Mean
A	115	A Center	GT-6	0.7	1.1
		A South	GT-7	1.9	5.1
		A North	GT-8	1.1	2.2
		A East	GT-9	0.9	1.6
		A West	GT-10	1.3	3.0
B	115	B Center	GT-1	1.6	3.6
		B North	GT-2	1.5	3.7
		B South	GT-3	1.1	2.6
		B West	GT-4	1.1	1.8
		B East	GT-5	2.0	3.6
			GT-11	1.7	3.5
			GT-12	1.2	2.6
	70	B Center	GT-13	1.3	2.3
		B North	GT-14	0.8	2.6
		B South	GT-15	0.5	1.0
		B East	GT-16	2.0	4.4
		B West	GT-17	2.1	4.0

Note: Individual or replicate sets of tests are alternately shaded and unshaded.

Table 4.27. Results of Particle Tracer Uniformity Tests of LB-S2

Test Port	Operating Fan	Injection Port & Location	Flow Condition (%)	Run No.	Un-normalized %COV	Normalized %COV
2	A	A Center	115	PT-4	8.6	9.3
	B	B Center	115	*PT-1*	*29.7*	*10.4*
				PT-2	18.0	7.4
				PT-3	12.2	10.9
				PT-5	*53.1*	*4.6*
				PT-7	4.2	3.3
			70	PT-6	20.2	7.7
6 in. downstream of Port 2	B	B Center	115	PT-8	9.1	5.1

Note 1: Individual or replicate sets of tests are alternately shaded and unshaded.
Note 2: Italicized tests have been excluded in subsequent data analyses.

Figure 4.17. Run PT-8 with Probe and OPC Orientation at Open End of Duct of LB-S2

5.0 Conclusions

The results of the tests for each scale model stack are summarized in Table 5.1. The criteria for sampling probe locations given in American National Standards Institute/Health Physical Society (ANSI/HPS) N13.1-1999, *Sampling and Monitoring Releases of Airborne Radioactive Substances from the Stack and Ducts of Nuclear Facilities,* were met in all cases (ANSI 1999). These criteria address the capability of the sampling probe to extract a sample that represents the effluent stream. The range of results presented in Table 5.1 for the LB-C2 and LV-S1 stacks covers not only the designed location for the air sampling probe, but also the locations within five duct diameters both up and downstream of that location (Test Ports 1 to 3). This allows for some variability that may occur because of design or construction changes. The LB-S2 ductwork is already constructed, so tests using different ports were not needed. As a result, the summary table below contains LB-S2 results only from Test Port 2.

Table 5.1. Summary of Test Results for the Scale Model Stacks

	Units	LB-C2	LV-S1	LB-S2
		Test Ports 1–3		Test Port 2
Velocity Uniformity	Range of %COV	1.3–4.6	3.5–6.7	4.3–5.6
Flow Angle	Range of Flow Angle, degrees	2.5–10.6	4.8–10.9	2.3–11.6
Gas Tracer Uniformity	Range of %COV	1.5–5.8	1.4–9.0	0.5–2.1
	Range of Maximum % Deviation from Mean	4.7–13.2	2.5–21.0	1.0–5.1
Particle Tracer Uniformity	Range of Normalized %COV	3.2–13.5	2.0–7.5	3.3–10.9

Based on these scale model tests, the locations proposed for the air sampling probes in each of the three Group 5-6 stacks meet the requirements of the ANSI/HPS N13.1-1999 standard. Additional velocity uniformity and flow angle tests on the actual stacks will be necessary during cold-startup to confirm the validity of the scale model results in representing the actual stacks. In particular, the velocity uniformity test results for the actual stacks must be within 5 %COV of the range of results listed above for the scale model so that scale model results can be said to be representative of the stack. For example, if the actual LB-S2 stack sampling probe is located in a position corresponding to Test Port 2 , the measured velocity uniformity %COV should be between 0.0 and 10.6%COV (non-negative value for 4.3 – 5 = 0.0, and 5.6 + 5 =10.6). The velocity uniformity test results summarized in Table 5.1 cover a range of flow conditions which are expected to bracket the conditions of the actual stack. For cold-startup tests, the DV value and Reynolds number should meet the criteria listed in Section 1 (i.e., DV within a factor of six and Reynolds number >10,000). The velocity uniformity acceptance range would be constructed using the scale model results that correspond to the probe location and fan operating conditions present during the test on the actual stack.

Sections 4.1 and 4.2 discussed statistically significant effects of the test variables and their interactions on several response variables (Flow Angle, Velocity %COV, Gas Tracer %COV, Gas Tracer

%MaxDev, and Particle Tracer %COV) from testing with the LB-C2 and LV-S1scale models. Because fewer tests were performed with the LB-S2 scale model, statistical analyses of the data were not possible. The statistical results for the LB-C2 and LV-S1 tests showed that the relevant test variables generally had statistically significant effects on the response variables, and that often the test variables also often had a statistically significant interaction effect. This means that the effect of one test variable on a response variable depends on the level of the other test variable. One finding bears specific discussion. It is notable for these scale models that the operating fan and the tracer injection position in the cross-section of the duct have statistically significant effects on the measured results. This conclusion is drawn in spite of the several changes in flow direction between the fans and the test ports. However, none of these variable effects or interactions resulted in the response variables exceeding their qualification criteria limits. So, from that perspective, the variable effects did not have practically significant effects.

In addition, some lessons were learned during this series of tests. The particle tracer tests should include using a fixed position reference particle concentration monitor. An OPC was used for that purpose. Particle tracer uniformity runs should be repeated if the aerosol generator output changes significantly (for example, more than 25%) during the conduct of traverses. If these concentration or response changes occur in between traverses, their effect on %COV can be addressed by normalizing the data to adjust for the changes, or to use a calculation method that is not affected by the changes. Methods that implement each of these approaches were tried during these tests, and are discussed in Appendix D. Ultimately, we concluded either method is satisfactory, but used the normalization method because that is what was done in previous studies and reports. It was also found that testing proceeded more expeditiously, and flow angle tests were easier to perform on a scale model if the ambient wind speed was below about 20 mph. This is especially true if the wind is excessively variable because that can cause small ambient pressure fluctuations that affect the readability of manometers used for flow angle and velocity readings.

6.0 References

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40 CFR 61, Subpart H. "National Emission Standard for Emissions of Radionuclides other than Radon from Department of Energy Facilities." *Code of Federal Regulations,* U.S. Environmental Protection Agency.

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Appendix A

LB-C2 Data Sheets

Appendix A.1: LB-C2 Calibration of Ventilation Flow Controller Data Sheets

VELOCITY TRAVERSE DATA FORM

Site	**LB-C2 Model**	Run No.	**VT-1**
Date	**4/30/09**	Fan Configuration	**A & B**
Testers	JF, XY, JAG, MSP	Fan Setting	**30** **Hz**
Stack Dia.	11.8125 in.	Stack Temp	74.3 deg F
Stack X-Area	109.6 in.2	Start/End Time	15:20 16:22
Test Port	2	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	160.25 inches	Points in Center 2/3	2 to: 7
Velocity units	ft/min	Data Files:	NA

Order -->		First				Second			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	1982	2153	2051	2062.0	1951	1972	1965	1962.7
2	1.24	2241	2229	2175	2215.0	2092	2107	2066	2088.3
3	2.29	2262	2282	2279	2274.3	2117	2180	2111	2136.0
4	3.81	2265	2266	2278	2269.7	2169	2189	2152	2170.0
Center	5.89	2213	2267	2216	2232.0	2265	2253	2204	2240.7
5	7.98	2194	2186	2167	2182.3	2278	2279	2265	2274.0
6	9.50	2120	2058	2129	2102.3	2299	2314	2282	2298.3
7	10.54	2026	1807	1944	1925.7	2146	2208	2211	2188.3
8	11.28	1872	1433	1508	1604.3	2080	2033	1841	1984.7
Averages ---------->		2130.6	2075.7	2083.0	2096.4	2155.2	2170.6	2121.9	2149.2

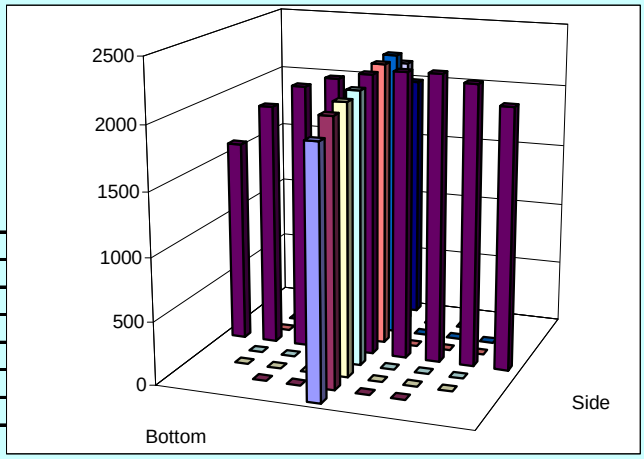
All	ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	2122.8		Mean	2171.6	2199.4	2185.5
Min Point	1604.3	-24.4%	Std. Dev.	123.2	75.7	99.3
Max Point	2298.3	8.3%	COV as %	5.7	3.4	**4.5**

Flow w/o C-Pt	1605	acfm
Vel Avg w/o C-Pt	2109	fpm

Instuments Used:	Cal Due
Solomat Zephyr SN 12951472	03/17/10
Fisher Scientific SN 61876141	4/9/2010

	Start	Finish	
Stack temp	74	74.6	F
Equipment temp	68	74	F
Ambient temp	69.8	68	F
Stack static	0.10	0.80	mbars
Ambient pressure	29.62	29.59	in Hg
Total Stack pressure	1003.10	1002.80	mbars
Ambient humidity	28%	26.00	RH

Notes: XY/4/30/09



Entries made by:	Xiao-Ying Yu	Technical Data Review performed by:	Ernest Antonio
Signature/date	signature on file/5/1/09	Signature/date	Signature on File 07 July 2010 TI-RPP-WTP-675

VELOCITY vs. FREQUENCY DATA FORM

VELFR_Rev0 8/11/2006

Site	LB-C2 model	Run No.	VF-1	
Date	5/1/2009	Stack Temp	78.4 deg. F	
Tester	JAG, XY, JEF, MSP	Stack RH%	26%	
Stack Dia.	11.8125 in.	Baro Press	29.41	
Stack X-Area	109.6 in2	Fan Configuration	A & B	
Test Port	2 SIDE	Start/End Time	1355 / 1500	
Dist. from disturbance	160.25 inches	Reference point from velocity test VT :		Side # 6

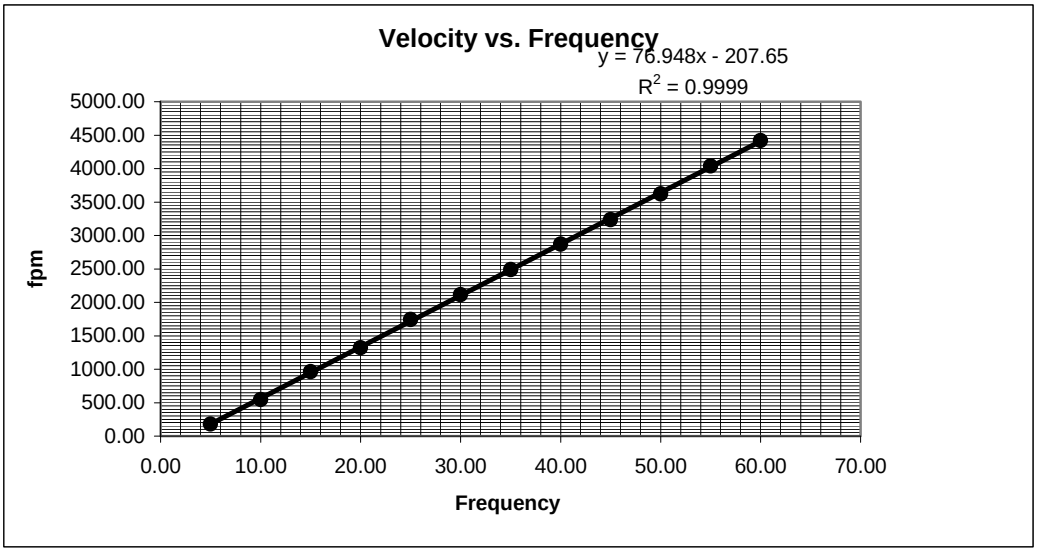
Velocity Readings, units = fpm

					Target	Target	Estmtd
					cfm	fpm	Hz
					1750	2228	31.7
	fpm				833	1592	23.4
Hz	1	2	3	Mean	StDev	2 StDev	cfm
5.00	171	190	168	176.33	11.93	23.86	134.20
10.00	536	549	552	545.67	8.50	17.01	415.28
15.00	954	984	946	961.33	20.03	40.07	731.62
20.00	1317	1340	1297	1318.00	21.52	43.03	1003.06
25.00	1750	1747	1724	1740.33	14.22	28.45	1324.47
30.00	2132	2129	2072	2111.00	33.81	67.62	1606.57
35.00	2476	2472	2513	2487.00	22.61	45.21	1892.72
40.00	2873	2837	2896	2868.67	29.74	59.48	2183.19
45.00	3284	3235	3188	3235.67	48.00	96.01	2462.49
50.00	3619	3573	3662	3618.00	44.51	89.02	2753.47
55.00	4087	4013	4013	4037.67	42.72	85.45	3072.85
60.00	4431	4433	4391	4418.33	23.69	47.38	3362.56

Instuments Used: **Cal Exp. Date:**

Solomat Zephyr SN 12951472 3/17/2010

Fisher Scientific SN 61876141 4/9/2010



Entries made by: John Glissmeyer

Signature/date

signature on file 5/1/2009

Technical Data Review performed by: Ernest Antonic

Signature/date Signature on File 07 July 2010

TI-RPP-WTP-675

Appendix A.2: LB-C2 Velocity Uniformity Data Sheets

VELOCITY TRAVERSE DATA FORM

Site	**LB-C2 Model**	Run No.	**VT-2**		
Date	**5/5/09**	Fan Configuration	**A&B**		
Testers	MSP,JAG,JEF	Fan Setting	**35**	**Hz**	
Stack Dia.	11.875 in.	Stack Temp	69.6	deg F	
Stack X-Area	110.8 in.2	Start/End Time	13:58	14:55	
Test Port	1	Center 2/3 from	1.09	to:	10.79
Distance to disturbance	220.5 inches	Points in Center 2/3	2	to:	7
Velocity units	ft/min	Data Files:	NA		

Order -->		2				1			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	2272	2221	2259	2250.7	2238	2384	2414	2345.3
2	1.24	2504	2420	2389	2437.7	2528	2561	2644	2577.7
3	2.29	2560	2584	2596	2580.0	2688	2665	2683	2678.7
4	3.82	2666	2615	2654	2645.0	2705	2735	2673	2704.3
Center	5.91	2634	2679	2612	2641.7	2669	2666	2611	2648.7
5	8.00	2647	2691	2621	2653.0	2583	2622	2572	2592.3
6	9.52	2654	2674	2643	2657.0	2487	2550	2535	2524.0
7	10.57	2618	2507	2602	2575.7	2420	2378	2397	2398.3
8	11.31	2392	2610	2505	2502.3	2247	2130	2220	2199.0
Averages ---------->		2549.7	2555.7	2542.3	2549.2	2507.2	2521.2	2527.7	2518.7

All	ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	2534.0		Mean	2598.6	2589.1	2593.9
Min Point	2199.0	-13.2%	Std. Dev.	78.7	104.6	89.0
Max Point	2704.3	6.7%	COV as %	3.0	4.0	**3.4**

Flow w/o C-Pt 1938 acfm

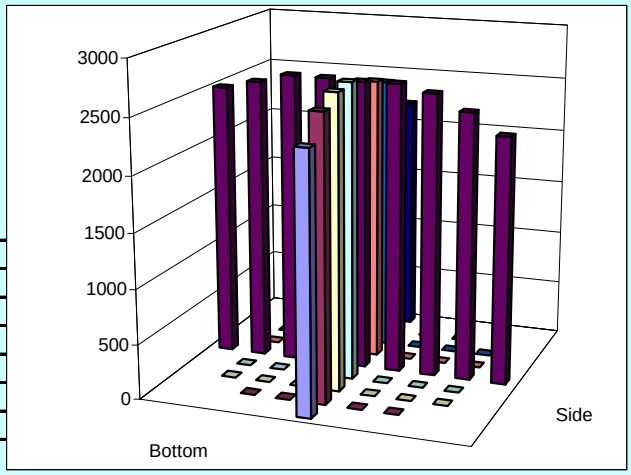
Vel Avg w/o C-Pt 2520 fpm

Instuments Used: Cal Due

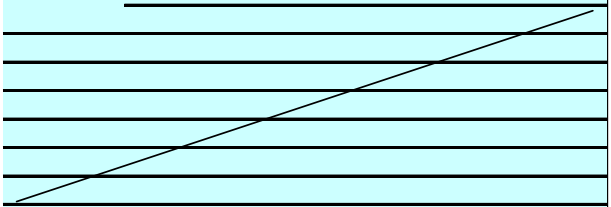
Solomat Zephyr SN 12951472 03/17/10

Fisher Scientific SN 61876141 04/09/10

	Start	Finish	
Stack temp	69.6	72.3	F
Equipment temp	65.4	69	F
Ambient temp	63.5	65.3	F
Stack static	0.01	1.01	mbars
Ambient pressure	29.23	29.23	in Hg
Total Stack pressure	990.00	991.00	mbars
Ambient humidity	35%	33%	RH



Notes: 3M Filtrete



Entries made by: Julia Flaherty

Signature/date 5/5/2009

Technical Data Review performed by: Ernest Antonio

Signature/date Signature on File 09 July 2010

TI-RPP-WTP-676

VELOCITY TRAVERSE DATA FORM

Site	**LB-C2 Model**	Run No.	**VT-3**
Date	**5/5/09**	Fan Configuration	**A&B**
Testers	MSP, JEF	Fan Setting	**35** **Hz**
Stack Dia.	11.781 in.	Stack Temp	76.6 deg F
Stack X-Area	109.0 in.2	Start/End Time	15:00 15:38
Test Port	2	Center 2/3 from	1.08 to: 10.70
Distance to disturbance	160 inches	Points in Center 2/3	2 to: 7
Velocity units	ft/min	Data Files:	NA

Order -->		1				2			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	2445	2413	2388	2415.3	2279	2278	2222	2259.7
2	1.24	2528	2533	2511	2524.0	2386	2397	2383	2388.7
3	2.29	2540	2520	2518	2526.0	2427	2406	2430	2421.0
4	3.82	2519	2496	2511	2508.7	2446	2407	2432	2428.3
Center	5.91	2459	2437	2457	2451.0	2416	2508	2452	2458.7
5	8.00	2404	2409	2372	2395.0	2517	2472	2479	2489.3
6	9.52	2340	2314	2378	2344.0	2477	2415	2415	2435.7
7	10.57	2251	2315	2271	2279.0	2267	2357	2333	2319.0
8	11.31	1910	2008	1867	1928.3	2095	2146	2144	2128.3
Averages ---------->		2377.3	2382.8	2363.7	2374.6	2367.8	2376.2	2365.6	2369.9

All	ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	2372.2		Mean	2432.5	2420.1	2426.3
Min Point	1928.3	-18.7%	Std. Dev.	96.7	54.5	75.7
Max Point	2526.0	6.5%	COV as %	4.0	2.3	**3.1**

Flow w/o C-Pt 1788 acfm

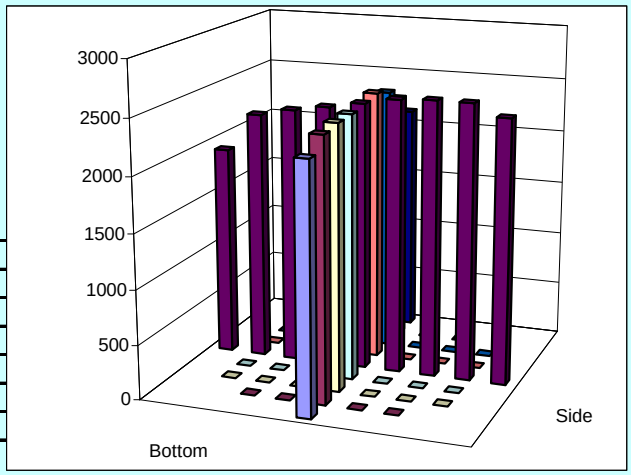
Vel Avg w/o C-Pt 2362 fpm

Instuments Used: Cal Due

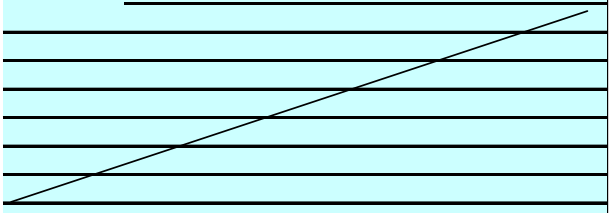
Solomat Zephyr SN 12951472 03/17/10

Fisher Scientific SN 61876141 04/09/10

	Start	Finish	
Stack temp	76.6	76.1	F
Equipment temp	69.2	70.1	F
Ambient temp	66.2	67.1	F
Stack static	1.12	1.11	mbars
Ambient pressure	29.23	29.23	in Hg
Total Stack pressure	1111.00	1111.00	mbars
Ambient humidity	32%	32%	RH



Notes: 3M Filtrete



Entries made by:	Julia Flaherty	Technical Data Review performed by:	Ernest Antonio
Signature/date	5/5/2009	Signature/date	Signature on File 09 July 2010
			TI-RPP-WTP-676

VELOCITY TRAVERSE DATA FORM

Site	**LB-C2 Model**	Run No.	**VT-4**
Date	**5/5/09**	Fan Configuration	**A&B**
Testers	MSP, JEF	Fan Setting	**35** **Hz**
Stack Dia.	11.813 in.	Stack Temp	74.4 deg F
Stack X-Area	109.6 in.2	Start/End Time	15:46 16:20
Test Port	3	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	100 inches	Points in Center 2/3	2 to: 7
Velocity units	ft/min	Data Files:	NA

Order -->		1				2			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	2408	2468	2402	2426.0	2261	2400	2305	2322.0
2	1.24	2534	2488	2542	2521.3	2430	2420	2404	2418.0
3	2.29	2527	2525	2528	2526.7	2519	2497	2517	2511.0
4	3.82	2539	2563	2548	2550.0	2542	2552	2527	2540.3
Center	5.91	2565	2561	2571	2565.7	2542	2534	2537	2537.7
5	8.00	2595	2590	2566	2583.7	2600	2599	2553	2584.0
6	9.52	2616	2588	2633	2612.3	2602	2588	2610	2600.0
7	10.57	2605	2642	2593	2613.3	2528	2491	2577	2532.0
8	11.31	2447	2543	2537	2509.0	2480	2281	2388	2383.0
Averages ---------->		2537.3	2552.0	2546.7	2545.3	2500.4	2484.7	2490.9	2492.0

All	ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	2518.7		Mean	2567.6	2531.9	2549.7
Min Point	2322.0	-7.8%	Std. Dev.	37.6	59.0	51.0
Max Point	2613.3	3.8%	COV as %	1.5	2.3	**2.0**

Flow w/o C-Pt 1914 acfm

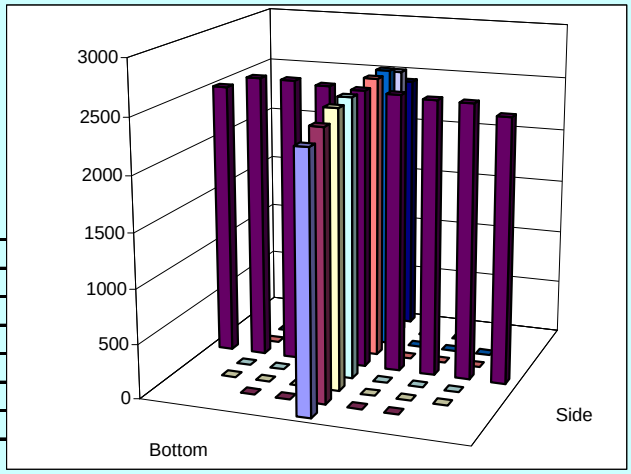
Vel Avg w/o C-Pt 2515 fpm

Instuments Used: Cal Due

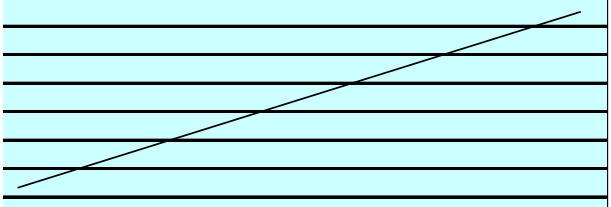
Solomat Zephyr SN 12951472 03/17/10

Fisher Scientific SN 61876141 04/09/10

	Start	Finish	
Stack temp	74.4	74.4	F
Equipment temp	70.1	70.8	F
Ambient temp	67.1	67.1	F
Stack static	1.20	1.07	mbars
Ambient pressure	29.23	29.23	in Hg
Total Stack pressure	991.00	991.00	mbars
Ambient humidity	31%	32%	RH



Notes: 3M Filtrete



Entries made by:	Julia Flaherty
Signature/date	5/5/2009
Technical Data Review performed by:	Ernest Antonio
Signature/date	Signature on File 09 July 2010
	TI-RPP-WTP-676

VELOCITY TRAVERSE DATA FORM

Site	**LB-C2 Model**	Run No.	**VT-5**
Date	**5/6/09**	Fan Configuration	**A&B**
Testers	JAG, MSP	Fan Setting	**35** **Hz**
Stack Dia.	11.781 in.	Stack Temp	71.0 deg F
Stack X-Area	109.0 in.2	Start/End Time	13:12 13:49
Test Port	2	Center 2/3 from	1.08 to: 10.70
Distance to disturbance	160 inches	Points in Center 2/3	2 to: 7
Velocity units	ft/min	Data Files:	NA

Order -->		1				2			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	2467	2310	2488	2421.7	2323	2290	2356	2323.0
2	1.24	2593	2602	2560	2585.0	2489	2400	2472	2453.7
3	2.29	2687	2642	2633	2654.0	2530	2476	2513	2506.3
4	3.82	2660	2634	2643	2645.7	2549	2557	2549	2551.7
Center	5.91	2587	2564	2599	2583.3	2609	2572	2590	2590.3
5	8.00	2526	2502	2534	2520.7	2676	2642	2670	2662.7
6	9.52	2463	2433	2446	2447.3	2675	2599	2663	2645.7
7	10.57	2466	2369	2339	2391.3	2555	2457	2517	2509.7
8	11.31	2224	1820	2076	2040.0	2258	2170	2172	2200.0
Averages ---------->		2519.2	2430.7	2479.8	2476.6	2518.2	2462.6	2500.2	2493.7

All	ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	2485.1		Mean	2546.8	2560.0	2553.4
Min Point	2040.0	-17.9%	Std. Dev.	99.0	77.0	85.5
Max Point	2662.7	7.1%	COV as %	3.9	3.0	**3.3**

Flow w/o C-Pt 1872 acfm

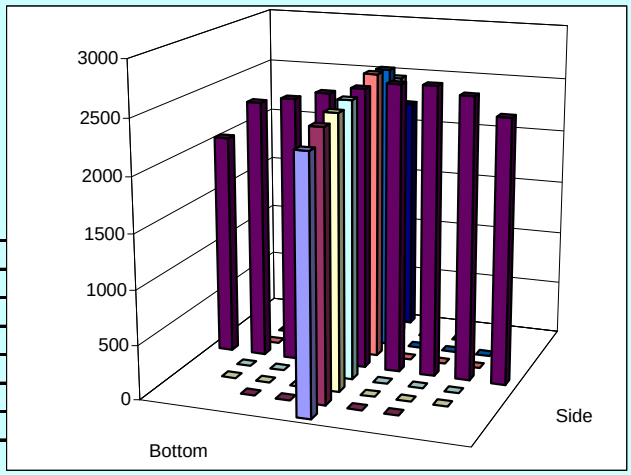
Vel Avg w/o C-Pt 2472 fpm

Instuments Used:

	Cal Due
Solomat Zephyr SN 12951472	03/17/10
Fisher Scientific SN 61876141	04/09/10

	Start	Finish	
Stack temp	71	68	F
Equipment temp	67	70	F
Ambient temp	67	64	F
Stack static	0.10	0.10	mbars
Ambient pressure	29.26	29.26	in Hg
Total Stack pressure	991.00	991.00	mbars
Ambient humidity	40%	48%	RH

Notes:



Entries made by:	John Glissmeyer
Signature/date	5/16/2009

Technical Data Review performed by:	Ernest Antonio
Signature/date	Signature on File 09 July 2010
	TI-RPP-WTP-676

VELOCITY TRAVERSE DATA FORM

Site	**LB-C2 Model**	Run No.	**VT-6**
Date	**5/6/09**	Fan Configuration	**A&B**
Testers	JAG,MSP	Fan Setting	**35** **Hz**
Stack Dia.	11.781 in.	Stack Temp	68.0 deg F
Stack X-Area	109.0 in.2	Start/End Time	13:51 14:16
Test Port	2	Center 2/3 from	1.08 to: 10.70
Distance to disturbance	160 inches	Points in Center 2/3	2 to: 7
Velocity units	ft/min	Data Files:	NA

Order -->		2				1			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	2444	2330	2336	2370.0	2321	2257	2262	2280.0
2	1.24	2669	2598	2583	2616.7	2391	2482	2417	2430.0
3	2.29	2645	2659	2594	2632.7	2555	2537	2557	2549.7
4	3.82	2607	2625	2649	2627.0	2523	2564	2562	2549.7
Center	5.91	2561	2564	2544	2556.3	2544	2599	2562	2568.3
5	8.00	2488	2419	2584	2497.0	2651	2628	2629	2636.0
6	9.52	2468	2403	2419	2430.0	2585	2648	2604	2612.3
7	10.57	2342	2399	2408	2383.0	2545	2539	2503	2529.0
8	11.31	1896	2257	2355	2169.3	2262	2351	2339	2317.3
Averages ---------->		2457.8	2472.7	2496.9	2475.8	2486.3	2511.7	2492.8	2496.9

All	ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	2486.4		Mean	2534.7	2553.6	2544.1
Min Point	2169.3	-12.8%	Std. Dev.	100.6	66.3	82.4
Max Point	2636.0	6.0%	COV as %	4.0	2.6	**3.2**

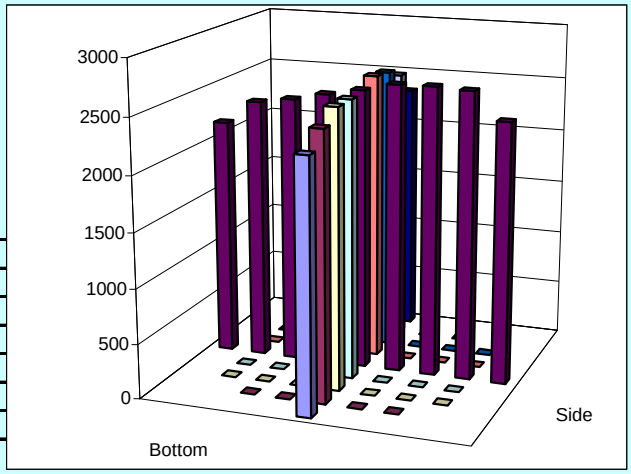
Flow w/o C-Pt 1875 acfm

Vel Avg w/o C-Pt 2477 fpm

Instuments Used:

	Cal Due
Solomat Zephyr SN 12951472	03/17/10
Fisher Scientific SN 61876141	04/09/10

	Start	Finish	
Stack temp	68	66	F
Equipment temp	70	70	F
Ambient temp	64	62	F
Stack static	0.10	0.10	mbars
Ambient pressure	29.26	29.26	in Hg
Total Stack pressure	991.00	991.00	mbars
Ambient humidity	48%	56%	RH



Notes: Raining during last half of test

JAG 5/6/09

Entries made by:	John Glissmeyer
Signature/date	5/6/2009
Technical Data Review performed by:	Ernest Antonio
Signature/date	Signature on File 09 July 2010
	TI-RPP-WTP-676

VELOCITY TRAVERSE DATA FORM

Site	**LB-C2 Model**	Run No.	**VT-7**
Date	**5/7/09**	Fan Configuration	**A**
Testers	JAG,MSP	Fan Setting	**35** **Hz**
Stack Dia.	11.875 in.	Stack Temp	73.0 deg F
Stack X-Area	110.8 in.2	Start/End Time	14:15 14:52
Test Port	1	Center 2/3 from	1.09 to: 10.79
Distance to disturbance	220.5 inches	Points in Center 2/3	2 to: 7
Velocity units	ft/min	Data Files:	NA

Order -->		1				2			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	1136	1165	1102	1134.3	1124	1168	1173	1155.0
2	1.24	1326	1336	1240	1300.7	1306	1327	1293	1308.7
3	2.29	1360	1352	1374	1362.0	1337	1345	1339	1340.3
4	3.82	1409	1412	1419	1413.3	1379	1394	1392	1388.3
Center	5.91	1420	1397	1423	1413.3	1394	1421	1405	1406.7
5	8.00	1369	1366	1369	1368.0	1384	1373	1402	1386.3
6	9.52	1314	1345	1339	1332.7	1393	1313	1381	1362.3
7	10.57	1293	1291	1250	1278.0	1243	1218	1199	1220.0
8	11.31	1134	1235	1205	1191.3	1012	1038	1103	1051.0
Averages ---------->		1306.8	1322.1	1302.3	1310.4	1285.8	1288.6	1298.6	1291.0

All	ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1300.7		Mean	1352.6	1344.7	1348.6
Min Point	1051.0	-19.2%	Std. Dev.	52.2	64.1	56.3
Max Point	1413.3	8.7%	COV as %	3.9	4.8	**4.2**

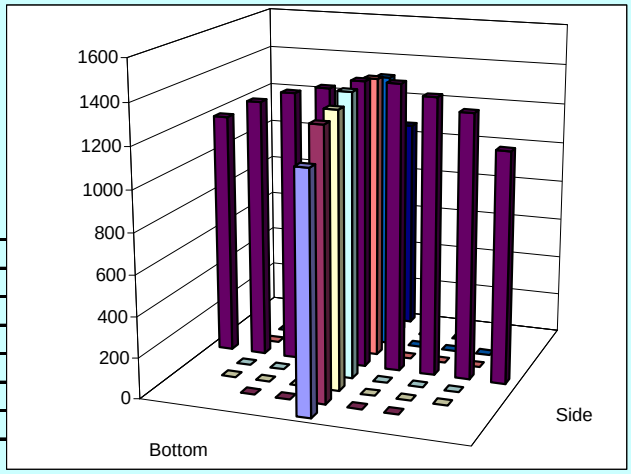
Flow w/o C-Pt 990 acfm

Vel Avg w/o C-Pt 1287 fpm

Instuments Used:

	Cal Due
Solomat Zephyr SN 12951472	03/17/10
Fisher Scientific SN 61876141	04/09/10

	Start	Finish	
Stack temp	73	71	F
Equipment temp	67	69	F
Ambient temp	65	64	F
Stack static	0.02	-0.01	mbars
Ambient pressure	29.56	29.56	in Hg
Total Stack pressure	1001.00	1001.00	mbars
Ambient humidity	30%	29%	RH



Notes:

JAG 5/6/09

Entries made by:	John Glissmeyer
Signature/date	5/7/2009
Technical Data Review performed by:	Ernest Antonio
Signature/date	Signature on File 09 July 2010
	TI-RPP-WTP-676

VELOCITY TRAVERSE DATA FORM

Site	**LB-C2 Model**	Run No.	**VT-8**
Date	**5/7/09**	Fan Configuration	**A**
Testers	JAG,MSP	Fan Setting	**35** **Hz**
Stack Dia.	11.781 in.	Stack Temp	71.0 deg F
Stack X-Area	109.0 in.2	Start/End Time	14:55 15:30
Test Port	2	Center 2/3 from	1.08 to: 10.70
Distance to disturbance	160 inches	Points in Center 2/3	2 to: 7
Velocity units	ft/min	Data Files:	NA

Order -->		1				2			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	1170	1298	1223	1230.3	1172	1083	1149	1134.7
2	1.24	1332	1365	1363	1353.3	1300	1230	1266	1265.3
3	2.29	1361	1373	1355	1363.0	1325	1310	1273	1302.7
4	3.82	1378	1388	1396	1387.3	1353	1366	1361	1360.0
Center	5.91	1404	1417	1393	1404.7	1393	1393	1407	1397.7
5	8.00	1409	1403	1446	1419.3	1419	1433	1429	1427.0
6	9.52	1315	1352	1378	1348.3	1416	1378	1397	1397.0
7	10.57	1301	1272	1298	1290.3	1381	1316	1300	1332.3
8	11.31	1150	1269	1003	1140.7	1176	1168	1230	1191.3
Averages ---------->		1313.3	1348.6	1317.2	1326.4	1326.1	1297.4	1312.4	1312.0

All	ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1319.2		Mean	1366.6	1354.6	1360.6
Min Point	1134.7	-14.0%	Std. Dev.	42.8	57.9	49.3
Max Point	1427.0	8.2%	COV as %	3.1	4.3	**3.6**

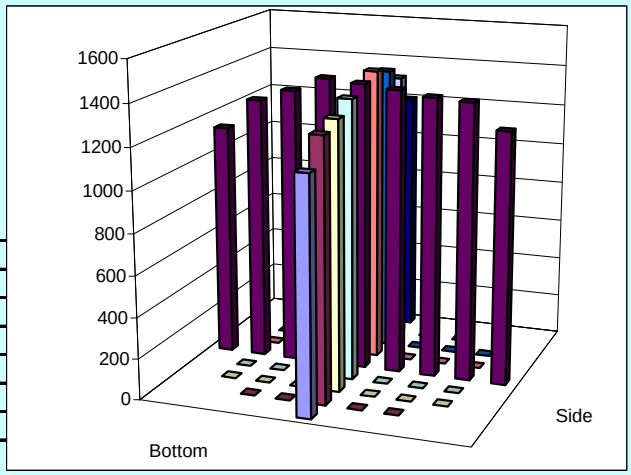
Flow w/o C-Pt 991 acfm

Vel Avg w/o C-Pt 1309 fpm

Instuments Used:

	Cal Due
Solomat Zephyr SN 12951472	03/17/10
Fisher Scientific SN 61876141	04/09/10

	Start	Finish	
Stack temp	71	71	F
Equipment temp	70	71	F
Ambient temp	64	65	F
Stack static	0.02	0.05	mbars
Ambient pressure	29.56	29.56	in Hg
Total Stack pressure	1001.00	1001.00	mbars
Ambient humidity	29%	29%	RH



Notes:

JAG 5/7/09

Entries made by:	John Glissmeyer
Signature/date	5/7/2009
Technical Data Review performed by:	Ernest Antonio
Signature/date	Signature on File 09 July 2010
	TI-RPP-WTP-676

VELOCITY TRAVERSE DATA FORM

Site	**LB-C2 Model**	Run No.	**VT-9**
Date	**5/7/09**	Fan Configuration	**A**
Testers	JAG,MSP	Fan Setting	**35** **Hz**
Stack Dia.	11.875 in.	Stack Temp	73.0 deg F
Stack X-Area	110.8 in.2	Start/End Time	15:35 16:12
Test Port	1	Center 2/3 from	1.09 to: 10.79
Distance to disturbance	220.5 inches	Points in Center 2/3	2 to: 7
Velocity units	ft/min	Data Files:	NA

Order -->		1				2			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	1182	1140	1119	1147.0	1169	1182	1213	1188.0
2	1.24	1316	1271	1346	1311.0	1357	1292	1308	1319.0
3	2.29	1387	1360	1388	1378.3	1350	1342	1350	1347.3
4	3.82	1402	1406	1401	1403.0	1427	1386	1412	1408.3
Center	5.91	1418	1393	1401	1404.0	1409	1422	1416	1415.7
5	8.00	1401	1392	1407	1400.0	1411	1414	1439	1421.3
6	9.52	1341	1333	1320	1331.3	1348	1342	1341	1343.7
7	10.57	1302	1286	1267	1285.0	1262	1238	1226	1242.0
8	11.31	1135	1147	1238	1173.3	976	1049	1062	1029.0
Averages ---------->		1320.4	1303.1	1320.8	1314.8	1301.0	1296.3	1307.4	1301.6

All	ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1308.2		Mean	1359.0	1356.8	1357.9
Min Point	1029.0	-21.3%	Std. Dev.	49.3	64.8	55.3
Max Point	1421.3	8.6%	COV as %	3.6	4.8	**4.1**

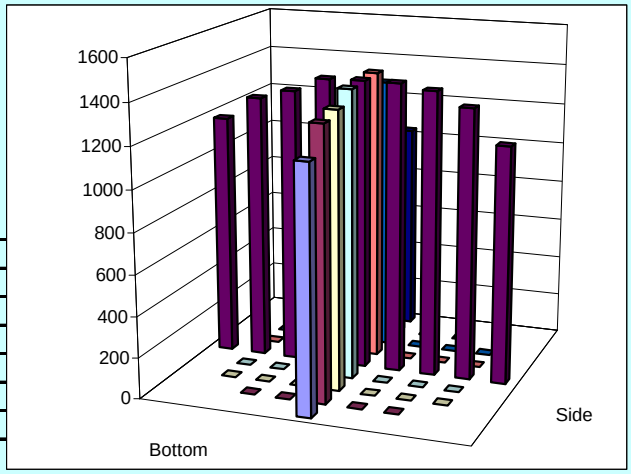
Flow w/o C-Pt 996 acfm

Vel Avg w/o C-Pt 1295 fpm

Instuments Used:

	Cal Due
Solomat Zephyr SN 12951472	03/17/10
Fisher Scientific SN 61876141	04/09/10

	Start	Finish	
Stack temp	73	68	F
Equipment temp	71	74	F
Ambient temp	66	65	F
Stack static	0.01	0.00	mbars
Ambient pressure	29.56	29.56	in Hg
Total Stack pressure	1001.00	1001.00	mbars
Ambient humidity	28%	29%	RH



Notes:

JAG 5/7/09

Entries made by:	John Glissmeyer
Signature/date	5/7/2009
Technical Data Review performed by:	Ernest Antonio
Signature/date	Signature on File 09 July 2010
	TI-RPP-WTP-676

VELOCITY TRAVERSE DATA FORM

Site	**LB-C2 Model**	Run No.	**VT-10**
Date	**5/7/09**	Fan Configuration	**A**
Testers	JAG,MSP	Fan Setting	**35** **Hz**
Stack Dia.	11.813 in.	Stack Temp	69.0 deg F
Stack X-Area	109.6 in.2	Start/End Time	16:15 16:48
Test Port	3	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	100 inches	Points in Center 2/3	2 to: 7
Velocity units	ft/min	Data Files:	NA

Order -->		1				2			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	1241	1218	1156	1205.0	1143	1168	1178	1163.0
2	1.24	1293	1303	1288	1294.7	1314	1330	1321	1321.7
3	2.29	1306	1337	1337	1326.7	1342	1348	1332	1340.7
4	3.82	1336	1363	1336	1345.0	1367	1351	1350	1356.0
Center	5.91	1368	1360	1344	1357.3	1312	1374	1350	1345.3
5	8.00	1363	1316	1366	1348.3	1356	1358	1333	1349.0
6	9.52	1368	1343	1350	1353.7	1332	1325	1351	1336.0
7	10.57	1314	1312	1361	1329.0	1330	1314	1309	1317.7
8	11.31	1327	1270	1286	1294.3	1101	1254	1142	1165.7
Averages ---------->		1324.0	1313.6	1313.8	1317.1	1288.6	1313.6	1296.2	1299.4

All	ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1308.3		Mean	1336.4	1338.0	1337.2
Min Point	1163.0	-11.1%	Std. Dev.	21.8	14.1	17.6
Max Point	1357.3	3.7%	COV as %	1.6	1.1	**1.3**

Flow w/o C-Pt 992 acfm

Vel Avg w/o C-Pt 1303 fpm

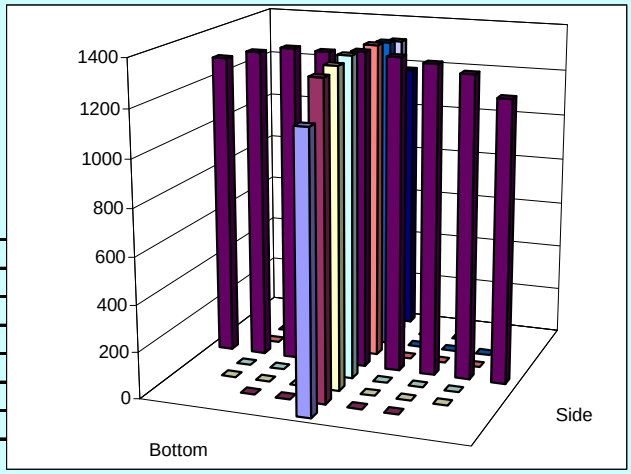
Instuments Used:

	Cal Due
Solomat Zephyr SN 12951472	03/17/10
Fisher Scientific SN 61876141	04/09/10

	Start	Finish	
Stack temp	69	73	F
Equipment temp	74	72	F
Ambient temp	64	64	F
Stack static	0.05	0.06	mbars
Ambient pressure	29.56	29.56	in Hg
Total Stack pressure	1001.00	1001.00	mbars
Ambient humidity	29%	29%	RH

Notes:

JAG 5/7/09



Entries made by:	John Glissmeyer
Signature/date	5/7/2009
Technical Data Review performed by:	Ernest Antonio
Signature/date	Signature on File 09 July 2010
	TI-RPP-WTP-676

VELOCITY TRAVERSE DATA FORM

Site	**LB-C2 Model**	Run No.	**VT-11**
Date	**5/11/09**	Fan Configuration	**A Only**
Testers	MSP, JEF	Fan Setting	**35** **Hz**
Stack Dia.	11.875 in.	Stack Temp	73.7 deg F
Stack X-Area	110.8 in.2	Start/End Time	9:20 9:50
Test Port	1	Center 2/3 from	1.09 to: 10.79
Distance to disturbance	220.5 inches	Points in Center 2/3	2 to: 7
Velocity units	ft/min	Data Files:	NA

Order --> FIRST

Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	1162	1152	1110	1141.3	1152	1156	1183	1163.7
2	1.24	1298	1271	1257	1275.3	1259	1303	1294	1285.3
3	2.29	1383	1368	1391	1380.7	1346	1369	1369	1361.3
4	3.82	1399	1414	1418	1410.3	1362	1394	1378	1378.0
Center	5.91	1377	1431	1394	1400.7	1409	1404	1408	1407.0
5	8.00	1395	1402	1372	1389.7	1395	1414	1401	1403.3
6	9.52	1318	1300	1306	1308.0	1317	1369	1358	1348.0
7	10.57	1265	1308	1236	1269.7	1180	1249	1249	1226.0
8	11.31	1185	1120	1099	1134.7	1037	978	1100	1038.3
Averages ---------->		1309.1	1307.3	1287.0	1301.1	1273.0	1292.9	1304.4	1290.1

All	ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1295.6		Mean	1347.8	1344.1	1346.0
Min Point	1038.3	-19.9%	Std. Dev.	61.2	66.2	61.3
Max Point	1410.3	8.9%	COV as %	4.5	4.9	**4.6**

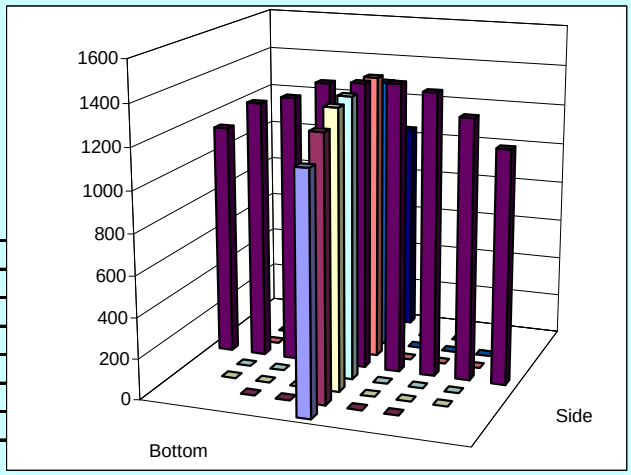
Flow w/o C-Pt 986 acfm

Vel Avg w/o C-Pt 1282 fpm

Instuments Used:

	Cal Due
Solomat Zephyr SN 12951472	03/17/10
Fisher Scientific SN 61876141	04/09/10

	Start	Finish	
Stack temp	73.7	71.6	F
Equipment temp	66.9	71.7	F
Ambient temp	67.1	67.1	F
Stack static	0.30	0.30	mbars
Ambient pressure	29.32	29.32	in Hg
Total Stack pressure	993.00	993.00	mbars
Ambient humidity	37%	38%	RH



Notes: 3M Filtrete

XYY 7/26/10

Entries made by:	Julia Flaherty
Signature/date	5/11/2009
Technical Data Review performed by:	Ernest Antonio
Signature/date	Signature on File 09 July 2010
	TI-RPP-WTP-676

VELOCITY TRAVERSE DATA FORM

Site	**LB-C2 Model**	Run No.	**VT-12**
Date	**5/11/09**	Fan Configuration	**B Only**
Testers	MSP, JEF	Fan Setting	**35** **Hz**
Stack Dia.	11.875 in.	Stack Temp	75.3 deg F
Stack X-Area	110.8 in.2	Start/End Time	9:55 10:26
Test Port	1	Center 2/3 from	1.09 to: 10.79
Distance to disturbance	220.5 inches	Points in Center 2/3	2 to: 7
Velocity units	ft/min	Data Files:	NA

Order --> FIRST

Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	1013	1068	1079	1053.3	1160	1105	1163	1142.7
2	1.24	1273	1249	1239	1253.7	1266	1268	1259	1264.3
3	2.29	1282	1292	1298	1290.7	1296	1284	1323	1301.0
4	3.82	1297	1318	1296	1303.7	1325	1324	1306	1318.3
Center	5.91	1325	1335	1336	1332.0	1319	1324	1303	1315.3
5	8.00	1305	1312	1321	1312.7	1311	1292	1317	1306.7
6	9.52	1278	1291	1263	1277.3	1285	1301	1278	1288.0
7	10.57	1255	1256	1279	1263.3	1247	1278	1275	1266.7
8	11.31	1223	1252	1229	1234.7	1182	1152	1211	1181.7
Averages ---------->		1250.1	1263.7	1260.0	1257.9	1265.7	1258.7	1270.6	1265.0

All	ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1261.4		Mean	1290.5	1294.3	1292.4
Min Point	1053.3	-16.5%	Std. Dev.	27.9	22.1	24.2
Max Point	1332.0	5.6%	COV as %	2.2	1.7	**1.9**

Flow w/o C-Pt 964 acfm

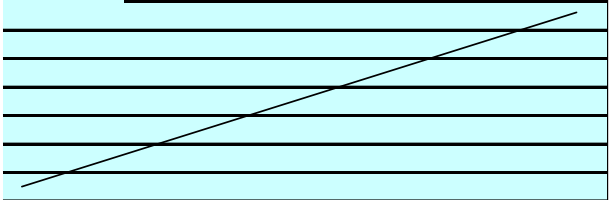
Vel Avg w/o C-Pt 1254 fpm

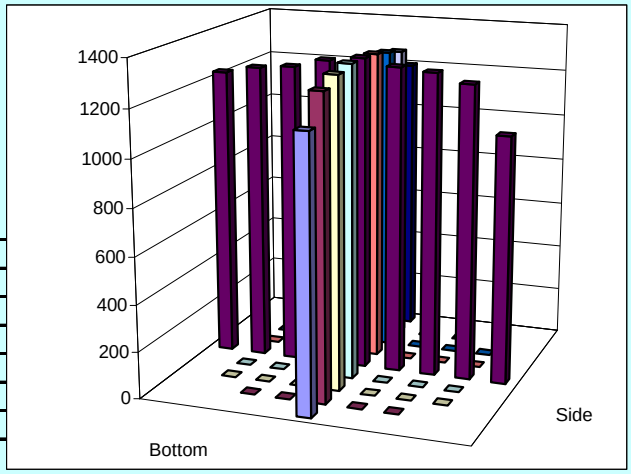
Instuments Used:

	Cal Due
Solomat Zephyr SN 12951472	03/17/10
Fisher Scientific SN 61876141	04/09/10

	Start	Finish	
Stack temp	75.3	77.3	F
Equipment temp	71.9	73.5	F
Ambient temp	67.1	68.9	F
Stack static	0.20	0.20	mbars
Ambient pressure	29.32	29.32	in Hg
Total Stack pressure	993.00	993.00	mbars
Ambient humidity	37%	34%	RH

Notes: 3M Filtrete





Entries made by:	Julia Flaherty
Signature/date	5/11/2009
Technical Data Review performed by:	Ernest Antonio
Signature/date	Signature on File 09 July 2010
	TI-RPP-WTP-676

VELOCITY TRAVERSE DATA FORM

Site	**LB-C2 Model**	Run No.	**VT-13**
Date	**5/11/09**	Fan Configuration	**B Only**
Testers	MSP, JEF	Fan Setting	**35** **Hz**
Stack Dia.	11.781 in.	Stack Temp	77.1 deg F
Stack X-Area	109.0 in.2	Start/End Time	10:30 10:58
Test Port	2	Center 2/3 from	1.08 to: 10.70
Distance to disturbance	160 inches	Points in Center 2/3	2 to: 7
Velocity units	ft/min	Data Files:	NA

Order --> FIRST

Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	1254	1287	1292	1277.7	1199	1209	1172	1193.3
2	1.24	1325	1336	1348	1336.3	1302	1308	1244	1284.7
3	2.29	1337	1348	1330	1338.3	1302	1348	1258	1302.7
4	3.82	1337	1352	1367	1352.0	1348	1324	1316	1329.3
Center	5.91	1311	1358	1329	1332.7	1391	1371	1337	1366.3
5	8.00	1345	1337	1376	1352.7	1372	1378	1351	1367.0
6	9.52	1309	1337	1319	1321.7	1350	1357	1392	1366.3
7	10.57	1245	1243	1281	1256.3	1297	1314	1358	1323.0
8	11.31	1101	1032	1332	1155.0	1134	1250	1179	1187.7
Averages ---------->		1284.9	1292.2	1330.4	1302.5	1299.4	1317.7	1289.7	1302.3

All	ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1302.4		Mean	1327.1	1334.2	1330.7
Min Point	1155.0	-11.3%	Std. Dev.	33.0	33.5	32.2
Max Point	1367.0	5.0%	COV as %	2.5	2.5	**2.4**

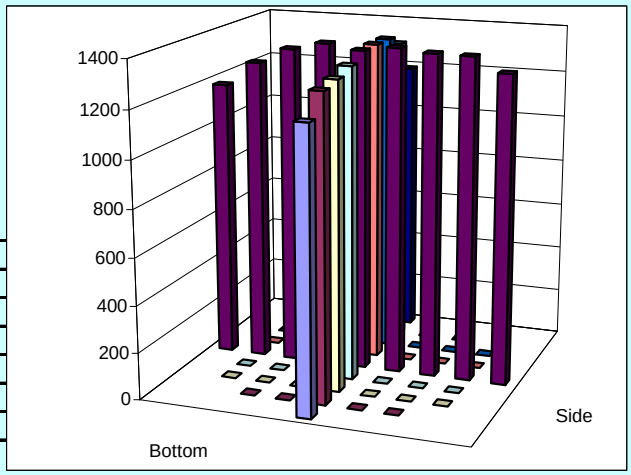
Flow w/o C-Pt 981 acfm

Vel Avg w/o C-Pt 1297 fpm

Instuments Used:

	Cal Due
Solomat Zephyr SN 12951472	03/17/10
Fisher Scientific SN 61876141	04/09/10

	Start	Finish	
Stack temp	77.1	77.3	F
Equipment temp	73.5	73.4	F
Ambient temp	69.8	70.7	F
Stack static	0.30	0.30	mbars
Ambient pressure	29.32	29.29	in Hg
Total Stack pressure	993.00	993.00	mbars
Ambient humidity	34%	32%	RH



Notes: 3M Filtrete

XYY 6/30/10

Entries made by:	Julia Flaherty
Signature/date	5/11/2009

Technical Data Review performed by:	Ernest Antonio
Signature/date	Signature on File 09 July 2010
	TI-RPP-WTP-676

VELOCITY TRAVERSE DATA FORM

Site	**LB-C2 Model**	Run No.	**VT-14**
Date	**5/11/09**	Fan Configuration	**B only**
Testers	MSP, JEF	Fan Setting	**35** **Hz**
Stack Dia.	11.813 in.	Stack Temp	78.8 deg F
Stack X-Area	109.6 in.2	Start/End Time	11:00 11:30
Test Port	3	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	100 inches	Points in Center 2/3	2 to: 7
Velocity units	ft/min	Data Files:	NA

Order --> FIRST

Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	1207	1231	1236	1224.7	1208	1248	1184	1213.3
2	1.24	1316	1319	1317	1317.3	1347	1333	1321	1333.7
3	2.29	1359	1369	1358	1362.0	1332	1300	1346	1326.0
4	3.82	1343	1324	1334	1333.7	1370	1346	1398	1371.3
Center	5.91	1350	1300	1377	1342.3	1349	1385	1327	1353.7
5	8.00	1350	1322	1325	1332.3	1313	1368	1359	1346.7
6	9.52	1362	1352	1303	1339.0	1326	1290	1324	1313.3
7	10.57	1300	1331	1318	1316.3	1264	1272	1325	1287.0
8	11.31	1295	1304	1309	1302.7	1171	1243	1282	1232.0
Averages ---------->		1320.2	1316.9	1319.7	1318.9	1297.8	1309.4	1318.4	1308.6

All	ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1313.7		Mean	1334.7	1333.1	1333.9
Min Point	1213.3	-7.6%	Std. Dev.	15.6	27.8	21.7
Max Point	1371.3	4.4%	COV as %	1.2	2.1	**1.6**

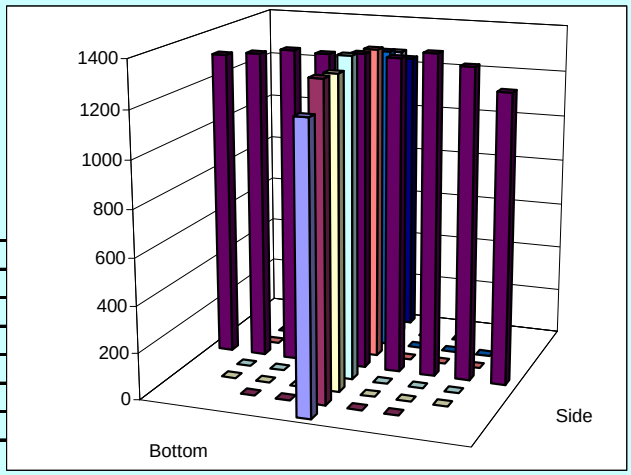
Flow w/o C-Pt 997 acfm

Vel Avg w/o C-Pt 1309 fpm

Instuments Used:

	Cal Due
Solomat Zephyr SN 12951472	03/17/10
Fisher Scientific SN 61876141	04/09/10

	Start	Finish	
Stack temp	78.8	77.9	F
Equipment temp	73.4	73	F
Ambient temp	70.7	70.7	F
Stack static	0.30	0.30	mbars
Ambient pressure	29.29	29.29	in Hg
Total Stack pressure	992.00	992.00	mbars
Ambient humidity	32%	32%	RH



Notes: 3M Filtrete

XYY 7/26/10

Entries made by:	Julia Flaherty
Signature/date	5/11/2009

Technical Data Review performed by:	Ernest Antonio
Signature/date	Signature on File 09 July 2010
	TI-RPP-WTP-676

VELOCITY TRAVERSE DATA FORM

Site	**LB-C2 Model**	Run No.	**VT-15**
Date	**5/11/09**	Fan Configuration	**B Only**
Testers	MSP, JEF	Fan Setting	**35** **Hz**
Stack Dia.	11.813 in.	Stack Temp	80.7 deg F
Stack X-Area	109.6 in.2	Start/End Time	13:10 13:45
Test Port	3	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	100 inches	Points in Center 2/3	2 to: 7
Velocity units	ft/min	Data Files:	NA

Order --> FIRST

Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	1206	1226	1208	1213.3	1192	1167	1223	1194.0
2	1.24	1290	1309	1316	1305.0	1323	1309	1325	1319.0
3	2.29	1318	1341	1334	1331.0	1371	1334	1284	1329.7
4	3.82	1339	1331	1291	1320.3	1309	1347	1297	1317.7
Center	5.91	1341	1311	1342	1331.3	1320	1320	1308	1316.0
5	8.00	1314	1321	1326	1320.3	1339	1339	1284	1320.7
6	9.52	1324	1291	1261	1292.0	1257	1181	1232	1223.3
7	10.57	1274	1301	1327	1300.7	1192	1244	1283	1239.7
8	11.31	1243	1187	1278	1236.0	1195	1149	1129	1157.7
Averages ---------->		1294.3	1290.9	1298.1	1294.4	1277.6	1265.6	1262.8	1268.6

All	ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1281.5		Mean	1314.4	1295.1	1304.8
Min Point	1157.7	-9.7%	Std. Dev.	15.3	43.9	33.2
Max Point	1331.3	3.9%	COV as %	1.2	3.4	**2.5**

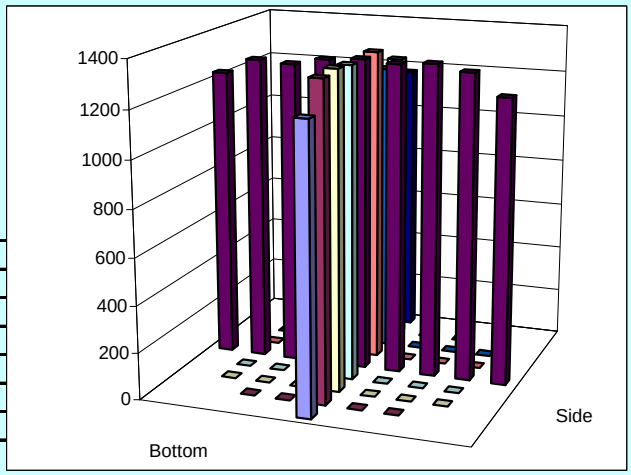
Flow w/o C-Pt 971 acfm

Vel Avg w/o C-Pt 1276 fpm

Instuments Used:

	Cal Due
Solomat Zephyr SN 12951472	03/17/10
Fisher Scientific SN 61876141	04/09/10

	Start	Finish	
Stack temp	80.7	80	F
Equipment temp	70.5	72.3	F
Ambient temp	72.5	70.7	F
Stack static	0.30	0.30	mbars
Ambient pressure	29.26	29.26	in Hg
Total Stack pressure	991.00	991.00	mbars
Ambient humidity	31%	31%	RH



Notes: 3M Filtrete

XYY 7/26/10

Entries made by:	Julia Flaherty
Signature/date	5/11/2009

Technical Data Review performed by:	Ernest Antonio
Signature/date	Signature on File 09 July 2010
	TI-RPP-WTP-676

VELOCITY TRAVERSE DATA FORM

Site	**LB-C2 Model**	Run No.	**VT-16**
Date	**5/11/09**	Fan Configuration	**B Only**
Testers	MSP, JEF	Fan Setting	**35** **Hz**
Stack Dia.	11.813 in.	Stack Temp	80.6 deg F
Stack X-Area	109.6 in.2	Start/End Time	13:48 14:21
Test Port	3	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	100 inches	Points in Center 2/3	2 to: 7
Velocity units	ft/min	Data Files:	NA

Order --> FIRST

Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	1123	1113	1153	1129.7	1085	1147	996	1076.0
2	1.24	1169	1290	1213	1224.0	1217	1273	1190	1226.7
3	2.29	1268	1267	1269	1268.0	1254	1292	1266	1270.7
4	3.82	1308	1286	1278	1290.7	1218	1260	1274	1250.7
Center	5.91	1286	1267	1288	1280.3	1267	1266	1261	1264.7
5	8.00	1232	1269	1285	1262.0	1247	1270	1251	1256.0
6	9.52	1232	1252	1232	1238.7	1245	1260	1230	1245.0
7	10.57	1272	1255	1270	1265.7	1202	1175	1244	1207.0
8	11.31	1187	1175	1248	1203.3	1100	1226	1045	1123.7
Averages ---------->		1230.8	1241.6	1248.4	1240.3	1203.9	1241.0	1195.2	1213.4

All	ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1226.8		Mean	1261.3	1245.8	1253.6
Min Point	1076.0	-12.3%	Std. Dev.	23.1	22.3	23.2
Max Point	1290.7	5.2%	COV as %	1.8	1.8	**1.9**

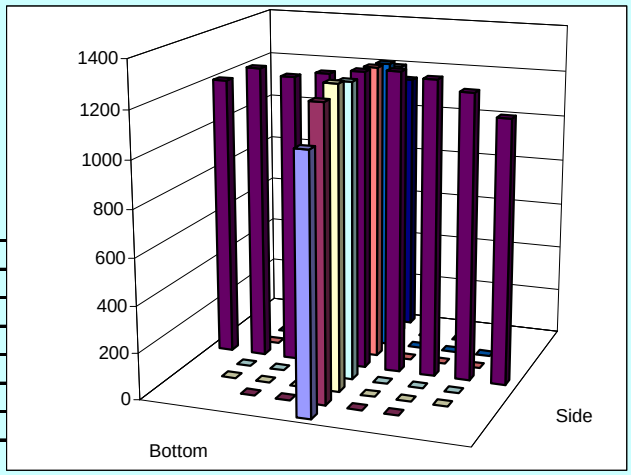
Flow w/o C-Pt 929 acfm

Vel Avg w/o C-Pt 1221 fpm

Instuments Used:

	Cal Due
Solomat Zephyr SN 12951472	03/17/10
Fisher Scientific SN 61876141	04/09/10

	Start	Finish	
Stack temp	80.6	81.6	F
Equipment temp	72.5	74.8	F
Ambient temp	70.7	73.4	F
Stack static	0.30	0.30	mbars
Ambient pressure	29.26	29.26	in Hg
Total Stack pressure	991.00	991.00	mbars
Ambient humidity	30%	30%	RH



Notes: 3M Filtrete

XYY 7/26/10

Entries made by:	Julia Flaherty
Signature/date	5/11/2009
Technical Data Review performed by:	Ernest Antonio
Signature/date	Signature on File 09 July 2010
	TI-RPP-WTP-676

VELOCITY TRAVERSE DATA FORM

Site	**LB-C2 Model**	Run No.	**VT-17**
Date	**5/11/09**	Fan Configuration	**A & B**
Testers	MSP, JEF	Fan Setting	**35** **Hz**
Stack Dia.	11.781 in.	Stack Temp	82.0 deg F
Stack X-Area	109.0 in.2	Start/End Time	14:28 14:58
Test Port	2	Center 2/3 from	1.08 to: 10.70
Distance to disturbance	160 inches	Points in Center 2/3	2 to: 7
Velocity units	ft/min	Data Files:	NA

Order --> FIRST

Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	2292	2344	2175	2270.3	2044	1995	2047	2028.7
2	1.24	2422	2447	2291	2386.7	2338	2356	2302	2332.0
3	2.29	2554	2603	2431	2529.3	2531	2510	2488	2509.7
4	3.82	2610	2582	2453	2548.3	2564	2591	2581	2578.7
Center	5.91	2612	2619	2484	2571.7	2584	2608	2611	2601.0
5	8.00	2585	2509	2461	2518.3	2603	2597	2601	2600.3
6	9.52	2523	2394	2372	2429.7	2600	2578	2624	2600.7
7	10.57	2342	2325	2155	2274.0	2446	2498	2496	2480.0
8	11.31	2219	1889	2008	2038.7	2180	2179	2335	2231.3
Averages ---------->		2462.1	2412.4	2314.4	2396.3	2432.2	2434.7	2453.9	2440.3

All	ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	2418.3		Mean	2465.4	2528.9	2497.2
Min Point	2028.7	-16.1%	Std. Dev.	107.4	99.5	104.8
Max Point	2601.0	7.6%	COV as %	4.4	3.9	**4.2**

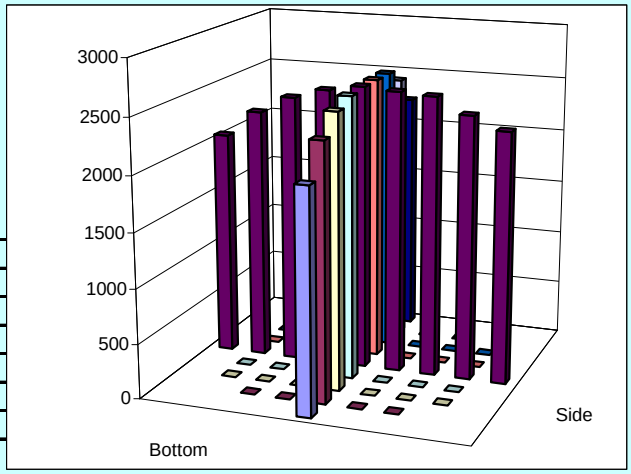
Flow w/o C-Pt 1815 acfm

Vel Avg w/o C-Pt 2397 fpm

Instuments Used:

	Cal Due
Solomat Zephyr SN 12951472	03/17/10
Fisher Scientific SN 61876141	04/09/10

	Start	Finish	
Stack temp	82	78.6	F
Equipment temp	75	75.7	F
Ambient temp	74.3	72.5	F
Stack static	1.20	1.10	mbars
Ambient pressure	29.26	29.26	in Hg
Total Stack pressure	992.00	992.00	mbars
Ambient humidity	30%	29%	RH



Notes: 3M Filtrete

XYY 7/26/10

Entries made by:	Julia Flaherty
Signature/date	5/11/2009

Technical Data Review performed by:	Ernest Antonio
Signature/date	Signature on File 09 July 2010
	TI-RPP-WTP-676

VELOCITY TRAVERSE DATA FORM

Site	**LB-C2 Model**	Run No.	**VT-18**
Date	**5/11/09**	Fan Configuration	**A & B**
Testers	MSP, JEF	Fan Setting	**35** **Hz**
Stack Dia.	11.844 in.	Stack Temp	78.9 deg F
Stack X-Area	110.2 in.2	Start/End Time	15:00 15:36
Test Port	4	Center 2/3 from	1.09 to: 10.76
Distance to disturbance	12 inches	Points in Center 2/3	2 to: 7
Velocity units	ft/min	Data Files:	NA

Order --> FIRST

Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	2721	2706	2716	2714.3	2690	2492	2679	2620.3
2	1.24	2749	2795	2738	2760.7	2663	2688	2681	2677.3
3	2.29	2779	2720	2730	2743.0	2715	2583	2688	2662.0
4	3.82	2755	2719	2720	2731.3	2631	2537	2644	2604.0
Center	5.91	2618	2636	2551	2601.7	2670	2402	2605	2559.0
5	8.00	2060	2078	2073	2070.3	2575	2333	2725	2544.3
6	9.52	1937	1739	1918	1864.7	2659	2717	2710	2695.3
7	10.57	1774	1731	1767	1757.3	2679	2729	2630	2679.3
8	11.31	1833	1851	1823	1835.7	2691	2674	2432	2599.0
Averages ---------->		2358.4	2330.6	2337.3	2342.1	2663.7	2572.8	2643.8	2626.7

All	ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	2484.4		Mean	2361.3	2631.6	2496.5
Min Point	1757.3	-29.3%	Std. Dev.	446.5	61.9	336.8
Max Point	2760.7	11.1%	COV as %	18.9	2.4	**13.5**

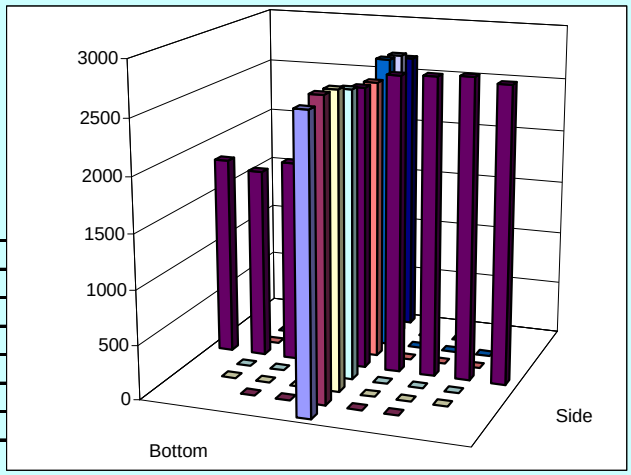
Flow w/o C-Pt 1892 acfm

Vel Avg w/o C-Pt 2472 fpm

Instuments Used:

	Cal Due
Solomat Zephyr SN 12951472	03/17/10
Fisher Scientific SN 61876141	04/09/10

	Start	Finish	
Stack temp	78.9	83.4	F
Equipment temp	75.3	80.6	F
Ambient temp	73.4	94.1	F
Stack static	1.20	0.80	mbars
Ambient pressure	29.26	29.26	in Hg
Total Stack pressure	992.00	992.00	mbars
Ambient humidity	29%	18%	RH



Notes: 3M Filtrete

XYY 7/26/10

Entries made by:	Julia Flaherty
Signature/date	5/11/2009

Technical Data Review performed by:	Ernest Antonio
Signature/date	Signature on File 09 July 2010
	TI-RPP-WTP-676

VELOCITY TRAVERSE DATA FORM

Site	**LB-C2 Model**	Run No.	**VT-19**
Date	**5/12/09**	Fan Configuration	**A & B**
Testers	JAG, JEF	Fan Setting	**35** **Hz**
Stack Dia.	11.875 in.	Stack Temp	70.5 deg F
Stack X-Area	110.8 in.2	Start/End Time	13:30 14:50
Test Port	8	Center 2/3 from	1.09 to: 10.79
Distance to disturbance	4.5 inches	Points in Center 2/3	2 to: 7
Velocity units	ft/min	Data Files:	NA

Order -->		FIRST				SECOND			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	1339	1587	1643	1523.0	-611	-200	-163	-324.7
2	1.24	1492	1484	1607	1527.7	-184	-339	-338	-287.0
3	2.29	1301	1148	1059	1169.3	-519	-491	-570	-526.7
4	3.82	1055	542	450	682.3	-279	-411	61	-209.7
Center	5.91	100	-395	-398	-231.0	72	108	-232	-17.3
5	8.00	592	720	-699	204.3	682	506	419	535.7
6	9.52	723	840	-228	445.0	1224	1170	856	1083.3
7	10.57	1179	1253	506	979.3	1414	1376	1218	1336.0
8	11.31	1204	1328	596	1042.7	1281	1382	1019	1227.3
Averages ---------->		998.3	945.2	504.0	815.9	342.2	344.6	252.2	313.0

All	ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	564.4		Mean	682.4	273.5	478.0
Min Point	-526.7	-193.3%	Std. Dev.	599.9	721.8	672.0
Max Point	1527.7	170.7%	COV as %	87.9	263.9	**140.6**

Flow w/o C-Pt 500 acfm

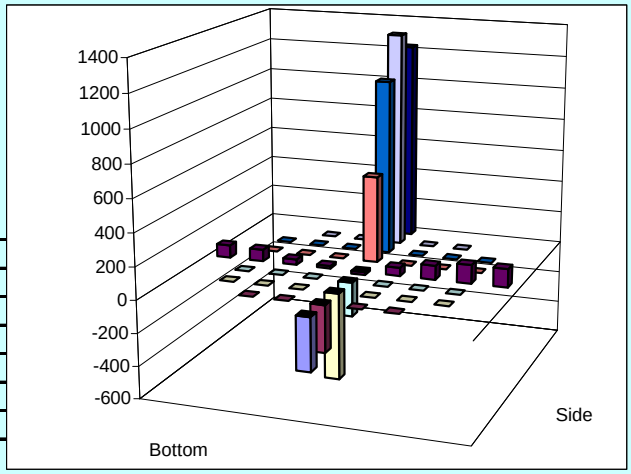
Vel Avg w/o C-Pt 651 fpm

Instuments Used: Cal Due

Solomat Zephyr SN 12951472 03/17/10

Fisher Scientific SN 61876141 04/09/10

	Start	Finish	
Stack temp	70.5	74	F
Equipment temp	66.3	68	F
Ambient temp	63.5	62.6	F
Stack static	1.40	1.30	mbars
Ambient pressure	29.32	29.32	in Hg
Total Stack pressure	994.00	994.00	mbars
Ambient humidity	27%	26%	RH



Notes: 3M Filtrete

Tip of pitot tube is essentially at the disturbance, and is probably mis-aligned with the velocity vector. Velocity vector strikes the pitot tube at an angle, giving incorrect readings on the static and total pressure ports.

XYY 7/26/10

Entries made by:	Julia Flaherty
Signature/date	5/12/2009
Technical Data Review performed by:	Ernest Antonio
Signature/date	Signature on File 09 July 2010
	TI-RPP-WTP-676

VELOCITY TRAVERSE DATA FORM

Site	**LB-C2 Model**	Run No.	**VT-20**
Date	**5/12/09**	Fan Configuration	**A & B**
Testers	JAG, JEF	Fan Setting	**35** **Hz**
Stack Dia.	11.875 in.	Stack Temp	66.0 deg F
Stack X-Area	110.8 in.2	Start/End Time	15:00 16:20
Test Port	8	Center 2/3 from	1.09 to: 10.79
Distance to disturbance	4.5 inches	Points in Center 2/3	2 to: 7
Velocity units	ft/min	Data Files:	NA

Order -->		Second				First			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	790	458	745	664.3	865	840	870	858.3
2	1.24	1420	1050	1300	1256.7	940	890	900	910.0
3	2.29	1620	1540	1660	1606.7	945	900	920	921.7
4	3.82	1390	1380	965	1245.0	910	885	890	895.0
Center	5.91	1010	995	1000	1001.7	975	935	850	920.0
5	8.00	965	960	950	958.3	1150	1060	1070	1093.3
6	9.52	890	1040	815	915.0	1420	1400	1370	1396.7
7	10.57	985	1200	790	991.7	1660	1590	1600	1616.7
8	11.31	1210	1170	995	1125.0	1780	1820	1730	1776.7
Averages ---------->		1142.2	1088.1	1024.4	1084.9	1182.8	1146.7	1133.3	1154.3

All	ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1119.6		Mean	1139.3	1107.6	1123.5
Min Point	664.3	-40.7%	Std. Dev.	247.4	287.8	258.3
Max Point	1776.7	58.7%	COV as %	21.7	26.0	**23.0**

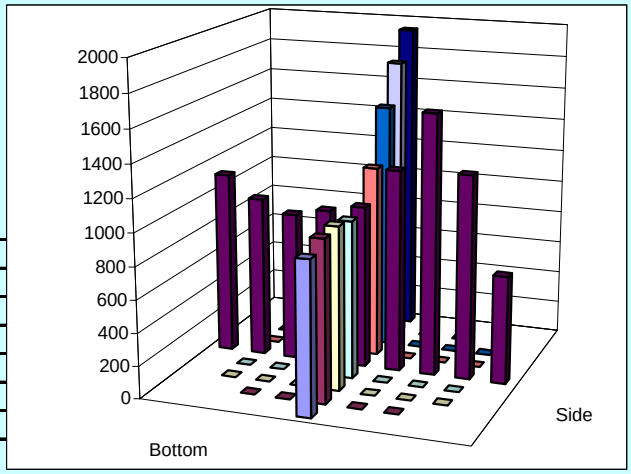
Flow w/o C-Pt 876 acfm

Vel Avg w/o C-Pt 1139 fpm

Instuments Used: Cal Due

TSI VelociCalc SN 305039	06/30/09
Fisher Scientific SN 61876141	04/09/10

	Start	Finish	
Stack temp	66	67	F
Equipment temp	N/A	N/A	F
Ambient temp	61.7	63.5	F
Stack static	N/A	N/A	mbars
Ambient pressure	29.35	29.32	in Hg
Total Stack pressure	N/A	N/A	mbars
Ambient humidity	27%	26%	RH



Notes: 3M Filtrete

Re-do VT-19 with the TSI anemometer.

Each measurement is the average of 4 readings.

Velocity sensor is straight, so the measurements are along the centerline of the test ports.

XYY 7/26/10

Entries made by:	Julia Flaherty
Signature/date	5/12/2009

Technical Data Review performed by:	Ernest Antonio
Signature/date	Signature on File 09 July 2010
	TI-RPP-WTP-676

VELOCITY TRAVERSE DATA FORM

Site	**LB-C2 Model**	Run No.	**VT-21**
Date	**5/13/09**	Fan Configuration	**A & B**
Testers	JAG, JEF	Fan Setting	**35** **Hz**
Stack Dia.	13.281 in.	Stack Temp	65.0 deg F
Stack X-Area	138.5 in.2	Start/End Time	16:11 17:10
Test Port	5	Center 2/3 from	1.22 to: 12.06
Distance to disturbance	3.625 inches	Points in Center 2/3	2 to: 7
Velocity units	ft/min	Data Files:	NA

Order -->		First				Second			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	1950	2400	2050	2133.3	2870	2800	2750	2806.7
2	1.39	2130	2480	2000	2203.3	2720	2700	2540	2653.3
3	2.57	2410	2470	2420	2433.3	2810	2710	2700	2740.0
4	4.28	2450	2490	2440	2460.0	2730	2620	2680	2676.7
Center	6.63	2560	2530	2660	2583.3	2610	2520	2610	2580.0
5	8.97	2640	2840	2820	2766.7	2540	2550	2600	2563.3
6	10.68	1010	1020	1160	1063.3	2520	2540	2550	2536.7
7	11.86	477	510	510	499.0	2510	2590	2530	2543.3
8	12.75	505	402	403	436.7	2280	2300	2350	2310.0
Averages ---------->		1792.4	1904.7	1829.2	1842.1	2621.1	2592.2	2590.0	2601.1

All	ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	2221.6		Mean	2001.3	2613.3	2307.3
Min Point	436.7	-80.3%	Std. Dev.	865.9	77.5	670.6
Max Point	2806.7	26.3%	COV as %	43.3	3.0	**29.1**

Flow w/o C-Pt 2094 acfm

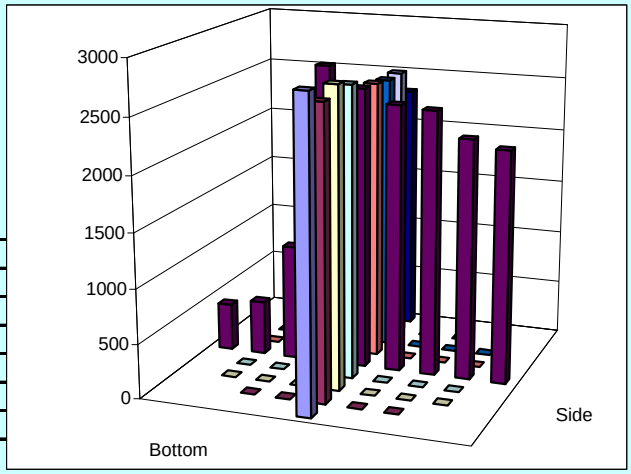
Vel Avg w/o C-Pt 2177 fpm

Instuments Used: Cal Due

TSI VelociCal SN 305039 06/30/09

Fisher Scientific SN 61876141 4/9/2010

	Start	Finish	
Stack temp	67	64	F
Equipment temp	N/A	N/A	F
Ambient temp	67.1	62.6	F
Stack static	N/A	N/A	mbars
Ambient pressure	29.35	29.35	in Hg
Total Stack pressure	N/A	N/A	mbars
Ambient humidity	25%	28%	RH



Notes: 3M Filtrete

Too close to a disturbance to use pitot tube.

XYY 7/26/10

Entries made by:	John Glissmeyer
Signature/date	5/13/2009
Technical Data Review performed by:	Ernest Antonio
Signature/date	Signature on File 09 July 2010
	TI-RPP-WTP-676

VELOCITY TRAVERSE DATA FORM

Site	**LB-C2 Model**	Run No.	**VT-22**
Date	**5/13/09**	Fan Configuration	**A & B**
Testers	JAG, JEF	Fan Setting	**35** **Hz**
Stack Dia.	13.25 in.	Stack Temp	71.0 deg F
Stack X-Area	137.9 in.2	Start/End Time	15:10 16:10
Test Port	6	Center 2/3 from	1.22 to: 12.03
Distance to disturbance	19.5 inches	Points in Center 2/3	2 to: 7
Velocity units	ft/min	Data Files:	NA

Order -->		First				Second			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	36	32	6	24.7	2073	2151	2178	2134.0
2	1.39	-59	-81	-124	-88.0	2093	2123	2138	2118.0
3	2.57	283	732	199	404.7	2092	2123	2145	2120.0
4	4.28	1404	1546	1433	1461.0	2125	2130	2155	2136.7
Center	6.63	2167	2191	2178	2178.7	2112	2108	2148	2122.7
5	8.97	2136	2134	2131	2133.7	2120	2078	2076	2091.3
6	10.68	2070	2091	2044	2068.3	2106	2125	2105	2112.0
7	11.86	2033	2087	2089	2069.7	2093	2143	2065	2100.3
8	12.75	1924	1770	1716	1803.3	1973	2041	2101	2038.3
Averages ---------->		1332.7	1389.1	1296.9	1339.6	2087.4	2113.6	2123.4	2108.1

All	ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1723.9		Mean	1461.1	2114.4	1787.8
Min Point	-88.0	-105.1%	Std. Dev.	932.9	15.0	718.8
Max Point	2178.7	26.4%	COV as %	63.8	0.7	**40.2**

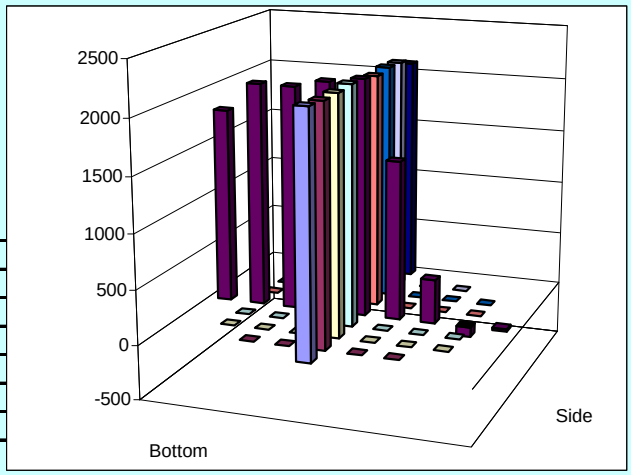
Flow w/o C-Pt 1600 acfm

Vel Avg w/o C-Pt 1671 fpm

Instuments Used:

	Cal Due
Solomat Zephyr SN 12951472	03/17/10
Fisher Scientific SN 61876141	4/9/2010

	Start	Finish	
Stack temp	71	71	F
Equipment temp	72	74	F
Ambient temp	71.6	71.6	F
Stack static	1.60	0.90	mbars
Ambient pressure	29.38	29.35	in Hg
Total Stack pressure	996.50	994.50	mbars
Ambient humidity	23%	23%	RH



Notes: 3M Filtrete

XYY 7/26/10

Entries made by:	Julia Flaherty
Signature/date	5/13/2009

Technical Data Review performed by:	Ernest Antonio
Signature/date	Signature on File 09 July 2010
	TI-RPP-WTP-676

VELOCITY TRAVERSE DATA FORM

Site	**LB-C2 Model**	Run No.	**VT-23**
Date	**5/14/09**	Fan Configuration	**A & B**
Testers	JAG, JEF	Fan Setting	**35** **Hz**
Stack Dia.	11.969 in.	Stack Temp	72.0 deg F
Stack X-Area	112.5 in.2	Start/End Time	10:40 11:30
Test Port	7	Center 2/3 from	1.10 to: 10.87
Distance to disturbance	5.25 inches	Points in Center 2/3	2 to: 7
Velocity units	ft/min	Data Files:	NA

Order -->		Second				First			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	1570	1540	1510	1540.0	510	444	350	434.7
2	1.26	1520	1490	1460	1490.0	423	510	399	444.0
3	2.32	1460	1380	1450	1430.0	481	411	407	433.0
4	3.87	1340	1320	1350	1336.7	580	650	585	605.0
Center	5.98	1130	1080	1100	1103.3	950	930	960	946.7
5	8.10	1190	1030	1130	1116.7	1160	1170	1210	1180.0
6	9.65	1280	1270	1230	1260.0	1370	1370	1400	1380.0
7	10.71	1400	1440	1440	1426.7	1510	1510	1550	1523.3
8	11.47	1540	1530	1530	1533.3	1650	1670	1660	1660.0
Averages ---------->		1381.1	1342.2	1355.6	1359.6	959.3	962.8	946.8	956.3

All	ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1158.0		Mean	1309.0	930.3	1119.7
Min Point	433.0	-62.6%	Std. Dev.	154.8	448.4	377.4
Max Point	1660.0	43.4%	COV as %	11.8	48.2	**33.7**

Flow w/o C-Pt 918 acfm

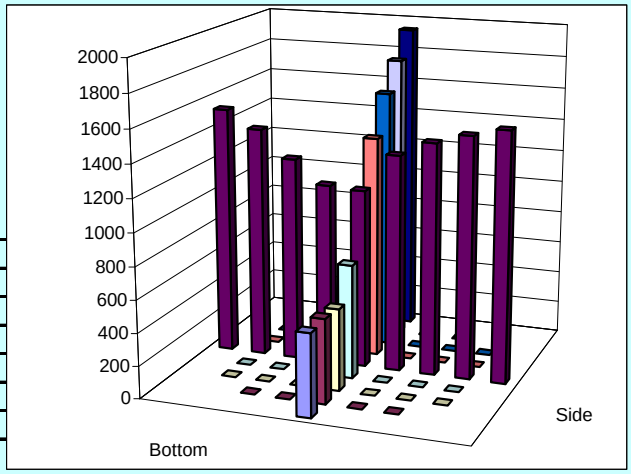
Vel Avg w/o C-Pt 1175 fpm

Instuments Used: Cal Due

TSI Velocicalc 8355 SN 305039 06/30/09

Fisher Scientific SN 61876141 4/9/2010

	Start	Finish	
Stack temp	72	74	F
Equipment temp	N/A	N/A	F
Ambient temp	72	70	F
Stack static	N/A	N/A	mbars
Ambient pressure	29.21	29.23	in Hg
Total Stack pressure	N/A	N/A	mbars
Ambient humidity	31%	31%	RH



Notes: 3M Filtrete

Each measurement is the average of 4 readings.

XYY 7/26/10

Entries made by:	Julia Flaherty
Signature/date	5/14/2009

Technical Data Review performed by:	Ernest Antonio
Signature/date	Signature on File 09 July 2010
	TI-RPP-WTP-676

Appendix A.3: LB-C2 Flow Angle Data Sheets

TI-RPP-WTP-677
Page

FLOW ANGLE DATA FORM

LB_C2_FowAngleRev0.xls

CCP-WTPSP-1187

Site	**LB-C2**		Run No.	**FA-1**	
Date	5/18/2009		Fan Setting	**35**	Hz
Tester	JAG, JEF, XYY		Fan configuration	**A&B**	
Stack Dia.	11.875	in	Approx. air vel.	2550	fpm at point >>1 side center
Stack X-Area	110.8	in2	Units	degrees (clockwise > pos. nos.)	
Elevation	N.A.	ft	Port	1	
Distance to disturbance	220.5	in	Stack Temp	85 F	
Start/End Time	1055/1230				

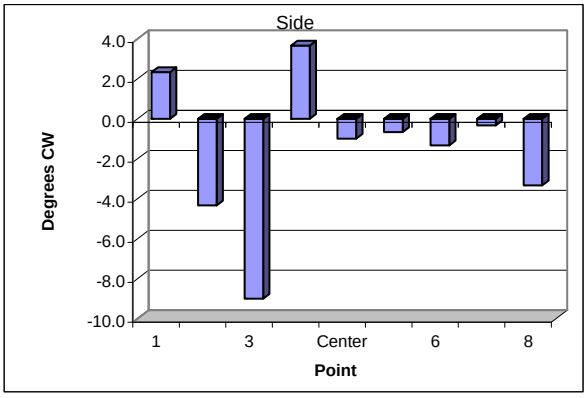
Order -->	1st					2nd				
Traverse-->		Side				Bottom				
Trial ---->		1	2	3		1	2	3		
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.	
1	0.50	-9	18	-2	2.3	4	12	11	9.0	
2	1.24	-2	-8	-3	-4.3	-12	15	17	6.7	
3	2.29	-3	-12	-12	-9.0	-9	4	14	3.0	
4	3.81	10	-8	9	3.7	-8	1	12	1.7	
Center	5.89	5	-4	-4	-1.0	2	2	7	3.7	
5	7.98	-1	-2	1	-0.7	0	-1	-1	-0.7	
6	9.50	-2	-1	-1	-1.3	0	-1	0	-0.3	
7	10.54	1	-2	0	-0.3	0	-2	-1	-1.0	
8	11.28	-6	-3	-1	-3.3	-2	-2	-2	-2.0	
Mean of absolute values:					2.9				3.1	
" " w/o points by wall:					2.9				2.4	
								Grand mean ABS	3.0	
								" " w/o wall pts	2.7	

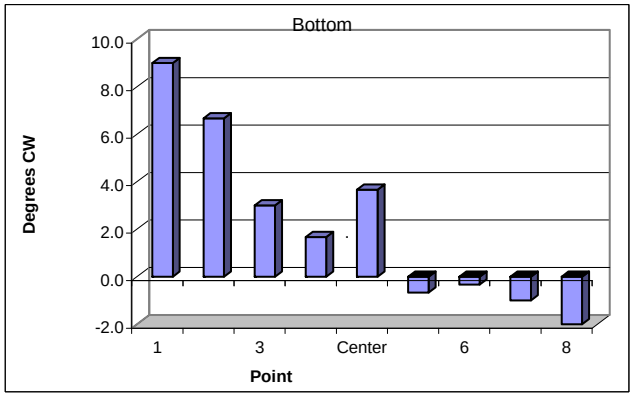
Instuments Used:		**Cal. Due**
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI 8355 SN 305039	30-Jun-09
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to hi `

Notes: JAG:
Should redo this run, because we had 3 different people taking measurements
The wooden plug was used, but it is short by about one inch. Perhaps points
1-4 showed variability because of that.

XYY 7/27/10





Entries made by: John Glissmeyer	Technical Data Review performed by: Ernest Antonio
Signature/date 5/18/2009	Signature/date Signature on File 08 July 2010 TI-RPP-WTP_677

FLOW ANGLE DATA FORM

LB_C2_FowAngleRev0.xls

CCP-WTPSP-1187

Site	**LB-C2**	Run No.	**FA-2**
Date	5/19/2009	Fan Setting	**35** Hz
Tester	JEF, XYY	Fan configuration	**A&B**
Stack Dia.	11.875 in	Approx. air vel.	2910 fpm at point >>1 side center
Stack X-Area	110.8 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	1
Distance to disturbance	220.5 in	Stack Temp	70 F
Start/End Time	905/946		

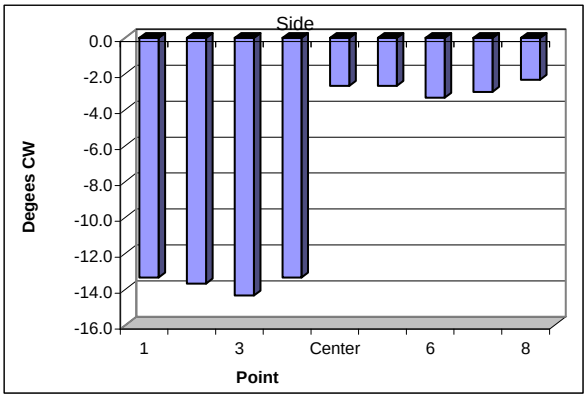
Order -->	1st					2nd			
Traverse-->		**Side**				**Bottom**			
Trial ---->		1	2	3		1	2	3	
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.
1	0.50	-11	-13	-16	-13.3	4	10	10	8.0
2	1.24	-13	-14	-14	-13.7	3	18	1	7.3
3	2.29	-14	-16	-13	-14.3	1	1	2	1.3
4	3.81	-13	-14	-13	-13.3	1	2	-1	0.7
Center	5.89	0	-2	-6	-2.7	-1	3	2	1.3
5	7.98	-3	-3	-2	-2.7	0	1	2	1.0
6	9.50	-3	-3	-4	-3.3	0	1	3	1.3
7	10.54	-3	-3	-3	-3.0	1	1	1	1.0
8	11.28	-2	-2	-3	-2.3	1	1	1	1.0
Mean of absolute values:					7.6				2.6
" " w/o points by wall:					7.6				2.0
								Grand mean ABS	5.1
								" " w/o wall pts	4.8

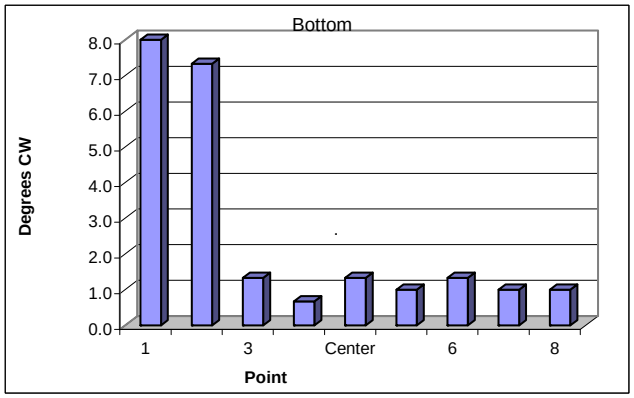
Instuments Used:		**Cal. Due**
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI 8355 SN 305039	30-Jun-09
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).

Notes:
Repeated FA-1 to see if consistent test takers help mesurement consisitency

XYY 7/27/10





Entries made by:	Julia Flaherty	Technical Data Review performed by:	Ernest Antonio
Signature/date	5/19/2009	Signature/date	Signature on File 08 July 2010 TI-RPP-WTP_677

FLOW ANGLE DATA FORM

LB_C2_FowAngleRev0.xls

CCP-WTPSP-1187

Site	**LB-C2**	Run No.	**FA-3**
Date	5/19/2009	Fan Setting	**35** Hz
Tester	JEF, XYY	Fan configuration	**A&B**
Stack Dia.	11.781 in	Approx. air vel.	2550 fpm at point >>1 side center
Stack X-Area	109.0 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	2
Distance to disturbance	160 in	Stack Temp	71 F
Start/End Time	950/1030		

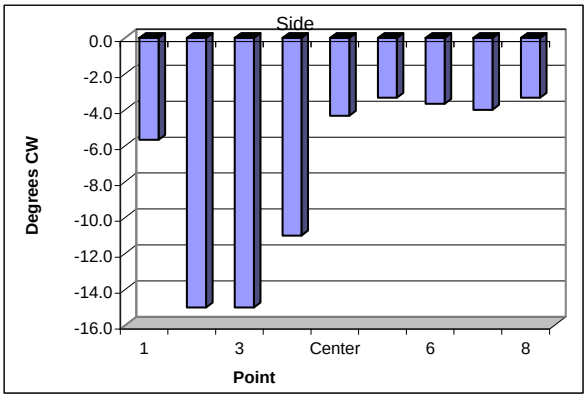
Order -->	1st					2nd			
Traverse-->		**Side**				**Bottom**			
Trial ---->		1	2	3		1	2	3	
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.
1	0.50	-16	13	-14	-5.7	4	2	3	3.0
2	1.24	-15	-15	-15	-15.0	13	16	16	15.0
3	2.29	-15	-15	-15	-15.0	14	14	14	14.0
4	3.81	-11	-10	-12	-11.0	10	11	11	10.7
Center	5.89	-3	-5	-5	-4.3	4	5	4	4.3
5	7.98	-4	-4	-2	-3.3	-1	0	1	0.0
6	9.50	-4	-4	-3	-3.7	-1	0	1	0.0
7	10.54	-3	-4	-5	-4.0	0	1	1	0.7
8	11.28	-4	-3	-3	-3.3	0	0	1	0.3
Mean of absolute values:					7.3				5.3
" " w/o points by wall:					8.0				6.4
								Grand mean ABS	6.3
								" " w/o wall pts	7.2

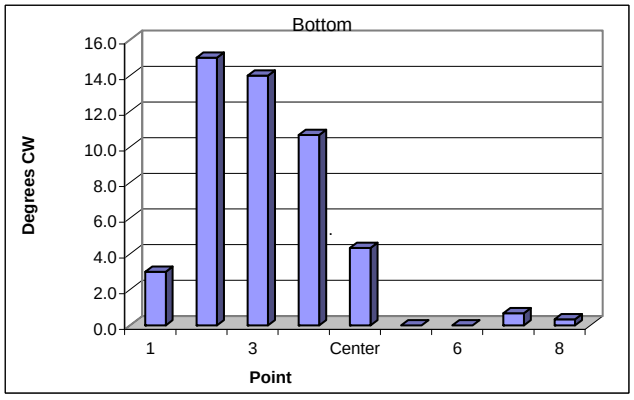
Instuments Used:		**Cal. Due**
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI 8355 SN 305039	30-Jun-09
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Notes: Port 2

XYY 7/27/10

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).





Entries made by:	Xiao-Ying Yu	Technical Data Review performed by:	Ernest Antonio
Signature/date	5/19/2009	Signature/date	Signature on File 08 July 2010 TI-RPP-WTP_677

FLOW ANGLE DATA FORM

LB_C2_FowAngleRev0.xls

CCP-WTPSP-1187

Site	**LB-C2**	Run No.	**FA-4**
Date	5/19/2009	Fan Setting	**35** Hz
Tester	JEF, XYY	Fan configuration	**A&B**
Stack Dia.	11.781 in	Approx. air vel.	2740 fpm at point >>1 side center
Stack X-Area	109.0 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	2
Distance to disturbance	160 in	Stack Temp	72 F
Start/End Time	1030/1121		

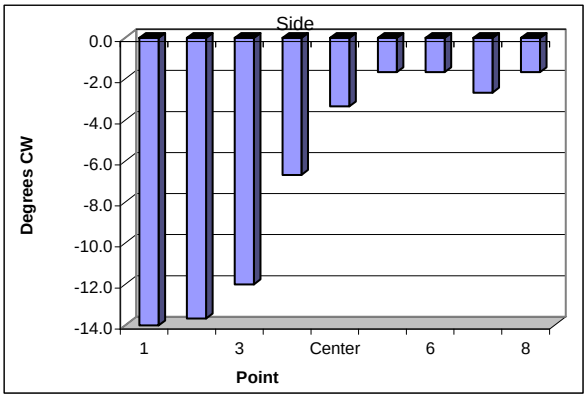
Order -->		2nd				1st			
Traverse-->		**Side**				**Bottom**			
Trial ---->		1	2	3		1	2	3	
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.
1	0.50	-13	-14	-15	-14.0	2	15	17	11.3
2	1.24	-13	-14	-14	-13.7	10	15	16	13.7
3	2.29	-12	-12	-12	-12.0	-11	13	16	6.0
4	3.81	-5	-8	-7	-6.7	-7	11	13	5.7
Center	5.89	-3	-3	-4	-3.3	5	4	2	3.7
5	7.98	-2	-1	-2	-1.7	1	2	2	1.7
6	9.50	-2	-2	-1	-1.7	0	2	1	1.0
7	10.54	-3	-2	-3	-2.7	1	1	1	1.0
8	11.28	-2	-2	-1	-1.7	-1	0	0	-0.3
Mean of absolute values:					6.4				4.9
" " w/o points by wall:					6.0				4.7
								Grand mean ABS	5.6
								" " w/o wall pts	5.3

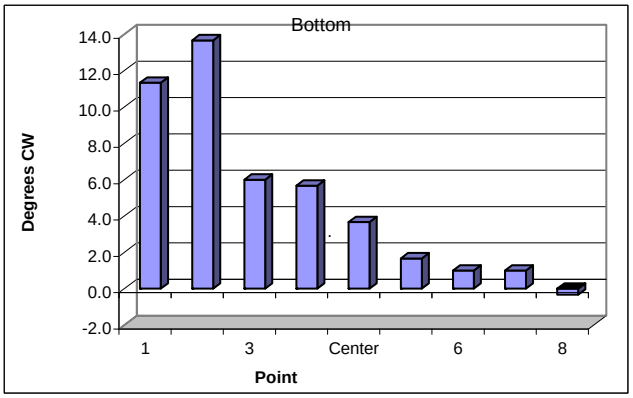
Instuments Used:		**Cal. Due**
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI 8355 SN 305039	30-Jun-09
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).

Notes:
The arrow wasn't quite aligned correctly for side. Redo with corrected arrow.

XYY 7/27/10





Entries made by:	Julia Flaherty	Technical Data Review performed by:	Ernest Antonio
Signature/date	5/19/2009	Signature/date	Signature on File 08 July 2010 TI-RPP-WTP_677

FLOW ANGLE DATA FORM

LB_C2_FowAngleRev0.xls

CCP-WTPSP-1187

Site	**LB-C2**	Run No.	**FA-5**
Date	5/19/2009	Fan Setting	**35** Hz
Tester	JEF, XYY	Fan configuration	**A&B**
Stack Dia.	11.781 in	Approx. air vel.	2750 fpm at point >>1 side center
Stack X-Area	109.0 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	2
Distance to disturbance	160 in	Stack Temp	73 F
Start/End Time	1125/1143		

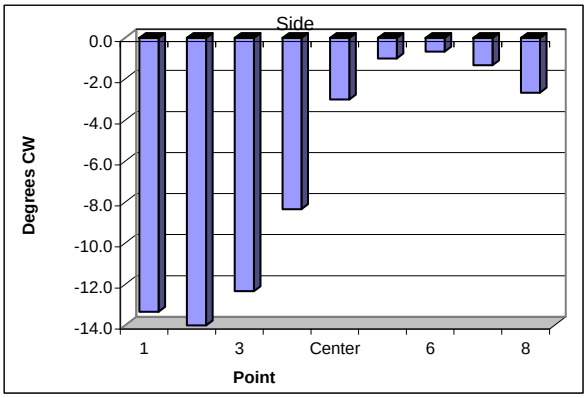
Order -->	1st					2nd			
Traverse-->		**Side**				**Bottom**			
Trial ---->		1	2	3		1	2	3	
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.
1	0.50	-14	-14	-12	-13.3	5	-5	15	5.0
2	1.24	-14	-13	-15	-14.0	16	-10	15	7.0
3	2.29	-12	-12	-13	-12.3	15	-9	4	3.3
4	3.81	-9	-8	-8	-8.3	12	-5	4	3.7
Center	5.89	-4	-3	-2	-3.0	5	5	0	3.3
5	7.98	-1	-2	0	-1.0	4	1	1	2.0
6	9.50	-1	0	-1	-0.7	3	3	4	3.3
7	10.54	-2	-1	-1	-1.3	3	3	3	3.0
8	11.28	-2	-3	-3	-2.7	2	2	3	2.3
Mean of absolute values:					6.3				3.7
" " w/o points by wall:					5.8				3.7
								Grand mean ABS	5.0
								" " w/o wall pts	4.7

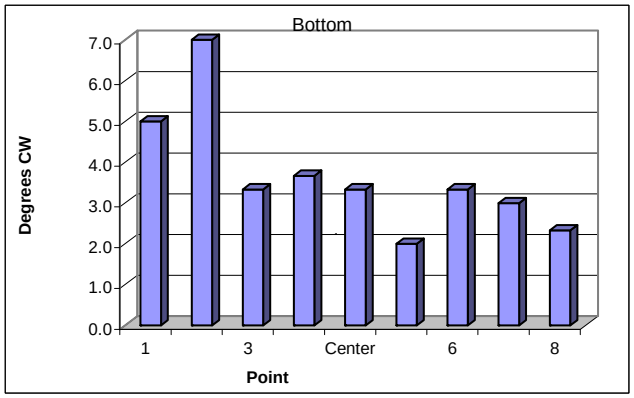
Instuments Used:		**Cal. Due**
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI 8355 SN 305039	30-Jun-09
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Notes: Port 2

XYY 7/27/10

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).





Entries made by:	Xiao-Ying Yu	Technical Data Review performed by:	Ernest Antonio
Signature/date	5/19/2009	Signature/date	Signature on File 08 July 2010 TI-RPP-WTP_677

FLOW ANGLE DATA FORM

LB_C2_FowAngleRev0.xls

CCP-WTPSP-1187

Site	**LB-C2**	Run No.	**FA-6**
Date	5/20/2009	Fan Setting	**35** Hz
Tester	JEF, XYY	Fan configuration	**A&B**
Stack Dia.	11.813 in	Approx. air vel.	2750 fpm at point >>1 side center
Stack X-Area	109.6 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	3
Distance to disturbance	100 in	Stack Temp	67.5 F
Start/End Time	930/1000		

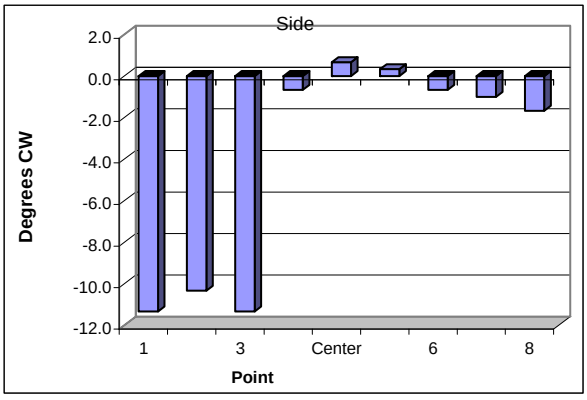
Order -->	1st					2nd			
Traverse-->		**Side**				**Bottom**			
Trial ---->		1	2	3		1	2	3	
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.
1	0.50	-11	-12	-11	-11.3	-10	-4	-6	-6.7
2	1.24	-9	-11	-11	-10.3	-9	-9	-8	-8.7
3	2.29	-11	-11	-12	-11.3	-6	-6	-6	-6.0
4	3.81	0	-1	-1	-0.7	-1	0	-2	-1.0
Center	5.89	1	0	1	0.7	4	3	3	3.3
5	7.98	0	1	0	0.3	3	2	2	2.3
6	9.50	0	-1	-1	-0.7	2	2	2	2.0
7	10.54	-1	0	-2	-1.0	2	2	3	2.3
8	11.28	-3	0	-2	-1.7	2	2	2	2.0
Mean of absolute values:					4.2				3.8
" " w/o points by wall:					3.6				3.7
								Grand mean ABS	4.0
								" " w/o wall pts	3.6

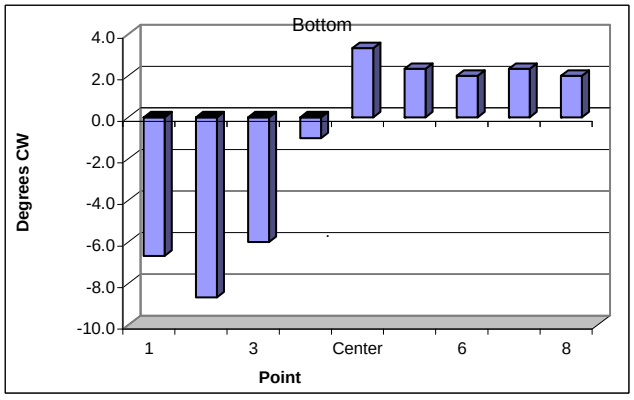
Instuments Used:		**Cal. Due**
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI 8355 SN 305039	30-Jun-09
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).

Notes: Port 3
Bottom port is not installed exactly perpendicular to the main pipe, a few degrees off.

XYY 7/27/10





Entries made by:	Xiao-Ying Yu	Technical Data Review performed by:	Ernest Antonio
Signature/date	5/20/2009	Signature/date	Signature on File 08 July 2010 TI-RPP-WTP_677

FLOW ANGLE DATA FORM

LB_C2_FowAngleRev0.xls

CCP-WTPSP-1187

Site	**LB-C2**	Run No.	**FA-7**
Date	5/20/2009	Fan Setting	**35** Hz
Tester	JEF, XYY	Fan configuration	**A&B**
Stack Dia.	11.844 in	Approx. air vel.	2750 fpm at point >>1 side center
Stack X-Area	110.2 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	4
Distance to disturbance	12 in	Stack Temp	67.2 F
Start/End Time	1000/1041		

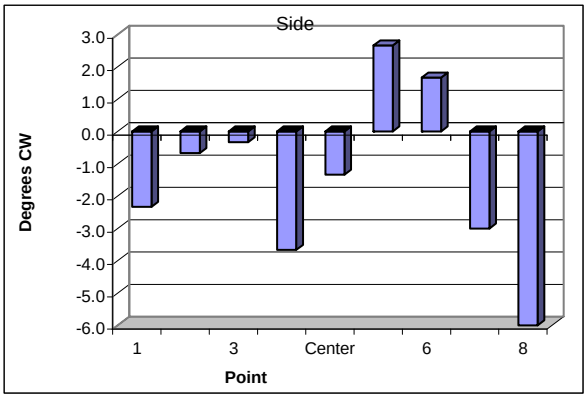
Order -->		1st				2nd			
Traverse-->		**Side**				**Bottom**			
Trial ---->		1	2	3		1	2	3	
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.
1	0.50	-2	-3	-2	-2.3	1	0	3	1.3
2	1.24	-1	0	-1	-0.7	19	-11	20	9.3
3	2.29	0	-1	0	-0.3	-6	-6	6	-2.0
4	3.81	-4	-3	-4	-3.7	0	0	-2	-0.7
Center	5.89	-2	-1	-1	-1.3	-4	-1	-2	-2.3
5	7.98	3	2	3	2.7	-1	0	0	-0.3
6	9.50	3	1	1	1.7	0	2	2	1.3
7	10.54	-3	-3	-3	-3.0	3	2	3	2.7
8	11.28	-8	-5	-5	-6.0	2	-2	0	0.0
Mean of absolute values:					2.4				2.2
" " w/o points by wall:					1.9				2.7
								Grand mean ABS	2.3
								" " w/o wall pts	2.3

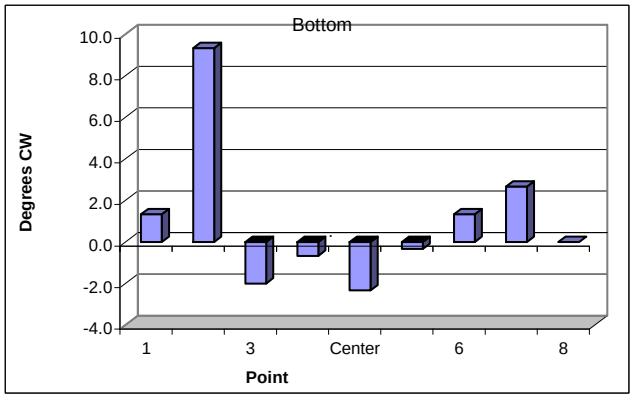
Instuments Used:		**Cal. Due**
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI 8355 SN 305039	30-Jun-09
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Notes: Port 4

XYY 7/27/10

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).





Entries made by:	Xiao-Ying Yu	Technical Data Review performed by:	Ernest Antonio
Signature/date	5/20/2009	Signature/date	Signature on File 08 July 2010 TI-RPP-WTP_677

TI-RPP-WTP-677	
Page	

FLOW ANGLE DATA FORM

LB_C2_FowAngleRev0.xls

CCP-WTPSP-1187

Site	**LB-C2**		Run No.	**FA-8**	
Date	5/20/2009		Fan Setting	**35**	Hz
Tester	JEF, XYY		Fan configuration	**A only**	
Stack Dia.	11.875	in	Approx. air vel.	1380	fpm at point >> 1 side center
Stack X-Area	110.8	in2	Units	degrees (clockwise > pos. nos.)	
Elevation	N.A.	ft	Port	1	
Distance to disturbance	220.5	in	Stack Temp	69.9 F	
Start/End Time	1045/1120				

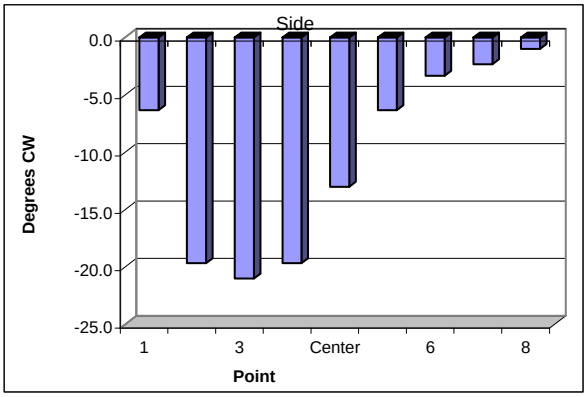
Order -->	1st				2nd			
Traverse-->	**Side**				**Bottom**			
Trial ---->	1	2	3		1	2	3	
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.
1	0.50	-7	-7	-5	-6.3	10	11	11	10.7
2	1.24	-19	-21	-19	-19.7	16	16	18	16.7
3	2.29	-23	-20	-20	-21.0	15	17	15	15.7
4	3.81	-19	-20	-20	-19.7	14	12	16	14.0
Center	5.89	-10	-15	-14	-13.0	11	10	12	11.0
5	7.98	-4	-8	-7	-6.3	6	9	9	8.0
6	9.50	-3	-3	-4	-3.3	7	7	6	6.7
7	10.54	-3	-2	-2	-2.3	7	7	8	7.3
8	11.28	-1	-2	0	-1.0	8	7	9	8.0
Mean of absolute values:					10.3				10.9
" " w/o points by wall:					12.2				11.3
								Grand mean ABS	10.6
								" " w/o wall pts	11.8

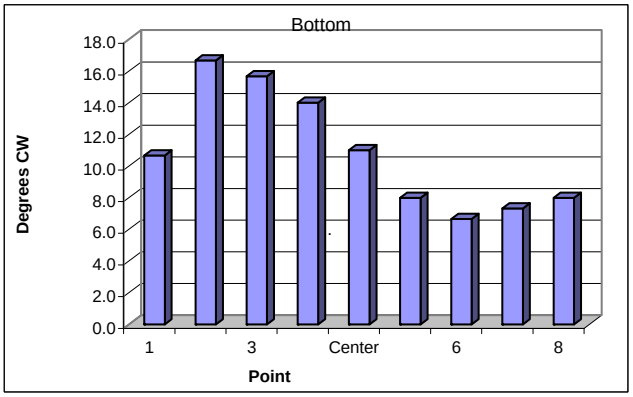
Instuments Used:		**Cal. Due**
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI 8355 SN 305039	30-Jun-09
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Notes: Port 1

XYY 7/27/10

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).





Entries made by:	Julia Flaherty	Technical Data Review performed by:	Ernest Antonio
Signature/date	5/20/2009	Signature/date	Signature on File 08 July 2010
			TI-RPP-WTP_677

FLOW ANGLE DATA FORM

LB_C2_FowAngleRev0.xls

CCP-WTPSP-1187

Site	**LB-C2**	Run No.	**FA-9**
Date	5/20/2009	Fan Setting	**35** Hz
Tester	JEF, XYY	Fan configuration	**A only**
Stack Dia.	11.781 in	Approx. air vel.	1430 fpm at point >> 1 side center
Stack X-Area	109.0 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	2
Distance to disturbance	160 in	Stack Temp	71.5 F
Start/End Time	1125/1150		

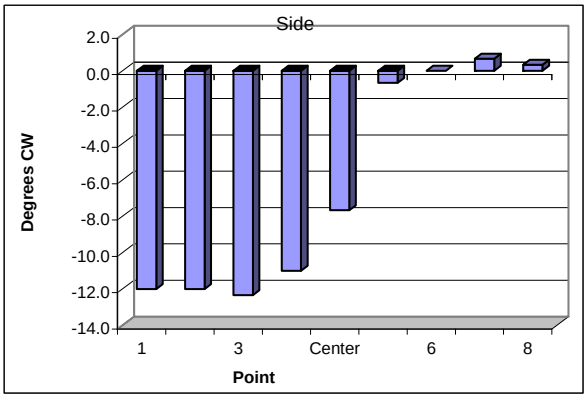
Order -->	1st					2nd			
Traverse-->		**Side**				**Bottom**			
Trial ---->		1	2	3		1	2	3	
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.
1	0.50	-2	-16	-18	-12.0	-5	4	6	1.7
2	1.24	-3	-16	-17	-12.0	-12	5	9	0.7
3	2.29	-4	-15	-18	-12.3	-12	2	0	-3.3
4	3.81	-10	-11	-12	-11.0	-8	-9	-9	-8.7
Center	5.89	-8	-7	-8	-7.7	-3	2	-1	-0.7
5	7.98	0	-1	-1	-0.7	1	1	3	1.7
6	9.50	0	0	0	0.0	3	5	5	4.3
7	10.54	1	0	1	0.7	4	6	6	5.3
8	11.28	0	1	0	0.3	5	8	8	7.0
Mean of absolute values:					6.3				3.7
" " w/o points by wall:					6.3				3.5
								Grand mean ABS	5.0
								" " w/o wall pts	4.9

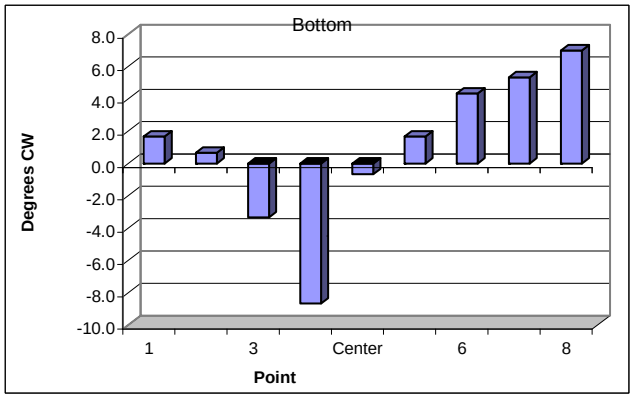
Instuments Used:		**Cal. Due**
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI 8355 SN 305039	30-Jun-09
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).

Notes: Port 2

XYY 7/27/10





Entries made by:	Julia Flaherty	Technical Data Review performed by:	Ernest Antonio
Signature/date	5/20/2009	Signature/date	Signature on File 08 July 2010 TI-RPP-WTP_677

FLOW ANGLE DATA FORM

LB_C2_FowAngleRev0.xls

CCP-WTPSP-1187

Site	**LB-C2**	Run No.	**FA-10**
Date	5/21/2009	Fan Setting	**35** Hz
Tester	JEF, XYY	Fan configuration	**A Only**
Stack Dia.	11.813 in	Approx. air vel.	1360 fpm at point >>1 side center
Stack X-Area	109.6 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	3
Distance to disturbance	100 in	Stack Temp	68.7 F
Start/End Time	0928 / 0954		

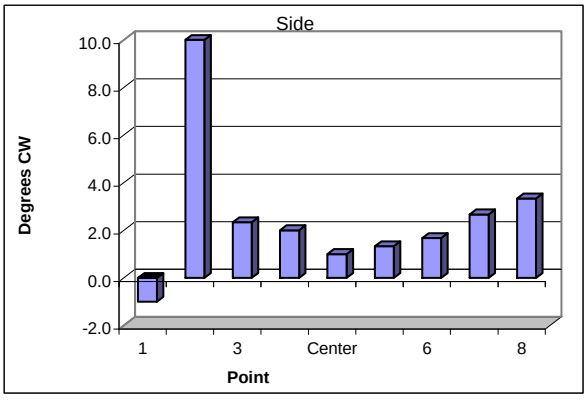
Order -->	1st					2nd			
Traverse-->		**Side**				**Bottom**			
Trial ---->		1	2	3		1	2	3	
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.
1	0.50	7	7	-17	-1.0	-1	9	8	5.3
2	1.24	9	10	11	10.0	16	16	14	15.3
3	2.29	7	-2	2	2.3	12	16	17	15.0
4	3.81	6	-2	2	2.0	12	12	11	11.7
Center	5.89	3	-1	1	1.0	5	5	5	5.0
5	7.98	1	2	1	1.3	6	5	5	5.3
6	9.50	2	2	1	1.7	5	5	5	5.0
7	10.54	4	2	2	2.7	6	7	7	6.7
8	11.28	2	4	4	3.3	8	7	8	7.7
Mean of absolute values:					2.8				8.6
" " w/o points by wall:					3.0				9.1
								Grand mean ABS	5.7
								" " w/o wall pts	6.1

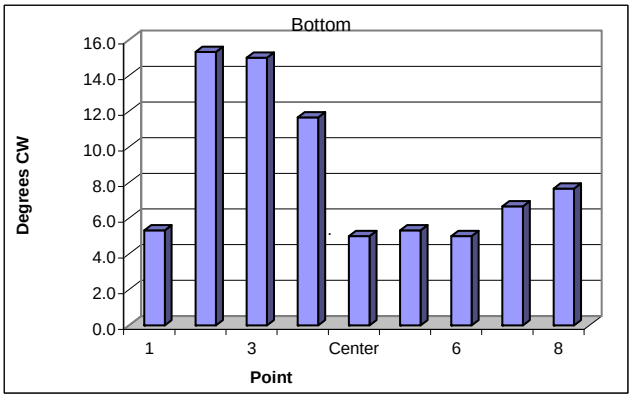
Instuments Used:		**Cal. Due**
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI 8355 SN 305039	30-Jun-09
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).

Notes: Port 3
Start using long wood plug in port.

XYY 7/27/10





Entries made by:	Xiao-Ying Yu	Technical Data Review performed by:	Ernest Antonio
Signature/date	5/21/2009	Signature/date	Signature on File 08 July 2010 TI-RPP-WTP_677

FLOW ANGLE DATA FORM

LB_C2_FowAngleRev0.xls

CCP-WTPSP-1187

Site	**LB-C2**	Run No.	**FA-11**
Date	5/21/2009	Fan Setting	**35** Hz
Tester	JEF, XYY	Fan configuration	**A Only**
Stack Dia.	11.813 in	Approx. air vel.	1340 fpm at point >>1 side center
Stack X-Area	109.6 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	3
Distance to disturbance	100 in	Stack Temp	66.8 F
Start/End Time	0955 / 1025		

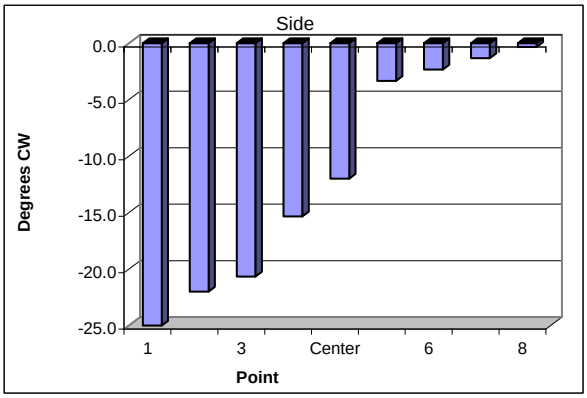
Order -->		2nd				1st			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3		1	2	3	
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.
1	0.50	-21	-28	-26	-25.0	8	11	4	7.7
2	1.24	-23	-22	-21	-22.0	12	14	15	13.7
3	2.29	-23	-20	-19	-20.7	13	14	15	14.0
4	3.81	-17	-13	-16	-15.3	10	11	11	10.7
Center	5.89	-13	-11	-12	-12.0	5	6	5	5.3
5	7.98	-2	-4	-4	-3.3	4	5	5	4.7
6	9.50	-3	-2	-2	-2.3	5	6	5	5.3
7	10.54	-3	-1	0	-1.3	6	6	6	6.0
8	11.28	-1	0	0	-0.3	7	8	7	7.3
Mean of absolute values:					11.4				8.3
" " w/o points by wall:					11.0				8.5
								Grand mean ABS	9.8
								" " w/o wall pts	9.8

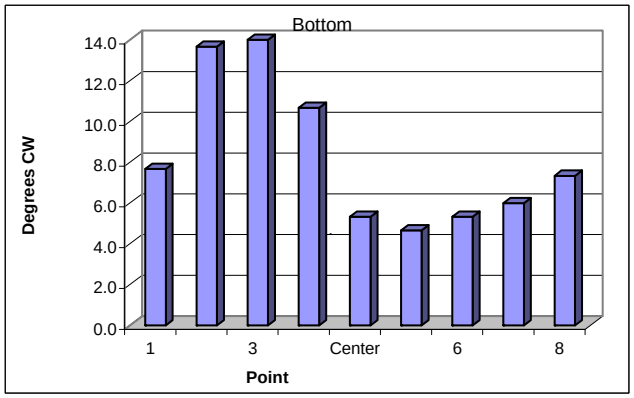
Instuments Used:		**Cal. Due**
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI 8355 SN 305039	30-Jun-09
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Notes: Port 3

XYY 7/27/10

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).





Entries made by:	Julia Flaherty	Technical Data Review performed by:	Ernest Antonio
Signature/date	5/21/2009	Signature/date	Signature on File 08 July 2010 TI-RPP-WTP_677

FLOW ANGLE DATA FORM

LB_C2_FowAngleRev0.xls

CCP-WTPSP-1187

Site	**LB-C2**	Run No.	**FA-12**
Date	5/21/2009	Fan Setting	**35** Hz
Tester	JEF, XYY	Fan configuration	**A Only**
Stack Dia.	11.813 in	Approx. air vel.	1360 fpm at point >>1 side center
Stack X-Area	109.6 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	3
Distance to disturbance	100 in	Stack Temp	70.8 F
Start/End Time	1025 / 1044		

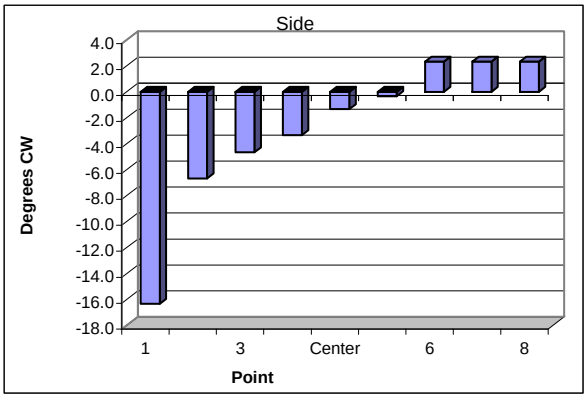
Order -->	1st					2nd			
Traverse-->	**Side**					**Bottom**			
Trial ---->	1	2	3			1	2	3	
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.
1	0.50	-16	-16	-17	-16.3	12	12	12	12.0
2	1.24	-7	-4	-9	-6.7	17	16	17	16.7
3	2.29	-7	-5	-2	-4.7	15	14	11	13.3
4	3.81	-5	-4	-1	-3.3	12	10	11	11.0
Center	5.89	-1	-2	-1	-1.3	8	4	6	6.0
5	7.98	0	0	-1	-0.3	7	5	6	6.0
6	9.50	3	3	1	2.3	6	6	7	6.3
7	10.54	4	1	2	2.3	8	8	10	8.7
8	11.28	2	3	2	2.3	9	10	11	10.0
Mean of absolute values:					4.4				10.0
" " w/o points by wall:					3.0				9.7
								Grand mean ABS	7.2
								" " w/o wall pts	6.4

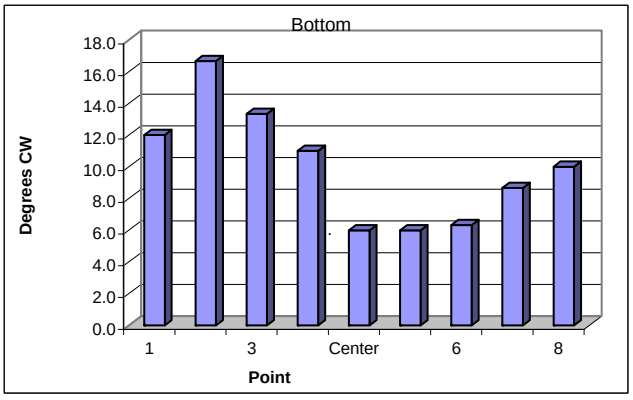
Instuments Used:		**Cal. Due**
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI 8355 SN 305039	30-Jun-09
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Notes: Port 3

XYY 7/27/10

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).





Entries made by:	Xiao-Ying Yu	Technical Data Review performed by:	Ernest Antonio
Signature/date	5/21/2009	Signature/date	Signature on File 08 July 2010 TI-RPP-WTP_677

FLOW ANGLE DATA FORM

LB_C2_FowAngleRev0.xls

CCP-WTPSP-1187

Site	**LB-C2**	Run No.	**FA-13**
Date	5/21/2009	Fan Setting	**35** Hz
Tester	JEF, XYY	Fan configuration	**A Only**
Stack Dia.	11.813 in	Approx. air vel.	1380 fpm at point >>1 side center
Stack X-Area	109.6 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	3
Distance to disturbance	100 in	Stack Temp	72.6 F
Start/End Time	1044 / 1115		

Order -->		1st				2nd			
Traverse-->		**Side**				**Bottom**			
Trial ---->		1	2	3		1	2	3	
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.
1	0.50	-15	-18	-16	-16.3	14	9	-10	4.3
2	1.24	-17	-17	-17	-17.0	14	13	-13	4.7
3	2.29	-16	-16	-16	-16.0	10	12	-9	4.3
4	3.81	-12	-8	-11	-10.3	0	4	-5	-0.3
Center	5.89	-4	-4	-5	-4.3	2	1	0	1.0
5	7.98	-2	-1	0	-1.0	4	4	4	4.0
6	9.50	1	0	3	1.3	4	4	6	4.7
7	10.54	2	4	3	3.0	9	7	6	7.3
8	11.28	1	0	2	1.0	8	7	7	7.3
Mean of absolute values:					7.8				4.2
" " w/o points by wall:					7.6				3.8
								Grand mean ABS	6.0
								" " w/o wall pts	5.7

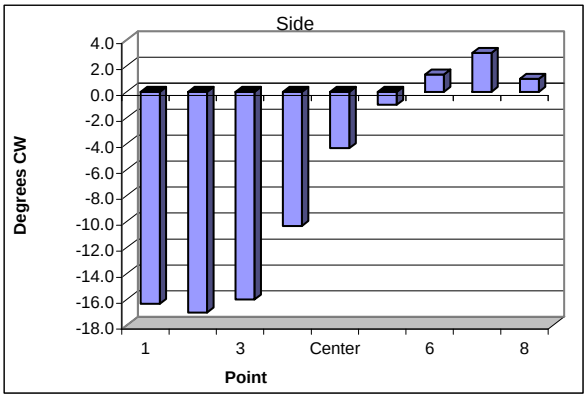
Instuments Used:		**Cal. Due**
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI 8355 SN 305039	30-Jun-09
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

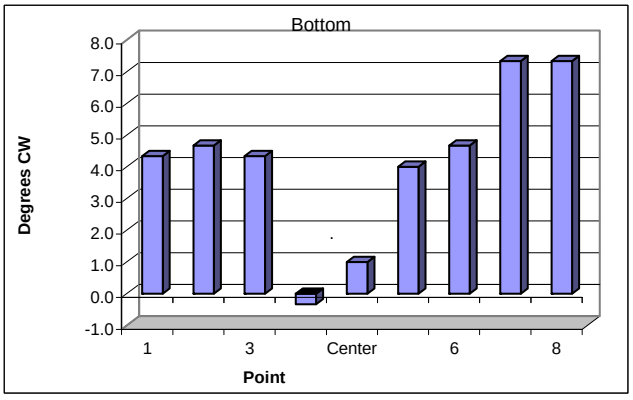
Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).

Notes: Used short wooden plug in port.

Section of duct at port 3 isn't fully tight; easily moves circumferentially
Accidentally moved it, but returned to original position for the test.

XYY 7/27/10





Entries made by:	Xiao-Ying Yu	Technical Data Review performed by:	Ernest Antonio
Signature/date	5/21/2009	Signature/date	Signature on File 08 July 2010 TI-RPP-WTP_677

FLOW ANGLE DATA FORM

LB_C2_FowAngleRev0.xls

CCP-WTPSP-1187

Site	**LB-C2**	Run No.	**FA-14**
Date	5/21/2009	Fan Setting	**35** Hz
Tester	JEF, XYY	Fan configuration	**A & B**
Stack Dia.	11.813 in	Approx. air vel.	2720 fpm at point >>1 side center
Stack X-Area	109.6 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	3
Distance to disturbance	100 in	Stack Temp	74.8 F
Start/End Time	1115 / 1141		

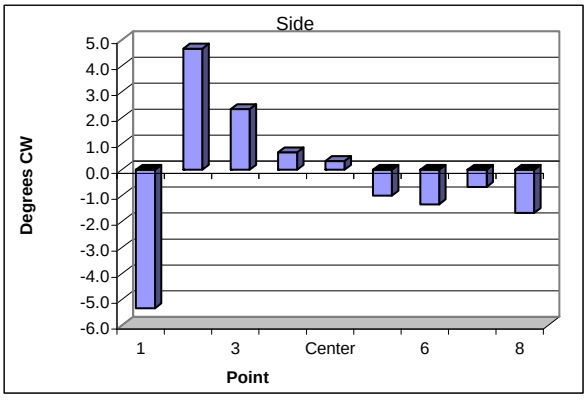
Order -->		2nd				1st				
Traverse-->		**Side**				**Bottom**				
Trial ---->		1	2	3		1	2	3		
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.	
1	0.50	-12	-12	8	-5.3	10	1	8	6.3	
2	1.24	-6	9	11	4.7	18	18	17	17.7	
3	2.29	-8	8	7	2.3	13	14	14	13.7	
4	3.81	0	1	1	0.7	5	8	7	6.7	
Center	5.89	1	0	0	0.3	2	4	3	3.0	
5	7.98	-1	-1	-1	-1.0	1	1	0	0.7	
6	9.50	-1	-2	-1	-1.3	0	2	0	0.7	
7	10.54	-1	-1	0	-0.7	0	2	1	1.0	
8	11.28	-1	-3	-1	-1.7	0	3	1	1.3	
Mean of absolute values:					2.0				5.7	
" " w/o points by wall:					1.6				6.2	
								Grand mean ABS	3.8	
								" " w/o wall pts	3.9	

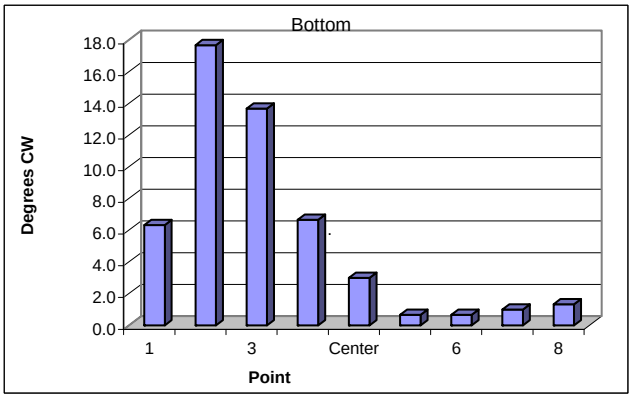
Instuments Used:		**Cal. Due**
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI 8355 SN 305039	30-Jun-09
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Notes: Long wooden plug used in port. Repeat to see difference w/ FA-6.

XYY 7/27/10

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).





Entries made by:	Julia Flaherty	Technical Data Review performed by:	Ernest Antonio
Signature/date	5/21/2009	Signature/date	Signature on File 08 July 2010 TI-RPP-WTP_677

FLOW ANGLE DATA FORM

LB_C2_FowAngleRev0.xls

CCP-WTPSP-1187

Site	**LB-C2**	Run No.	**FA-15**
Date	5/22/2009	Fan Setting	**35** Hz
Tester	JEF, XYY	Fan configuration	**B only**
Stack Dia.	11.813 in	Approx. air vel.	1310 fpm at point >>1 side center
Stack X-Area	109.6 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	3
Distance to disturbance	100 in	Stack Temp	76 F
Start/End Time	1020 / 1045		

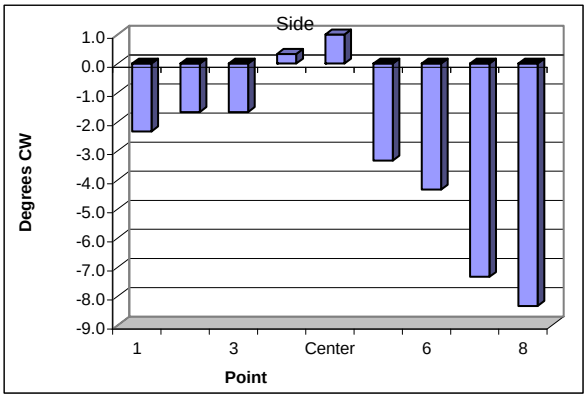
Order -->	1st					2nd			
Traverse-->	Side					Bottom			
Trial ---->	1	2	3			1	2	3	
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.
1	0.50	-2	-2	-3	-2.3	5	4	7	5.3
2	1.24	-2	-1	-2	-1.7	5	2	6	4.3
3	2.29	-2	-1	-2	-1.7	5	1	5	3.7
4	3.81	0	3	-2	0.3	5	12	5	7.3
Center	5.89	1	2	0	1.0	5	10	5	6.7
5	7.98	-3	-4	-3	-3.3	0	0	1	0.3
6	9.50	-5	-5	-3	-4.3	-3	1	-1	-1.0
7	10.54	-7	-8	-7	-7.3	-5	-5	-6	-5.3
8	11.28	-8	-8	-9	-8.3	-8	-5	-5	-6.0
Mean of absolute values:					3.4				4.4
" " w/o points by wall:					2.8				4.1
								Grand mean ABS	3.9
								" " w/o wall pts	3.5

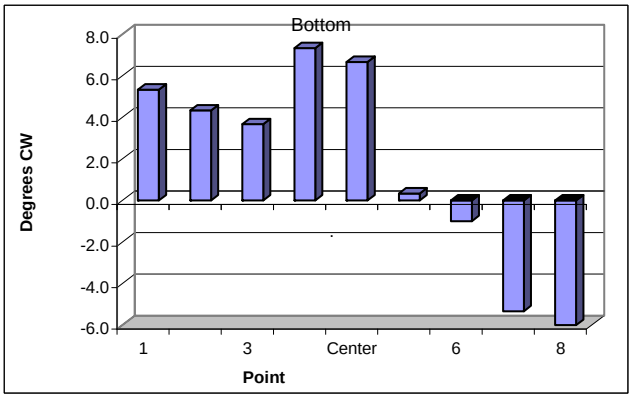
Instuments Used:		**Cal. Due**
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI 8355 SN 305039	30-Jun-09
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Notes: Port 3

XYY 7/27/10

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).





Entries made by:	Xiao-Ying Yu	Technical Data Review performed by:	Ernest Antonio
Signature/date	5/22/2009	Signature/date	Signature on File 08 July 2010 TI-RPP-WTP_677

FLOW ANGLE DATA FORM

LB_C2_FowAngleRev0.xls

CCP-WTPSP-1187

Site	**LB-C2**	Run No.	**FA-16**
Date	5/22/2009	Fan Setting	**35** Hz
Tester	JEF, XYY	Fan configuration	**B only**
Stack Dia.	11.813 in	Approx. air vel.	1290 fpm at point >>1 side center
Stack X-Area	109.6 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	2
Distance to disturbance	160 in	Stack Temp	77 F
Start/End Time	1046 / 1108		

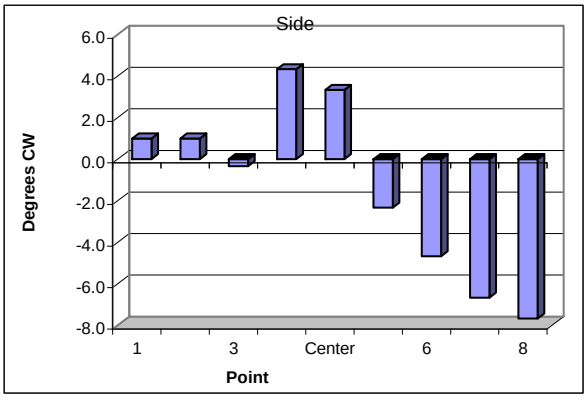
Order -->	1st					2nd			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3		1	2	3	
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.
1	0.50	2	1	0	1.0	1	5	3	3.0
2	1.24	0	2	1	1.0	16	-8	-6	0.7
3	2.29	-1	0	0	-0.3	15	-8	-7	0.0
4	3.81	8	4	1	4.3	13	-7	-7	-0.3
Center	5.89	3	5	2	3.3	2	-6	-4	-2.7
5	7.98	-2	-2	-3	-2.3	-5	-4	-5	-4.7
6	9.50	-3	-5	-6	-4.7	-5	-5	-5	-5.0
7	10.54	-7	-6	-7	-6.7	-6	-7	-5	-6.0
8	11.28	-8	-7	-8	-7.7	-8	-7	-8	-7.7
Mean of absolute values:					3.5				3.3
" " w/o points by wall:					3.2				2.8
								Grand mean ABS	3.4
								" " w/o wall pts	3.0

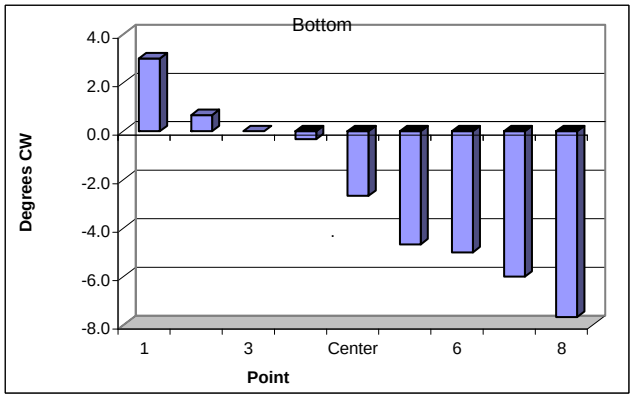
Instuments Used:		**Cal. Due**
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI 8355 SN 305039	30-Jun-09
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).

Notes: Port 2

XYY 7/27/10





Entries made by:	Xiao-Ying Yu	Technical Data Review performed by:	Ernest Antonio
Signature/date	5/22/2009	Signature/date	Signature on File 08 July 2010 TI-RPP-WTP_677

FLOW ANGLE DATA FORM

LB_C2_FowAngleRev0.xls

CCP-WTPSP-1187

Site	**LB-C2**	Run No.	**FA-17**
Date	5/22/2009	Fan Setting	**35** Hz
Tester	JEF, XYY	Fan configuration	**B only**
Stack Dia.	11.875 in	Approx. air vel.	1190 fpm at point >>1 side center
Stack X-Area	110.8 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	1
Distance to disturbance	220.5 in	Stack Temp	77.5 F
Start/End Time	1110 / 1140		

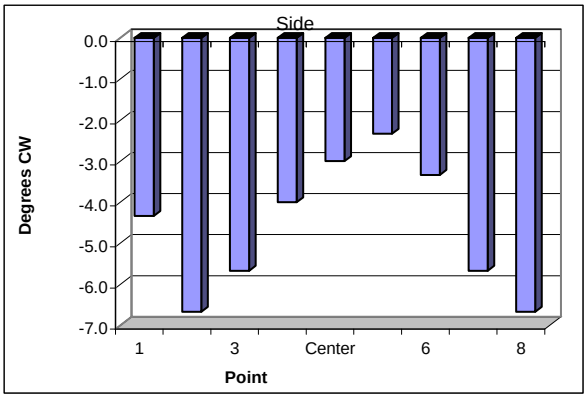
Order -->		1st				2nd			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3		1	2	3	
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.
1	0.50	-3	-4	-6	-4.3	9	3	9	7.0
2	1.24	-7	-6	-7	-6.7	23	-2	22	14.3
3	2.29	-5	-5	-7	-5.7	11	-7	20	8.0
4	3.81	-5	-5	-2	-4.0	5	-2	16	6.3
Center	5.89	-2	-2	-5	-3.0	5	-1	4	2.7
5	7.98	-1	-2	-4	-2.3	-1	-2	-4	-2.3
6	9.50	-3	-3	-4	-3.3	-4	-4	-3	-3.7
7	10.54	-5	-6	-6	-5.7	-5	-6	-4	-5.0
8	11.28	-4	-7	-9	-6.7	-8	-6	-7	-7.0
Mean of absolute values:					4.6				6.3
" " w/o points by wall:					4.4				6.0
								Grand mean ABS	5.4
								" " w/o wall pts	5.2

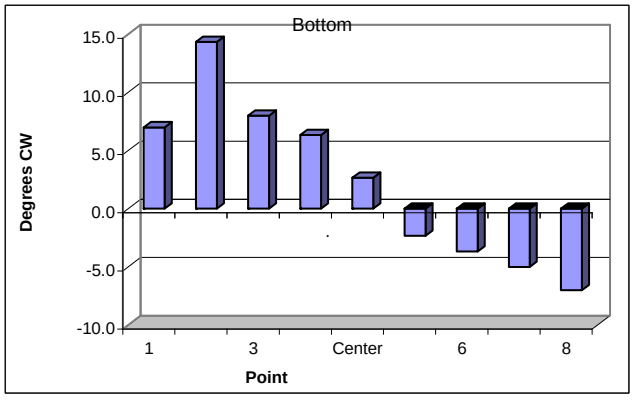
Instuments Used:		**Cal. Due**
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI 8355 SN 305039	30-Jun-09
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).

Notes:
Port 1 Run 1
Insensitive at point 2 between -2 and 23 deg from bottom
Insensitive at point 3 between -7 and 11 deg from bottom

XYY 7/27/10





Entries made by:	Julia Flaherty	Technical Data Review performed by:	Ernest Antonio
Signature/date	5/22/2009	Signature/date	Signature on File 08 July 2010 TI-RPP-WTP_677

FLOW ANGLE DATA FORM

LB_C2_FowAngleRev0.xls

CCP-WTPSP-1187

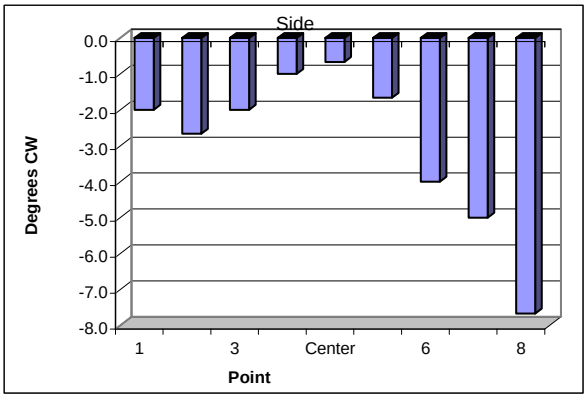
Site	**LB-C2**	Run No.	**FA-18**
Date	5/22/2009	Fan Setting	**35** Hz
Tester	JEF, XYY	Fan configuration	**B only**
Stack Dia.	11.875 in	Approx. air vel.	1160 fpm at point >>1 side center
Stack X-Area	110.8 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	1
Distance to disturbance	220.5 in	Stack Temp	90.4 F
Start/End Time	1420 / 1530		

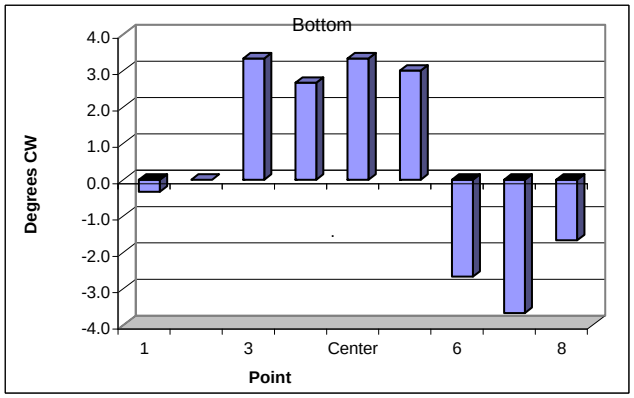
Order -->		1st				2nd			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3		1	2	3	
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.
1	0.50	-1	-3	-2	-2.0	4	-1	-4	-0.3
2	1.24	-2	-2	-4	-2.7	4	0	-4	0.0
3	2.29	-2	-2	-2	-2.0	5	4	1	3.3
4	3.81	-1	-2	0	-1.0	0	5	3	2.7
Center	5.89	0	-1	-1	-0.7	3	4	3	3.3
5	7.98	-1	-2	-2	-1.7	5	3	1	3.0
6	9.50	-2	-5	-5	-4.0	-3	-1	-4	-2.7
7	10.54	-5	-5	-5	-5.0	-3	-4	-4	-3.7
8	11.28	-7	-9	-7	-7.7	3	-5	-3	-1.7
Mean of absolute values:					3.0				2.3
" " w/o points by wall:					2.4				2.7
								Grand mean ABS	2.6
								" " w/o wall pts	2.5

Instuments Used:		**Cal. Due**
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI 8355 SN 305039	30-Jun-09
Angle indicator	Shop built	Cat. 3
Manometer	Solomat Zyplyr SN 129541472	Cat. 1

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).

Notes:
Run 2
Use Solomat manometer to replace Dwyer to see if there is any difference in readings.
Insensitive at point 3 between -7 and 11 deg from bottom
Additional sheet is available where Solomat manometer readings were recorded.
When pressure is < or = 0.01 mmH2O, we considered a good zero.
XYY 7/27/10





Entries made by:	Julia Flaherty	Technical Data Review performed by:	Ernest Antonio
Signature/date	5/22/2009	Signature/date	Signature on File 08 July 2010 TI-RPP-WTP_677

FLOW ANGLE DATA FORM

LB_C2_FowAngleRev0.xls

CCP-WTPSP-1187

Site	**LB-C2**	Run No.	**FA-19**
Date	5/22/2009	Fan Setting	**44** Hz
Tester	JEF, XYY	Fan configuration	**A & B**
Stack Dia.	11.875 in	Approx. air vel.	3510 fpm at point >>1 side center
Stack X-Area	110.8 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	1
Distance to disturbance	220.5 in	Stack Temp	90.9 F
Start/End Time	1531 / 1602		

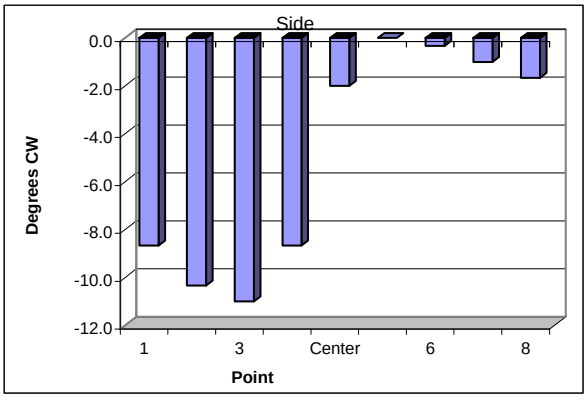
Order -->	1st					2nd			
Traverse-->		**Side**				**Bottom**			
Trial ---->		1	2	3		1	2	3	
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.
1	0.50	-7	-9	-10	-8.7	-4	5	-5	-1.3
2	1.24	-10	-10	-11	-10.3	-12	6	5	-0.3
3	2.29	-10	-12	-11	-11.0	-11	3	3	-1.7
4	3.81	-9	-9	-8	-8.7	-9	2	2	-1.7
Center	5.89	-2	-2	-2	-2.0	-4	5	4	1.7
5	7.98	0	0	0	0.0	1	0	0	0.3
6	9.50	0	0	-1	-0.3	1	0	0	0.3
7	10.54	-1	-1	-1	-1.0	0	0	0	0.0
8	11.28	-1	-2	-2	-1.7	0	-1	-1	-0.7
Mean of absolute values:					4.9				0.9
" " w/o points by wall:					4.8				0.9
								Grand mean ABS	2.9
								" " w/o wall pts	2.8

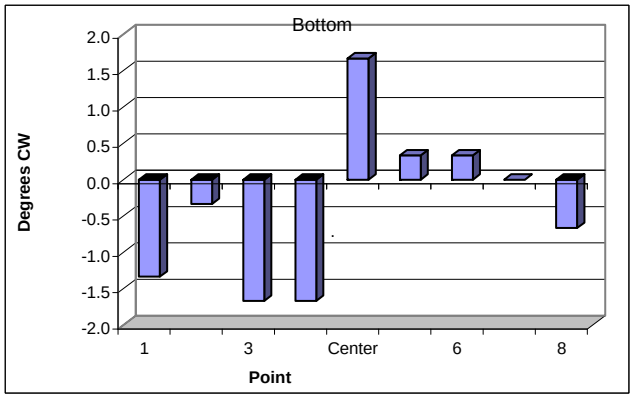
Instuments Used:		**Cal. Due**
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI 8355 SN 305039	30-Jun-09
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).

Notes:
Additional test using higher frequency or velocity.

XYY 7/27/10





Entries made by:	Xiao-Ying Yu	Technical Data Review performed by:	Ernest Antonio
Signature/date	5/22/2009	Signature/date	Signature on File 08 July 2010 TI-RPP-WTP_677

FLOW ANGLE DATA FORM

LB_C2_FowAngleRev0.xls

CCP-WTPSP-1187

Site	**LB-C2**	Run No.	**FA-20**
Date	5/26/2009	Fan Setting	**44** Hz
Tester	JEF, XYY	Fan configuration	**B Only**
Stack Dia.	11.875 in	Approx. air vel.	1520 fpm at point >>1 side center
Stack X-Area	110.8 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	1
Distance to disturbance	220.5 in	Stack Temp	91.1 F
Start/End Time	1415 / 1450		

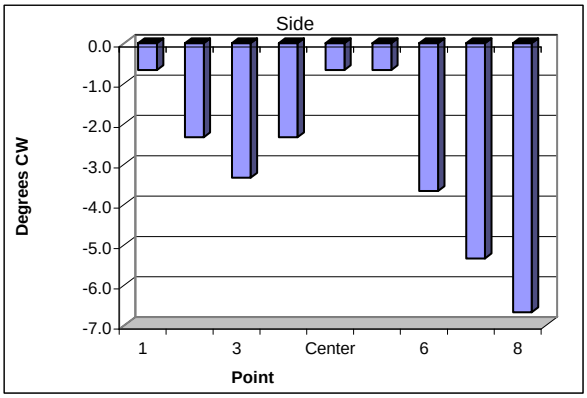
Order -->	1st					2nd			
Traverse-->		**Side**				**Bottom**			
Trial ---->		1	2	3		1	2	3	
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.
1	0.50	0	-1	-1	-0.7	5	-2	1	1.3
2	1.24	-2	-2	-3	-2.3	-5	-4	-4	-4.3
3	2.29	-4	-2	-4	-3.3	-4	-4	-5	-4.3
4	3.81	-4	-2	-1	-2.3	-1	-2	-4	-2.3
Center	5.89	-1	-1	0	-0.7	-1	-1	1	-0.3
5	7.98	-1	0	-1	-0.7	1	-1	1	0.3
6	9.50	-3	-4	-4	-3.7	0	0	0	0.0
7	10.54	-5	-6	-5	-5.3	-2	-1	-1	-1.3
8	11.28	-6	-7	-7	-6.7	-5	-5	-4	-4.7
Mean of absolute values:					2.9				2.1
" " w/o points by wall:					2.6				1.9
								Grand mean ABS	2.5
								" " w/o wall pts	2.2

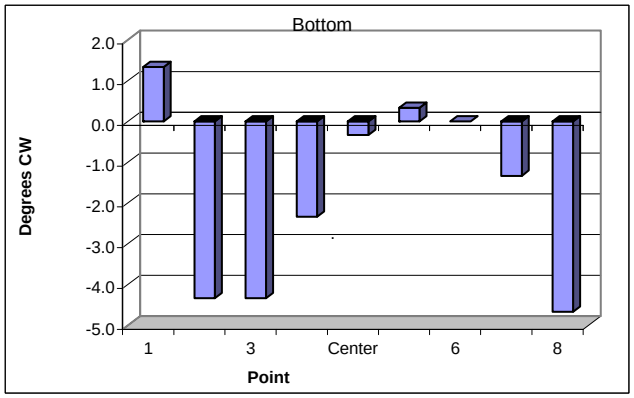
Instuments Used:		**Cal. Due**
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI 8355 SN 305039	30-Jun-09
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).

Notes: Additional test John prescribed. Running at higher velocity / frequency.

XYY 7/27/10





Entries made by:	Xiao-Ying Yu	Technical Data Review performed by:	Ernest Antonio
Signature/date	5/26/2009	Signature/date	Signature on File 08 July 2010 TI-RPP-WTP_677

FLOW ANGLE DATA FORM

LB_C2_FowAngleRev0.xls

CCP-WTPSP-1187

Site	**LB-C2**	Run No.	**FA-21**
Date	5/26/2009	Fan Setting	**35** Hz
Tester	JEF, XYY	Fan configuration	**B only**
Stack Dia.	11.875 in	Approx. air vel.	1170 fpm at point >>1 side center
Stack X-Area	110.8 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	1
Distance to disturbance	220.5 in	Stack Temp	88.6 F
Start/End Time	1450 / 1506		

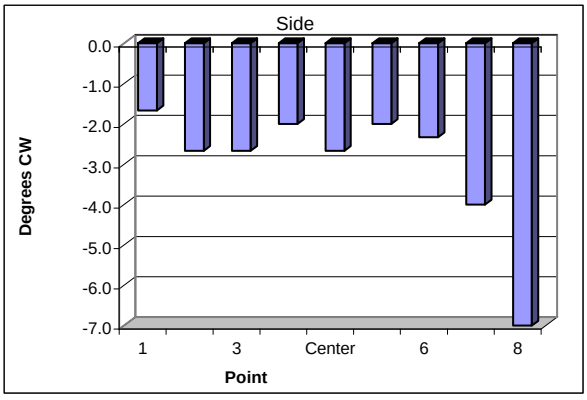
Order -->	2nd					1st			
Traverse-->		**Side**				**Bottom**			
Trial ---->		1	2	3		1	2	3	
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.
1	0.50	-3	-1	-1	-1.7	-1	-3	0	-1.3
2	1.24	-5	-2	-1	-2.7	-5	-5	-4	-4.7
3	2.29	-4	-2	-2	-2.7	-4	-5	-3	-4.0
4	3.81	-1	-3	-2	-2.0	-4	-2	-3	-3.0
Center	5.89	-2	-3	-3	-2.7	-2	-3	0	-1.7
5	7.98	-2	-2	-2	-2.0	-1	-2	2	-0.3
6	9.50	-2	-3	-2	-2.3	-2	-1	-2	-1.7
7	10.54	-4	-5	-3	-4.0	-3	-4	-4	-3.7
8	11.28	-7	-7	-7	-7.0	-4	-5	-6	-5.0
Mean of absolute values:					3.0				2.8
" " w/o points by wall:					2.6				2.7
								Grand mean ABS	2.9
								" " w/o wall pts	2.7

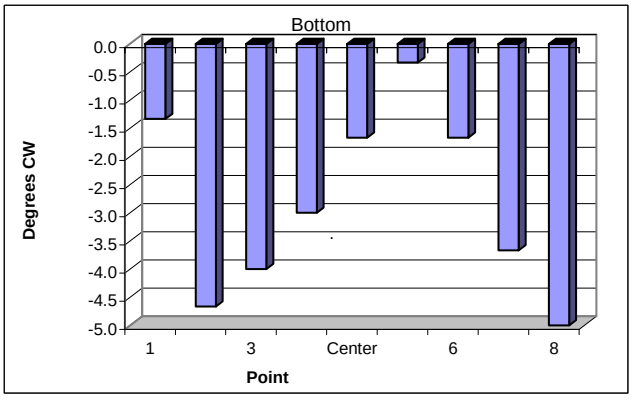
Instuments Used:		**Cal. Due**
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI 8355 SN 305039	30-Jun-09
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Notes: Run 3 at Port 1

XYY 7/27/10

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).





Entries made by:	Julia Flaherty	Technical Data Review performed by:	Ernest Antonio
Signature/date	5/26/2009	Signature/date	Signature on File 08 July 2010
			TI-RPP-WTP_677

FLOW ANGLE DATA FORM

LB_C2_FowAngleRev0.xls

CCP-WTPSP-1187

Site	**LB-C2**	Run No.	**FA-22**
Date	5/28/2009	Fan Setting	**44** Hz
Tester	JEF, XYY	Fan configuration	**A & B**
Stack Dia.	11.875 in	Approx. air vel.	3620 fpm at point >>1 side center
Stack X-Area	110.8 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	1
Distance to disturbance	220.5 in	Stack Temp	81.9 F
Start/End Time	1000 / 1035		

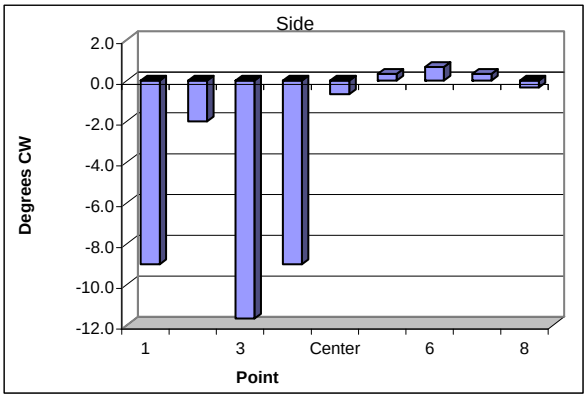
Order -->	1st					2nd			
Traverse-->	**Side**					**Bottom**			
Trial ---->	1	2	3			1	2	3	
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.
1	0.50	-8	-9	-10	-9.0	-6	-11	-12	-9.7
2	1.24	15	-11	-10	-2.0	-15	-15	-15	-15.0
3	2.29	-11	-12	-12	-11.7	-15	-15	-14	-14.7
4	3.81	-9	-9	-9	-9.0	-13	-13	-12	-12.7
Center	5.89	-1	1	-2	-0.7	-7	-7	-7	-7.0
5	7.98	1	1	-1	0.3	-2	-2	-2	-2.0
6	9.50	1	1	0	0.7	-2	-2	-2	-2.0
7	10.54	0	0	1	0.3	-2	-2	-1	-1.7
8	11.28	0	-1	0	-0.3	-2	-1	-2	-1.7
Mean of absolute values:					3.8				7.4
" " w/o points by wall:					3.5				7.9
								Grand mean ABS	5.6
								" " w/o wall pts	5.7

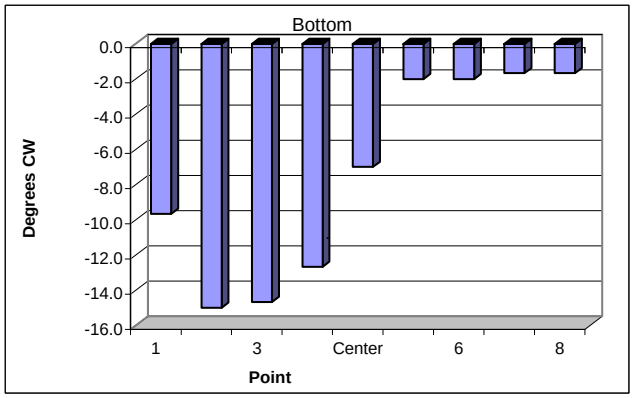
Instuments Used:		**Cal. Due**
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI 8355 SN 305039	30-Jun-09
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).

Notes: 1-degree change on side had up to 0.05 inch change in the manometer level. Very sensitive.

XYY 7/27/10





Entries made by:	Xiao-Ying Yu	Technical Data Review performed by:	Ernest Antonio
Signature/date	5/28/2009	Signature/date	Signature on File 08 July 2010 TI-RPP-WTP_677

FLOW ANGLE DATA FORM

LB_C2_FowAngleRev0.xls

CCP-WTPSP-1187

Site	**LB-C2**	Run No.	**FA-23**
Date	5/28/2009	Fan Setting	**44** Hz
Tester	JEF, XYY	Fan configuration	**A & B**
Stack Dia.	11.781 in	Approx. air vel.	3410 fpm at point >> 1 side center
Stack X-Area	109.0 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	2
Distance to disturbance	160 in	Stack Temp	81.8 F
Start/End Time	1035 / 1108		

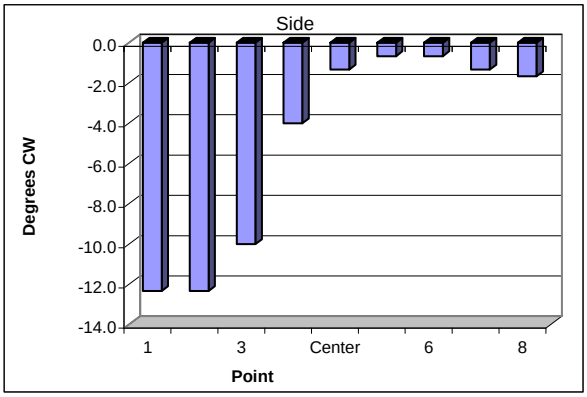
Order -->		1st				2nd				
Traverse-->		Side				Bottom				
Trial ---->		1	2	3		1	2	3		
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.	
1	0.50	-11	-13	-13	-12.3	-4	9	-3	0.7	
2	1.24	-12	-12	-13	-12.3	-9	16	16	7.7	
3	2.29	-10	-10	-10	-10.0	-11	-10	15	-2.0	
4	3.81	-5	-2	-5	-4.0	-7	-7	12	-0.7	
Center	5.89	-1	-1	-2	-1.3	-2	-1	0	-1.0	
5	7.98	-1	0	-1	-0.7	1	2	1	1.3	
6	9.50	-1	0	-1	-0.7	2	1	1	1.3	
7	10.54	-1	-1	-2	-1.3	2	1	1	1.3	
8	11.28	-1	-2	-2	-1.7	0	1	1	0.7	
Mean of absolute values:					4.9				1.9	
" " w/o points by wall:					4.3				2.2	
								Grand mean ABS	3.4	
								" " w/o wall pts	3.3	

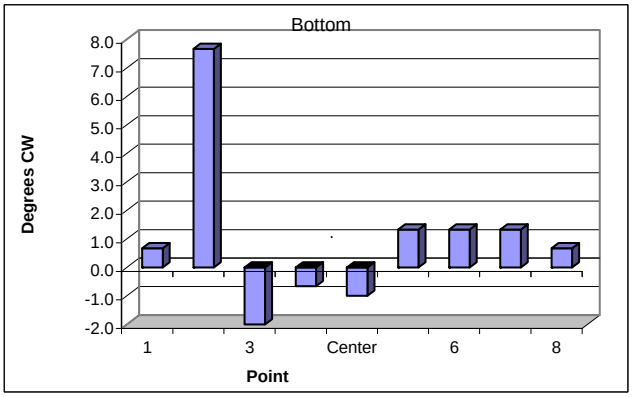
Instuments Used:		**Cal. Due**
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI 8355 SN 305039	30-Jun-09
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Notes: Highly sensitive to angle change. Manometer oil fluctuated a lot…

XYY 7/27/10

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).





Entries made by:	Julia Flaherty	Technical Data Review performed by:	Ernest Antonio
Signature/date	5/28/2009	Signature/date	Signature on File 08 July 2010 TI-RPP-WTP_677

FLOW ANGLE DATA FORM

LB_C2_FowAngleRev0.xls

CCP-WTPSP-1187

Site	LB-C2	Run No.	FA-24
Date	5/29/2009	Fan Setting	44 Hz
Tester	JEF, XYY	Fan configuration	A & B
Stack Dia.	11.781 in	Approx. air vel.	3410 fpm at point >>1 side center
Stack X-Area	109.0 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	2
Distance to disturbance	160 in	Stack Temp	88.8 F
Start/End Time	1000 / 1045		

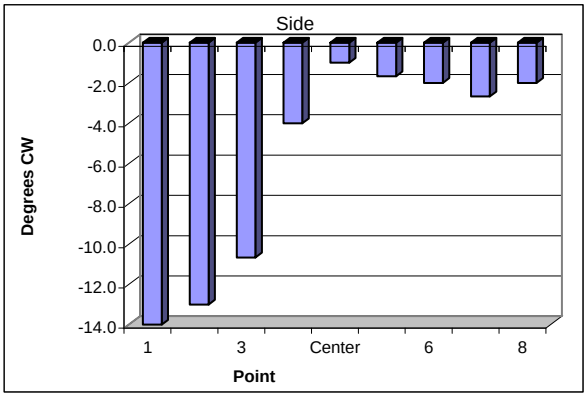
Order -->		1st				2nd				
Traverse-->		Side				Bottom				
Trial ---->		1	2	3		1	2	3		
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.	
1	0.50	-14	-13	-15	-14.0	19	19	20	19.3	
2	1.24	-13	-13	-13	-13.0	15	-10	15	6.7	
3	2.29	-11	-11	-10	-10.7	15	0	16	10.3	
4	3.81	1	-6	-7	-4.0	10	1	9	6.7	
Center	5.89	0	-2	-1	-1.0	-1	1	1	0.3	
5	7.98	-1	-2	-2	-1.7	0	0	1	0.3	
6	9.50	-2	-2	-2	-2.0	0	1	1	0.7	
7	10.54	-2	-3	-3	-2.7	1	0	0	0.3	
8	11.28	-2	-2	-2	-2.0	0	1	-1	0.0	
Mean of absolute values:					5.7				5.0	
" " w/o points by wall:					5.0				3.6	
								Grand mean ABS	5.3	
								" " w/o wall pts	4.3	

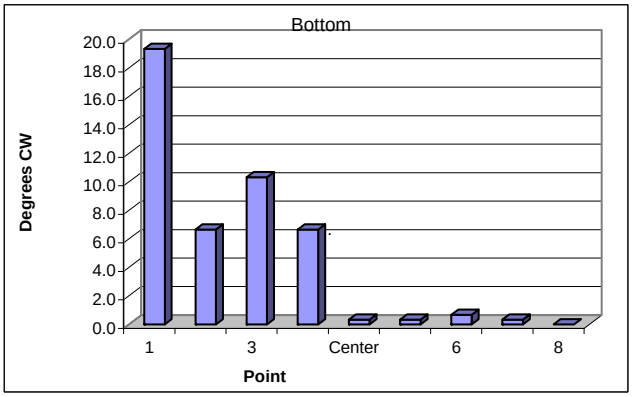
Instuments Used:		Cal. Due
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI 8355 SN 305039	30-Jun-09
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).

Notes: Large variability at the edges
max flow ~4100 fpm at 70 deg F on the manometer

XYY 7/27/10





Entries made by:	Julia Flaherty	Technical Data Review performed by:	Ernest Antonio
Signature/date	5/29/2009	Signature/date	Signature on File 08 July 2010 TI-RPP-WTP_677

FLOW ANGLE DATA FORM

LB_C2_FowAngleRev0.xls

CCP-WTPSP-1187

Site	**LB-C2**	Run No.	**FA-25**
Date	5/29/2009	Fan Setting	**44** Hz
Tester	XYY, JEF	Fan configuration	**A Only**
Stack Dia.	11.813 in	Approx. air vel.	1630 fpm at point >>1 side center
Stack X-Area	109.6 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	3
Distance to disturbance	100 in	Stack Temp	90.4 F
Start/End Time	1046 / 1111		

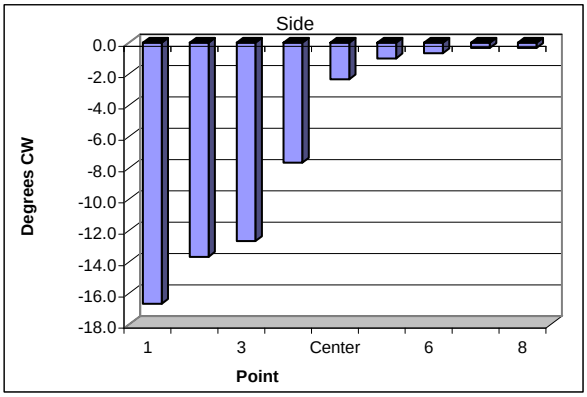
Order -->	1st				2nd			
Traverse-->	**Side**				**Bottom**			
Trial ---->	1	2	3		1	2	3	
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.
1	0.50	-16	-17	-17	-16.7	10	3	14	9.0
2	1.24	-14	-14	-13	-13.7	14	16	16	15.3
3	2.29	-13	-13	-12	-12.7	13	14	15	14.0
4	3.81	-7	-8	-8	-7.7	9	11	12	10.7
Center	5.89	-3	-2	-2	-2.3	4	4	4	4.0
5	7.98	-1	-1	-1	-1.0	2	5	4	3.7
6	9.50	-1	-1	0	-0.7	4	5	5	4.7
7	10.54	0	-1	0	-0.3	4	5	5	4.7
8	11.28	0	0	-1	-0.3	6	5	5	5.3
Mean of absolute values:					6.1				7.9
" " w/o points by wall:					5.5				8.1
							Grand mean ABS		7.0
							" " w/o wall pts		6.8

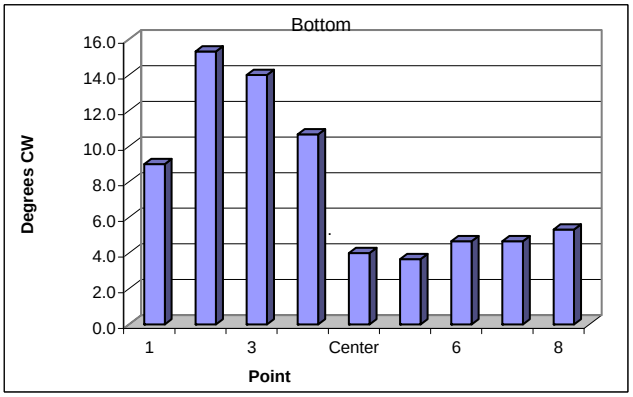
Instuments Used:		**Cal. Due**
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI 8355 SN 305039	30-Jun-09
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).

Notes:

XYY 7/27/10





Entries made by:	Xiao-Ying Yu	Technical Data Review performed by:	Ernest Antonio
Signature/date	5/29/2009	Signature/date	Signature on File 08 July 2010 TI-RPP-WTP_677

FLOW ANGLE DATA FORM

LB_C2_FowAngleRev0.xls

CCP-WTPSP-1187

Site	LB-C2	Run No.	FA-26
Date	5/29/2009	Fan Setting	44 Hz
Tester	JEF, XYY	Fan configuration	A Only
Stack Dia.	11.781 in	Approx. air vel.	1740 fpm at point >> 1 side center
Stack X-Area	109.0 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	2
Distance to disturbance	160 in	Stack Temp	92.8 F
Start/End Time	1112 / 1134		

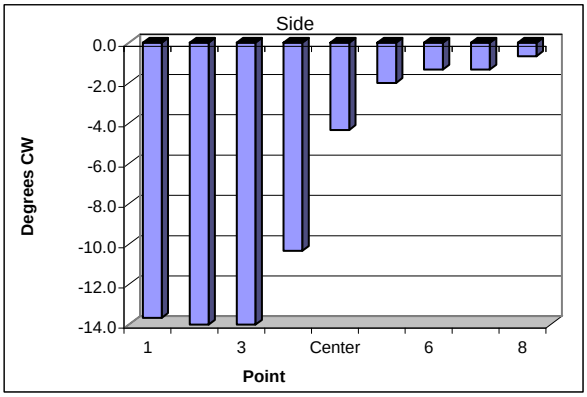
Order -->		1st				2nd				
Traverse-->		Side				Bottom				
Trial ---->		1	2	3		1	2	3		
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.	
1	0.50	-14	-14	-13	-13.7	-9	0	-7	-5.3	
2	1.24	-14	-15	-13	-14.0	-9	2	-9	-5.3	
3	2.29	-15	-14	-13	-14.0	-8	12	-9	-1.7	
4	3.81	-10	-10	-11	-10.3	-8	14	-6	0.0	
Center	5.89	-4	-5	-4	-4.3	-5	10	-4	0.3	
5	7.98	-2	-2	-2	-2.0	1	3	1	1.7	
6	9.50	-2	0	-2	-1.3	1	4	3	2.7	
7	10.54	-1	-1	-2	-1.3	4	4	3	3.7	
8	11.28	-1	0	-1	-0.7	5	4	3	4.0	
Mean of absolute values:					6.9				2.7	
" " w/o points by wall:					6.8				2.2	
								Grand mean ABS	4.8	
								" " w/o wall pts	4.5	

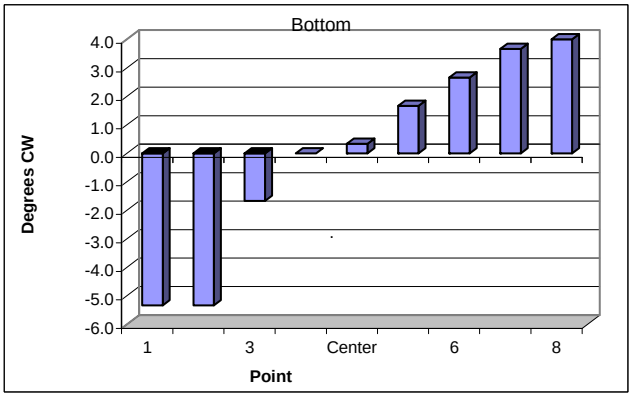
Instuments Used:		Cal. Due
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI 8355 SN 305039	30-Jun-09
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).

Notes:

XYY 7/27/10





Entries made by: Xiao-Ying Yu	Technical Data Review performed by: Ernest Antonio
Signature/date 5/29/2009	Signature/date Signature on File 08 July 2010 TI-RPP-WTP_677

FLOW ANGLE DATA FORM

LB_C2_FowAngleRev0.xls

CCP-WTPSP-1187

Site	LB-C2	Run No.	FA-27
Date	5/29/2009	Fan Setting	44 Hz
Tester	JEF, XYY	Fan configuration	A Only
Stack Dia.	11.875 in	Approx. air vel.	1760 fpm at point >>1 side center
Stack X-Area	110.8 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	1
Distance to disturbance	220.5 in	Stack Temp	102.3 F
Start/End Time	1400 / 1420		

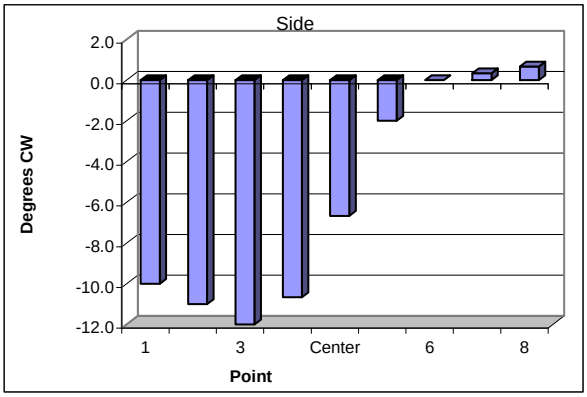
Order -->		1st				2nd			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3		1	2	3	
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.
1	0.50	-8	-11	-11	-10.0	-3	-2	-1	-2.0
2	1.24	-10	-12	-11	-11.0	-10	-10	-11	-10.3
3	2.29	-12	-12	-12	-12.0	-11	-10	-11	-10.7
4	3.81	-10	-11	-11	-10.7	-9	-10	-9	-9.3
Center	5.89	-8	-5	-7	-6.7	-5	-7	-7	-6.3
5	7.98	-1	-3	-2	-2.0	-1	-1	0	-0.7
6	9.50	1	0	-1	0.0	2	2	4	2.7
7	10.54	1	0	0	0.3	-4	3	4	1.0
8	11.28	1	0	1	0.7	4	4	4	4.0
Mean of absolute values:					5.9				5.2
" " w/o points by wall:					6.1				5.9
								Grand mean ABS	5.6
								" " w/o wall pts	6.0

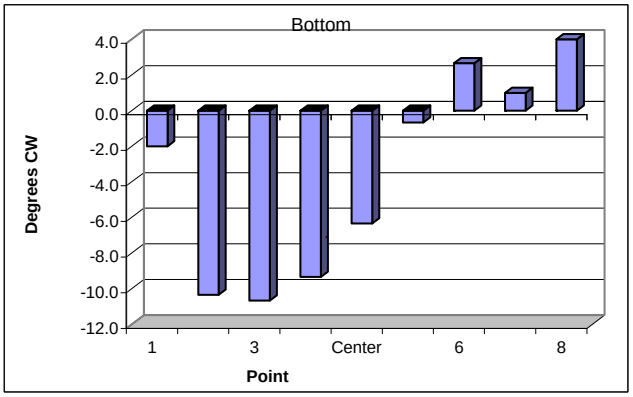
Instuments Used:		Cal. Due
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI 8355 SN 305039	30-Jun-09
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).

Notes:

XYY 7/27/10





Entries made by:	Julia Flaherty	Technical Data Review performed by:	Ernest Antonio
Signature/date	5/29/2009	Signature/date	Signature on File 08 July 2010 TI-RPP-WTP_677

FLOW ANGLE DATA FORM

LB_C2_FowAngleRev0.xls

CCP-WTPSP-1187

Site	LB-C2	Run No.	FA-28
Date	5/29/2009	Fan Setting	44 Hz
Tester	XYY, JEF	Fan configuration	B Only
Stack Dia.	11.875 in	Approx. air vel.	1410 fpm at point >>1 side center
Stack X-Area	110.8 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	1
Distance to disturbance	220.5 in	Stack Temp	102.4 F
Start/End Time	1421 / 1442		

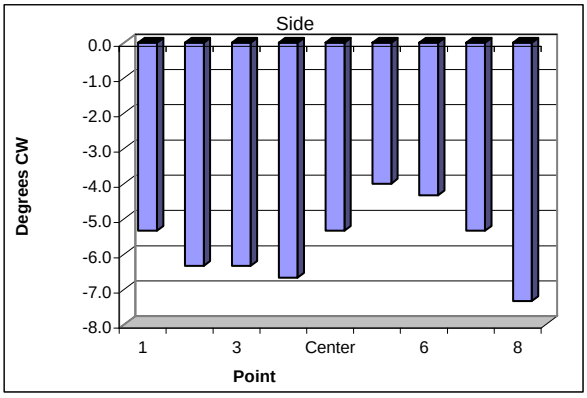
		Side				Bottom			
Order -->		2nd				1st			
Traverse-->									
Trial ---->		1	2	3		1	2	3	
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.
1	0.50	-6	-5	-5	-5.3	10	1	4	5.0
2	1.24	-6	-6	-7	-6.3	14	-7	-7	0.0
3	2.29	-6	-7	-6	-6.3	20	-6	-6	2.7
4	3.81	-6	-6	-8	-6.7	15	-4	-5	2.0
Center	5.89	-5	-5	-6	-5.3	5	-3	2	1.3
5	7.98	-4	-4	-4	-4.0	-1	0	-2	-1.0
6	9.50	-4	-4	-5	-4.3	-4	-4	-3	-3.7
7	10.54	-6	-5	-5	-5.3	-5	-5	-5	-5.0
8	11.28	-8	-7	-7	-7.3	-7	-7	-7	-7.0
Mean of absolute values:					5.7				3.1
" " w/o points by wall:					5.5				2.2
								Grand mean ABS	4.4
								" " w/o wall pts	3.9

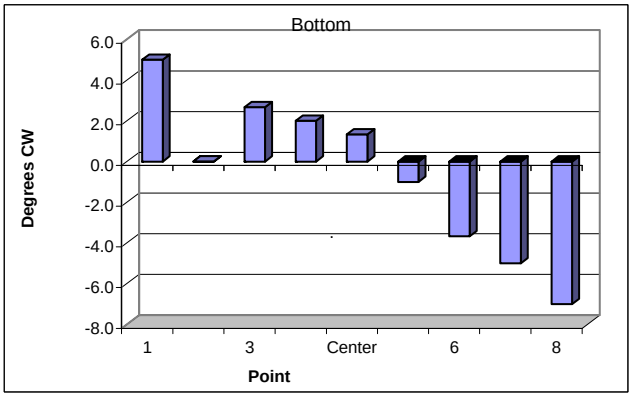
Instuments Used:		Cal. Due
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI 8355 SN 305039	30-Jun-09
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).

Notes:

~~XYY 7/27/10~~





Entries made by:	Julia Flaherty	Technical Data Review performed by:	Ernest Antonio
Signature/date	5/29/2009	Signature/date	Signature on File 08 July 2010 TI-RPP-WTP_677

Appendix A.4: LB-C2 Tracer Gas Uniformity Data Sheets

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LB-C2 Model**	Run No.	**GT-1**		
Date	6/2/2009	Fan Configuration	**A & B**		
Testers	JAG, MSP	Fan Setting	**35**	**Hz**	
Stack Dia.	11.875 in.	Stack Temp	82.85	deg F	
Stack X-Area	110.8 $in.^2$	Start/End Time	1015 / 1145		
Test Port	1	Center 2/3 from	1.09	to:	10.79
Distance to disturbance	220.5 inches	Points in Center 2/3	2	to:	7
Measurement units	ppm SF6	Injection Point	**A Center**		

		Side				Bottom			
Order -->		1st				2nd			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.38	1.13	1.05	1.16	1.113	1.06	1.16	1.16	1.127
2	1.24	1.04	1.12	1.08	1.080	1.25	1.14	1.32	1.237
3	2.29	1.13	1.15	1.17	1.150	1.20	1.21	1.44	1.283
4	3.82	1.17	1.13	1.27	1.190	1.12	1.17	1.24	1.177
Center	5.91	1.09	1.21	1.21	1.170	1.13	1.09	1.15	1.123
5	8.00	1.27	1.27	1.18	1.240	1.16	1.20	1.31	1.223
6	9.52	1.25	1.07	1.06	1.127	1.08	1.15	1.19	1.140
7	10.57	1.28	1.21	1.31	1.267	1.20	1.20	1.23	1.210
8	11.31	1.16	1.22	1.18	1.187	1.21	1.29	1.18	1.227
Averages ---------->		1.169	1.159	1.180	1.169	1.157	1.179	1.247	1.194

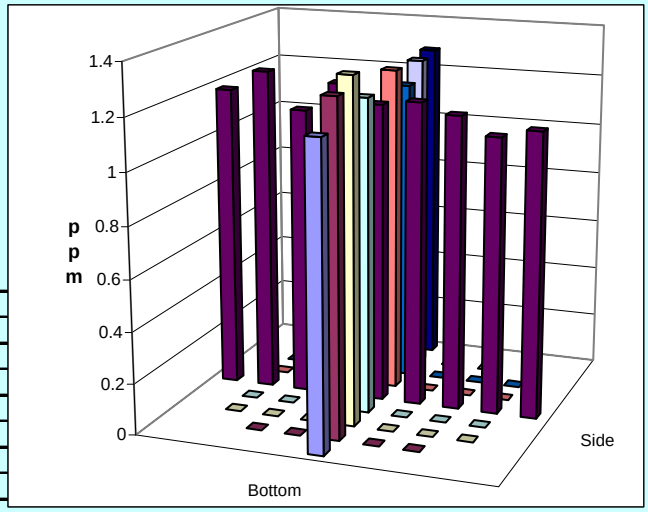
All	ppm	Dev. from mean
Mean	1.18	
Min Point	1.08	-8.6%
Max Point	1.28	8.6%

Center 2/3	Side	Bottom	All
Mean	1.17	1.20	1.19
Std. Dev.	0.06	0.06	0.06
COV as %	5.5	4.7	**5.0**

Avg. Conc. 1.186 ppm

Gas analyzer checked:
6/1/2009

	Start	Finish	
Tracer tank pressure	250	250	psig
Stack Temp	81.7	84	Fº
Center Pt. air vel.	2830	2770	fpm
Injection flowmeter	59	59	sccm
			JAG 6/2/09
Sampling flowmeter	10	9	lpm Sierra
Ambient pressure	996.00	996.00	in Hg
Ambient humidity	31	28	RH
B&K vapor correction	Y	Y	Y/N
Back-Gd gas ppb	7.3, 6.8, 7.3, 5.4	7.6, 20, 16, 7.4	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	75	80	



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	6/30/2009
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes:

Entries made by: John Glissmeyer
Signature/date *on file with original* 6/2/2009

Technical Data Review performed by: Ernest Antonio
Signature/date Signature on File 28 July 2010
TI-RPP-WTP678

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LB-C2 Model**	Run No.	**GT-2**
Date	6/2/2009	Fan Configuration	**A & B**
Testers	JAG, DMT	Fan Setting	**35** **Hz**
Stack Dia.	11.781 in.	Stack Temp	89.7 deg F
Stack X-Area	109.0 $in.^2$	Start/End Time	1450 / 1619
Test Port	2	Center 2/3 from	1.08 to: 10.70
Distance to disturbance	160 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**A Center**

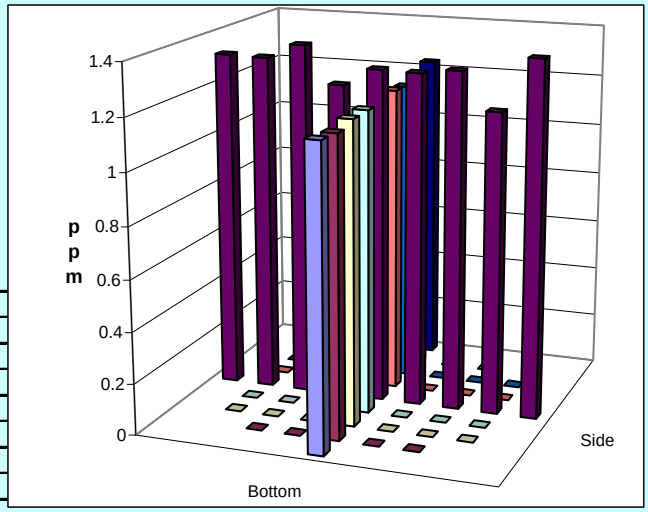
Order -->		2nd				1st				
Traverse-->		Side				Bottom				
Trial ---->		1	2	3	Mean	1	2	3	Mean	
Point	Depth, in.	ppm				ppm				
1	0.38	1.18	1.38	1.30	1.287	1.20	1.13	1.16	1.163	
2	1.24	1.01	1.14	1.13	1.093	1.17	1.14	1.16	1.157	
3	2.29	1.24	1.18	1.26	1.227	1.26	1.18	1.09	1.177	
4	3.82	1.27	1.27	1.09	1.210	1.25	1.17	1.12	1.180	
Center	5.91	1.09	1.24	1.31	1.213	1.23	1.37	1.31	1.303	
5	8.00	1.19	1.11	1.15	1.150	1.16	1.22	1.21	1.197	
6	9.52	1.30	1.32	1.23	1.283	1.19	1.20	1.16	1.183	
7	10.57	1.17	1.26	1.26	1.230	1.23	1.18	1.21	1.207	
8	11.31	1.14	1.27	1.29	1.233	1.23	1.24	1.22	1.230	
Averages ---------->		1.177	1.241	1.224	1.214	1.213	1.203	1.182	1.200	

All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1.21		Mean	1.20	1.20	1.20
Min Point	1.09	-9.4%	Std. Dev.	0.06	0.05	0.05
Max Point	1.30	8.0%	COV as %	5.1	4.0	**4.4**

Avg. Conc. 1.200 ppm

Gas analyzer checked:
6/1/2009
DMT 6/2/09

	Start	Finish	
Tracer tank pressure	250	250	psig
Stack Temp	91	88.4	F°
Center Pt. air vel.	2740	2730	fpm
Injection flowmeter	59	59	sccm
			DMT 6/2/09
Sampling flowmeter	10	9.5	lpm Sierra
Ambient pressure	993.00	993.00	in Hg
Ambient humidity	29	23	RH
B&K vapor correction	Y	Y	Y/N
Back-Gd gas ppb	16, 14, 11, 9.4	20, 14, 16, 13	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	85	85	



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	6/30/2009
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes:

DMT 6/2/09

Entries made by: Donna Trott
Signature/date *on file with original* 6/2/2009

Technical Data Review performed by: Ernest Antonio
Signature/date Signature on File 7 July 2010
TI-RPP-WTP678

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06	Site	**LB-C2 Model**	Run No.	**GT-3**	
	Date	6/2/2009	Fan Configuration	**A & B**	
	Testers	DMT, JAG	Fan Setting	**35**	**Hz**
	Stack Dia.	11.781 in.	Stack Temp	88.7	deg F
	Stack X-Area	109.0 $in.^2$	Start/End Time	1620 / 1750	
	Test Port	2	Center 2/3 from	1.08	to: 10.70
	Distance to disturbance	160 inches	Points in Center 2/3	2	to: 7
	Measurement units	ppm SF6	Injection Point	**A Center**	

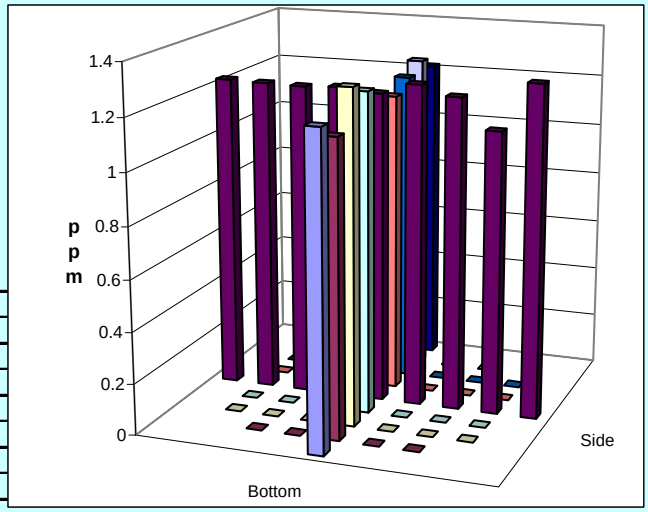
Order -->		1st				2nd				
Traverse-->		Side				Bottom				
Trial ---->		1	2	3	Mean	1	2	3	Mean	
Point	Depth, in.	ppm				ppm				
1	0.38	1.26	1.29	1.28	1.277	1.26	1.22	1.15	1.210	
2	1.24	1.16	1.01	1.10	1.090	1.14	1.13	1.16	1.143	
3	2.29	1.22	1.22	1.18	1.207	1.23	1.36	1.29	1.293	
4	3.82	1.26	1.19	1.28	1.243	1.32	1.27	1.16	1.250	
Center	5.91	1.19	1.21	1.20	1.200	1.08	1.29	1.27	1.213	
5	8.00	1.21	1.22	1.21	1.213	1.18	1.13	1.21	1.173	
6	9.52	1.25	1.20	1.17	1.207	1.12	1.38	1.16	1.220	
7	10.57	1.24	1.19	1.20	1.210	1.27	1.25	1.26	1.260	
8	11.31	1.23	1.17	1.24	1.213	1.20	1.23	1.21	1.213	
Averages ---------->		1.224	1.189	1.207	1.207	1.200	1.251	1.208	1.220	

All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1.21		Mean	1.20	1.22	1.21
Min Point	1.09	-10.2%	Std. Dev.	0.05	0.05	0.05
Max Point	1.29	6.6%	COV as %	4.1	4.2	**4.1**

Avg. Conc. 1.214 ppm

Gas analyzer checked:
6/2/2009
DMT 6/2/09

	Start	Finish	
Tracer tank pressure	250	250	psig
Stack Temp	88.4	89	Fº
Center Pt. air vel.	2730	2800	fpm
Injection flowmeter	59	59	sccm
			JAG 6/2/09
Sampling flowmeter	9.5	9.5	lpm Sierra
Ambient pressure	993.00	993.00	in Hg
Ambient humidity	23	23	RH
B&K vapor correction	Y	Y	Y/N
Back-Gd gas ppb	20, 14, 16, 13	18, 14, 19, 11	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	85	86.9	



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	6/30/2009
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes:

JAG 6/2/09

Entries made by: John Glissmeyer
Signature/date *on file with original* 6/2/2009

Technical Data Review performed by: Ernest Antonio
Signature/date Signature on File 7 July 2010
TI-RPP-WTP678

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LB-C2 Model**	Run No.	**GT-4**
Date	6/3/2009	Fan Configuration	**A & B**
Testers	DMT, MSP	Fan Setting	**35 Hz**
Stack Dia.	11.781 in.	Stack Temp	94.55 deg F
Stack X-Area	109.0 in.^{2}	Start/End Time	1440 / 1650
Test Port	2	Center 2/3 from	1.08 to: 10.70
Distance to disturbance	160 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**A West**

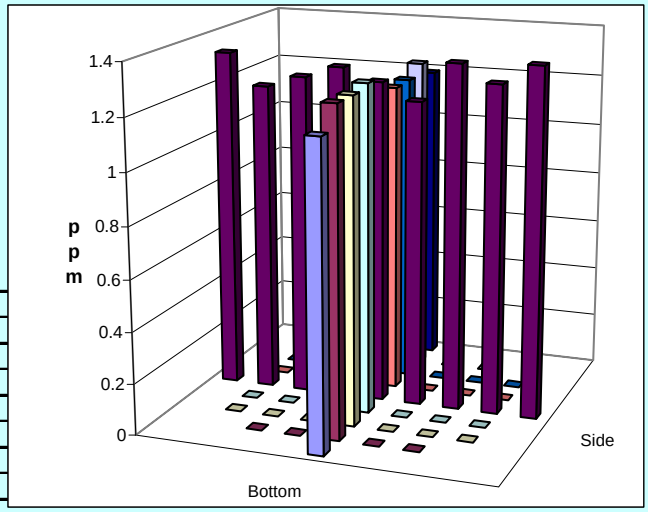
Order -->		1st				2nd			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.38	1.35	1.28	1.17	1.267	1.10	1.26	1.17	1.177
2	1.24	1.18	1.14	1.26	1.193	1.23	1.27	1.29	1.263
3	2.29	1.30	1.24	1.23	1.257	1.31	1.24	1.24	1.263
4	3.82	1.13	1.06	1.15	1.113	1.18	1.26	1.40	1.280
Center	5.91	1.18	1.19	1.15	1.173	1.26	1.27	1.24	1.257
5	8.00	1.22	1.13	1.30	1.217	1.32	1.15	1.15	1.207
6	9.52	1.12	1.17	1.23	1.173	1.12	1.21	1.30	1.210
7	10.57	1.17	1.14	1.08	1.130	1.23	1.33	1.19	1.250
8	11.31	1.23	1.37	1.13	1.243	1.22	1.20	1.14	1.187
Averages ---------->		1.209	1.191	1.189	1.196	1.219	1.243	1.236	1.233

All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1.21		Mean	1.18	1.25	1.21
Min Point	1.11	-8.3%	Std. Dev.	0.05	0.03	0.05
Max Point	1.28	5.4%	COV as %	4.2	2.2	**4.3**

Avg. Conc. 1.214 ppm

Gas analyzer checked:
6/1/2009
DMT 6/3/09

	Start	Finish	
Tracer tank pressure	300	300	psig
Stack Temp	95.3	93.8	F°
Center Pt. air vel.	2720	2640.0	fpm
Injection flowmeter	59	59	sccm
			DMT 6/3/09
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	993.00	993.00	in Hg
Ambient humidity	23	21	RH
B&K vapor correction	Y	Y	Y/N
Back-Gd gas ppb	8, 14, 8, 4	5, 20, 14, 9	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	87.8	89.6	



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	6/30/2009
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes:

DMT 6/3/09

Entries made by: Donna Trott
Signature/date *on file with original* 6/3/2009

Technical Data Review performed by: Ernest Antonio
Signature/date Signature on File 7 July 2010
TI-RPP-WTP678

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LB-C2 Model**	Run No.	**GT-5**
Date	6/4/2009	Fan Configuration	**A & B**
Testers	MSP, JEF	Fan Setting	**35 Hz**
Stack Dia.	11.781 in.	Stack Temp	82.95 deg F
Stack X-Area	109.0 $in.^2$	Start/End Time	1004 / 1125
Test Port	2	Center 2/3 from	1.08 to: 10.70
Distance to disturbance	160 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**A East**

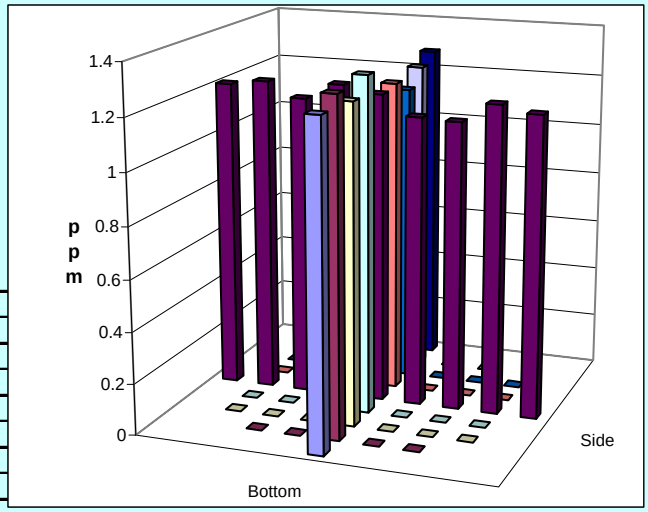
Order -->		1st				2nd			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.38	1.14	1.22	1.17	1.177	1.23	1.21	1.16	1.200
2	1.24	1.15	1.17	1.29	1.203	1.28	1.25	1.20	1.243
3	2.29	1.04	1.12	1.22	1.127	1.12	1.26	1.19	1.190
4	3.82	1.19	1.18	1.03	1.133	1.21	1.34	1.22	1.257
Center	5.91	1.20	1.31	1.12	1.210	1.21	1.16	1.11	1.160
5	8.00	1.27	1.14	1.30	1.237	1.22	1.21	1.09	1.173
6	9.52	1.21	1.07	1.24	1.173	1.06	1.15	1.16	1.123
7	10.57	1.15	1.14	1.40	1.230	1.31	1.05	1.19	1.183
8	11.31	1.22	1.07	1.34	1.210	1.24	1.24	1.18	1.220
Averages ---------->		1.174	1.158	1.234	1.189	1.209	1.208	1.167	1.194

All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1.19		Mean	1.19	1.19	1.19
Min Point	1.12	-5.7%	Std. Dev.	0.04	0.05	0.04
Max Point	1.26	5.5%	COV as %	3.7	3.9	**3.7**

Avg. Conc. 1.193 ppm

Gas analyzer checked:
6/1/2009
JEF 6/4/09

	Start	Finish	
Tracer tank pressure	300	300	psig
Stack Temp	83.7	82.2	F°
Center Pt. air vel.	2620	2860.0	fpm
Injection flowmeter	59	59	sccm
			JEF 6/4/09
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	990.00	990.00	in Hg
Ambient humidity	32	30	RH
B&K vapor correction	Y	Y	Y/N
Back-Gd gas ppb	3, 2, 5, 6	11, 4, 0, 6	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	78.8	79.7	



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	6/30/2009
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes:
JEF 6/4/09

Entries made by:	Julia Flaherty	Technical Data Review performed by:	Ernest Antonio
Signature/date	*on file with original* 6/4/2009	Signature/date	Signature on File 7 July 2010
			TI-RPP-WTP678

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06	Site	**LB-C2 Model**	Run No.	**GT-6**	
	Date	6/4/2009	Fan Configuration	**A & B**	
	Testers	DMT, JEF	Fan Setting	**35**	**Hz**
	Stack Dia.	11.781 in.	Stack Temp	93.85	deg F
	Stack X-Area	109.0 $in.^2$	Start/End Time	1414 / 1608	
	Test Port	2	Center 2/3 from	1.08	to: 10.70
	Distance to disturbance	160 inches	Points in Center 2/3	2	to: 7
	Measurement units	ppm SF6	Injection Point	**A Far**	

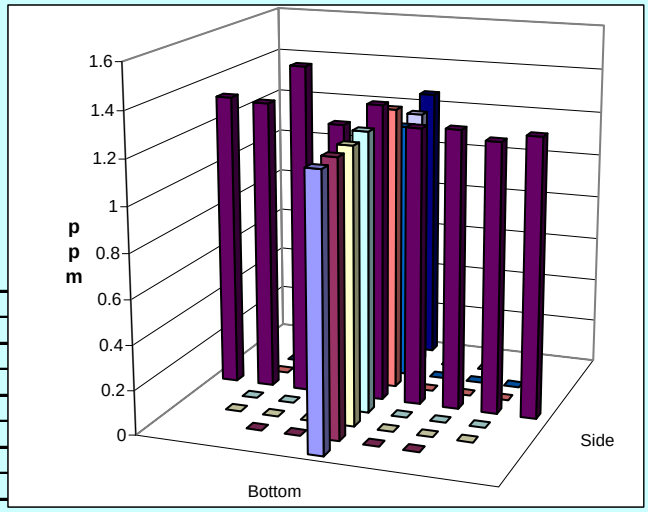
Order -->		1st				2nd			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.38	1.16	1.04	1.32	1.173	1.18	1.21	1.25	1.213
2	1.24	1.12	1.23	1.07	1.140	1.23	1.14	1.30	1.223
3	2.29	1.08	1.16	1.29	1.177	1.33	1.23	1.14	1.233
4	3.82	1.12	1.25	1.14	1.170	1.36	1.27	1.14	1.257
Center	5.91	1.23	1.33	1.20	1.253	1.31	1.21	1.49	1.337
5	8.00	1.11	1.25	1.12	1.160	1.25	1.24	1.36	1.283
6	9.52	1.46	1.27	1.44	1.390	1.14	1.17	1.20	1.170
7	10.57	1.21	1.21	1.26	1.227	1.14	1.28	1.16	1.193
8	11.31	1.27	1.18	1.27	1.240	1.23	1.28	1.25	1.253
Averages ---------->		1.196	1.213	1.234	1.214	1.241	1.226	1.254	1.240

All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1.23		Mean	1.22	1.24	1.23
Min Point	1.14	-7.1%	Std. Dev.	0.09	0.06	0.07
Max Point	1.39	13.2%	COV as %	7.1	4.5	**5.8**

Avg. Conc. 1.219 ppm

Gas analyzer checked:
6/1/2009
JEF 6/4/09

	Start	Finish	
Tracer tank pressure	300	300	psig
Stack Temp	91.6	96.1	F°
Center Pt. air vel.	2730	2710.0	fpm
Injection flowmeter	59	59	sccm
			JEF 6/4/09
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	989.00	987.00	in Hg
Ambient humidity	29	23	RH
B&K vapor correction	Y	Y	Y/N
Back-Gd gas ppb	2, 0, 0, 0	10, 16, 16, 16	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	87.8	93.2	



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	6/30/2009
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes: Background measures had negative values - record as zero.

Entries made by:	Julia Flaherty	Technical Data Review performed by:	Ernest Antonio
Signature/date	*on file with original* 6/4/2009	Signature/date	Signature on File 7 July 2010 TI-RPP-WTP678

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LB-C2 Model**	Run No.	**GT-7**		
Date	6/4/2009	Fan Configuration	**A & B**		
Testers	DMT, JEF	Fan Setting	**35**	**Hz**	
Stack Dia.	11.781 in.	Stack Temp	95.5	deg F	
Stack X-Area	109.0 in.^{2}	Start/End Time	1610 / 1716		
Test Port	2	Center 2/3 from	1.08	to:	10.70
Distance to disturbance	160 inches	Points in Center 2/3	2	to:	7
Measurement units	ppm SF6	Injection Point	**A Near**		

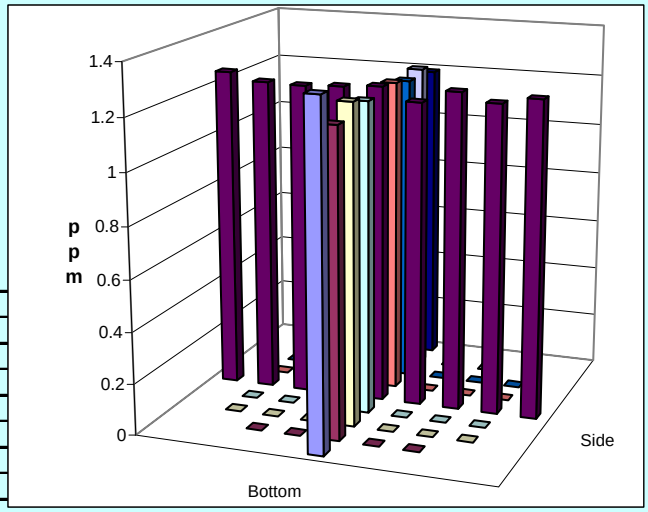
		Side				Bottom			
Order -->		2nd				1st			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.38	1.16	1.25	1.28	1.230	1.32	1.28	1.37	1.323
2	1.24	1.20	1.21	1.20	1.203	1.12	1.27	1.17	1.187
3	2.29	1.28	1.18	1.25	1.237	1.19	1.25	1.28	1.240
4	3.82	1.19	1.17	1.20	1.187	1.21	1.28	1.15	1.213
Center	5.91	1.27	1.21	1.23	1.237	1.20	1.21	1.31	1.240
5	8.00	1.21	1.24	1.23	1.227	1.23	1.26	1.19	1.227
6	9.52	1.23	1.19	1.24	1.220	1.21	1.21	1.20	1.207
7	10.57	1.17	1.27	1.23	1.223	1.23	1.25	1.20	1.227
8	11.31	1.21	1.29	1.26	1.253	1.22	1.14	1.21	1.190
Averages ---------->		1.213	1.223	1.236	1.224	1.214	1.239	1.231	1.228

All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1.23		Mean	1.22	1.22	1.22
Min Point	1.19	-3.2%	Std. Dev.	0.02	0.02	0.02
Max Point	1.32	7.9%	COV as %	1.5	1.6	**1.5**

Avg. Conc. 1.225 ppm

Gas analyzer checked:
6/1/2009
JEF 6/4/09

	Start	Finish	
Tracer tank pressure	300	300	psig
Stack Temp	96.1	94.9	F°
Center Pt. air vel.	2710	2750.0	fpm
Injection flowmeter	59	59	sccm
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	986.00	985.00	in Hg
Ambient humidity	24	25	RH
B&K vapor correction	Y	Y	Y/N
Back-Gd gas ppb	10, 16, 16, 16	13, 0, 7, 7	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	92.3	91.4	



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	6/30/2009
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes: Background measures had negative value - record as zero.

Entries made by: Julia Flaherty
Signature/date *on file with original* 6/4/2009

Technical Data Review performed by: Ernest Antonio
Signature/date Signature on File 7 July 2010
TI-RPP-WTP678

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LB-C2 Model**	Run No.	**GT-8**
Date	6/5/2009	Fan Configuration	**A & B**
Testers	DMT, JEF	Fan Setting	**35 Hz**
Stack Dia.	11.813 in.	Stack Temp	81.9 deg F
Stack X-Area	109.6 $in.^2$	Start/End Time	1000 / 1115
Test Port	3	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	100 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**A Center**

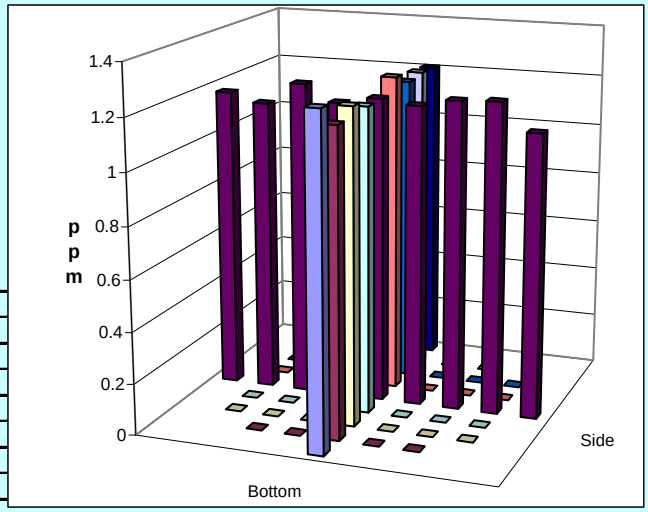
Order -->		1st				2nd			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.38	1.08	1.12	1.12	1.107	1.26	1.27	1.21	1.247
2	1.24	1.27	1.17	1.20	1.213	1.13	1.17	1.18	1.160
3	2.29	1.12	1.33	1.17	1.207	1.28	1.19	1.12	1.197
4	3.82	1.06	1.24	1.23	1.177	1.11	1.20	1.19	1.167
Center	5.91	1.14	1.31	1.13	1.193	1.14	1.18	1.18	1.167
5	8.00	1.15	1.16	1.19	1.167	1.22	1.24	1.20	1.220
6	9.52	1.25	1.23	1.21	1.230	1.15	1.20	1.18	1.177
7	10.57	1.08	1.11	1.24	1.143	1.24	1.14	1.18	1.187
8	11.31	1.12	1.30	1.11	1.177	1.21	1.19	1.14	1.180
Averages ---------->		1.141	1.219	1.178	1.179	1.193	1.198	1.176	1.189

All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1.18		Mean	1.19	1.18	1.19
Min Point	1.11	-6.5%	Std. Dev.	0.03	0.02	0.03
Max Point	1.25	5.3%	COV as %	2.5	1.8	**2.1**

Avg. Conc. 1.185 ppm

Gas analyzer checked:
6/1/2009
DMT 6/5/09

	Start	Finish	
Tracer tank pressure	300	300	psig
Stack Temp	80.6	83.2	Fº
Center Pt. air vel.	2850	2830.0	fpm
Injection flowmeter	59	59	sccm
			DMT 6/5/09
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	987.00	986.00	in Hg
Ambient humidity	48	44	RH
B&K vapor correction	Y	Y	Y/N
Back-Gd gas ppb	12, 4, 0, 0	9, 4, 4, 5	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	76.1	80.6	



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	6/30/2009
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes: Background measures had negative value, recorded as 0.

Entries made by:	Donna Trott	
Signature/date	*on file with original*	6/5/2009

Technical Data Review performed by:	Ernest Antonio
Signature/date	Signature on File 7 July 2010
	TI-RPP-WTP678

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LB-C2 Model**	Run No.	**GT-9**		
Date	6/5/2009	Fan Configuration	**A Only**		
Testers	DMT, JEF	Fan Setting	**35**	**Hz**	
Stack Dia.	11.813 in.	Stack Temp	85.25	deg F	
Stack X-Area	109.6 $in.^2$	Start/End Time	1115 / 1245		
Test Port	3	Center 2/3 from	1.08	to:	10.73
Distance to disturbance	100 inches	Points in Center 2/3	2	to:	7
Measurement units	ppm SF6	Injection Point	**A Center**		

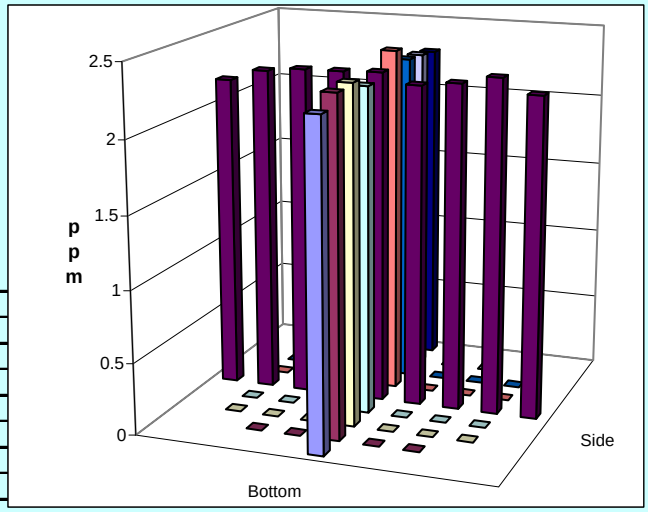
Order -->		2nd				1st			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.38	2.44	2.14	2.10	2.227	2.24	2.17	2.25	2.220
2	1.24	2.37	2.19	2.42	2.327	2.34	2.38	2.19	2.303
3	2.29	2.18	2.27	2.36	2.270	2.20	2.59	2.16	2.317
4	3.82	2.20	2.27	2.25	2.240	2.25	2.26	2.23	2.247
Center	5.91	2.13	2.44	2.36	2.310	2.25	2.29	2.33	2.290
5	8.00	2.30	2.22	2.38	2.300	2.32	2.32	2.53	2.390
6	9.52	2.57	2.03	2.29	2.297	2.17	2.38	2.31	2.287
7	10.57	2.28	2.16	2.37	2.270	2.19	2.28	2.35	2.273
8	11.31	2.16	2.17	2.24	2.190	2.18	2.21	2.37	2.253
Averages ---------->		2.292	2.210	2.308	2.270	2.238	2.320	2.302	2.287

All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	2.28		Mean	2.29	2.30	2.29
Min Point	2.19	-3.9%	Std. Dev.	0.03	0.05	0.04
Max Point	2.39	4.9%	COV as %	1.3	2.0	**1.6**

Avg. Conc. 2.276 ppm

Gas analyzer checked:
6/1/2009
DMT 6/5/09

	Start	Finish	
Tracer tank pressure	300	300	psig
Stack Temp	84.9	85.6	F°
Center Pt. air vel.	1280	1340.0	fpm
Injection flowmeter	59	59	sccm
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	986.00	985.00	in Hg
Ambient humidity	44	39	RH
B&K vapor correction	Y	Y	Y/N
Back-Gd gas ppb	9, 4, 4, 5	11, 5, 5, 14	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	80.6	82.4	



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	6/30/2009
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes:

DMT 6/5/09

Entries made by: Donna Trott
Signature/date *on file with original* 6/5/2009

Technical Data Review performed by: Ernest Antonio
Signature/date Signature on File 7 July 2010
TI-RPP-WTP678

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LB-C2 Model**	Run No.	**GT-10**
Date	6/5/2009	Fan Configuration	**A Only**
Testers	MSP, XYY	Fan Setting	**35 Hz**
Stack Dia.	11.813 in.	Stack Temp	91.25 deg F
Stack X-Area	109.6 $in.^2$	Start/End Time	1300 / 1449
Test Port	1	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	220.5 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**A Center**

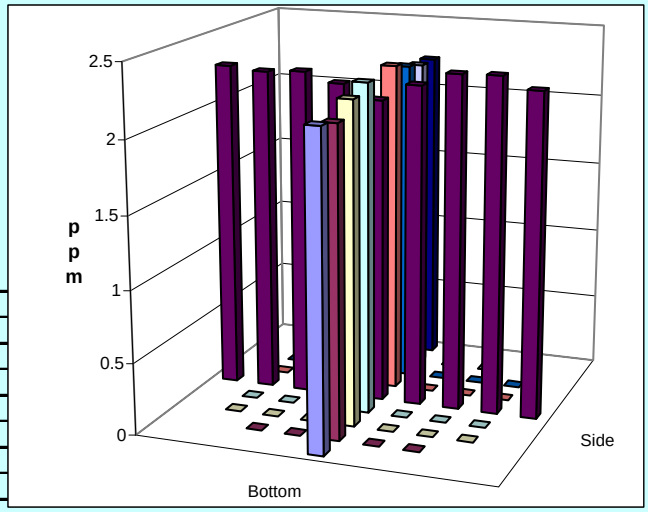
Order -->		1st				2nd			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.38	2.21	2.11	2.27	2.197	2.20	2.22	2.08	2.167
2	1.24	2.30	2.20	2.33	2.277	2.14	2.11	2.14	2.130
3	2.29	2.27	2.26	2.28	2.270	2.33	2.18	2.18	2.230
4	3.82	2.19	2.18	2.17	2.180	2.17	2.24	2.46	2.290
Center	5.91	2.05	2.07	2.07	2.063	2.17	2.11	2.08	2.120
5	8.00	2.13	2.22	2.12	2.157	2.30	2.44	2.18	2.307
6	9.52	2.21	2.28	2.17	2.220	2.30	2.30	2.17	2.257
7	10.57	2.20	2.18	2.23	2.203	2.20	2.32	2.14	2.220
8	11.31	2.12	2.29	2.27	2.227	2.28	2.10	2.27	2.217
Averages ---------->		2.187	2.199	2.212	2.199	2.232	2.224	2.189	2.215

All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	2.21		Mean	2.20	2.22	2.21
Min Point	2.06	-6.5%	Std. Dev.	0.07	0.07	0.07
Max Point	2.31	4.5%	COV as %	3.3	3.3	**3.2**

Avg. Conc. 2.222 ppm

Gas analyzer checked:
6/1/2009
XYY 6/5/09

	Start	Finish	
Tracer tank pressure	300	300	psig
Stack Temp	92.5	90	Fº
Center Pt. air vel.	1310	1420.0	fpm
Injection flowmeter	59	59	sccm
			XYY 6/5/09
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	985.00	983.00	in Hg
Ambient humidity	36	33	RH
B&K vapor correction	Y	Y	Y/N
Back-Gd gas ppb	19, 13, 5, 2	15, 13, 15, 12	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	85.1	86.9	



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	6/30/2009
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes: The meter on the regulator is not functioning properly, i.e., needle can be moved to any location. So the pressure reading for the tank is not reflecting pressure inside.

Entries made by: Xia-Ying Yu
Signature/date *on file with original* 6/5/2009

Technical Data Review performed by: Ernest Antonio
Signature/date Signature on File 7 July 2010
TI-RPP-WTP678

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LB-C2 Model**	Run No.	**GT-11**
Date	6/5/2009	Fan Configuration	**A Only**
Testers	MSP, XYY	Fan Setting	**35 Hz**
Stack Dia.	11.781 in.	Stack Temp	91.25 deg F
Stack X-Area	109.0 $in.^2$	Start/End Time	1450 / 1605
Test Port	2	Center 2/3 from	1.08 to: 10.70
Distance to disturbance	160 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**A Center**

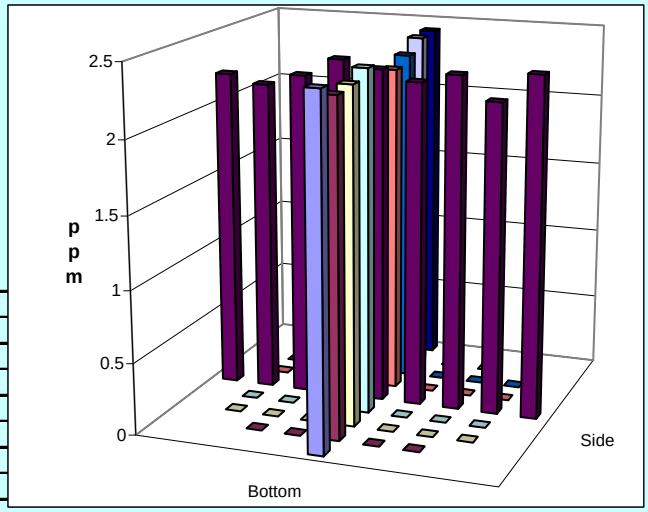
Order -->		1st				2nd			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.38	2.43	2.40	2.26	2.363	2.21	2.25	2.41	2.290
2	1.24	2.10	2.30	2.09	2.163	2.34	2.16	2.11	2.203
3	2.29	2.22	2.47	2.29	2.327	2.21	2.17	2.28	2.220
4	3.82	2.23	2.30	2.25	2.260	2.22	2.35	2.26	2.277
Center	5.91	2.41	2.20	2.38	2.330	2.16	2.26	2.25	2.223
5	8.00	2.38	2.23	2.53	2.380	2.14	2.08	2.31	2.177
6	9.52	2.27	2.14	2.35	2.253	2.35	2.08	2.25	2.227
7	10.57	2.13	2.23	2.16	2.173	2.24	2.08	2.59	2.303
8	11.31	2.51	2.10	2.08	2.230	2.25	2.33	2.36	2.313
Averages ---------->		2.298	2.263	2.266	2.276	2.236	2.196	2.313	2.248

All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	2.26		Mean	2.27	2.23	2.25
Min Point	2.16	-4.4%	Std. Dev.	0.08	0.04	0.07
Max Point	2.38	5.2%	COV as %	3.6	1.9	**2.9**

Avg. Conc. 2.260 ppm

Gas analyzer checked:
6/1/2009
XYY 6/5/09

	Start	Finish	
Tracer tank pressure	300	300	psig
Stack Temp	90	92.5	Fº
Center Pt. air vel.	1420	1300.0	fpm
Injection flowmeter	59	59	sccm
			XYY 6/5/09
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	983.00	981.00	in Hg
Ambient humidity	33	32	RH
B&K vapor correction	Y	Y	Y/N
Back-Gd gas ppb	6, 9, 3, 2	19, 24, 15, 15	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	86.9	87.8	



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	6/30/2009
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes: Damper on Fan B is closed, A is fully open.

Entries made by: Xiao-Ying Yu
Signature/date *on file with original* 6/5/2009

Technical Data Review performed by: Ernest Antonio
Signature/date Signature on File 8 July 2010
TI-RPP-WTP678

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06	Site	**LB-C2 Model**	Run No.	**GT-12**	
	Date	6/8/2009	Fan Configuration	**A & B**	
	Testers	JAG, JEF	Fan Setting	**35**	**Hz**
	Stack Dia.	11.781 in.	Stack Temp	85.1	deg F
	Stack X-Area	109.0 $in.^2$	Start/End Time	14:05 / 15:54	
	Test Port	2	Center 2/3 from	1.08	to: 10.70
	Distance to disturbance	160 inches	Points in Center 2/3	2	to: 7
	Measurement units	ppm SF6	Injection Point	**A Center**	

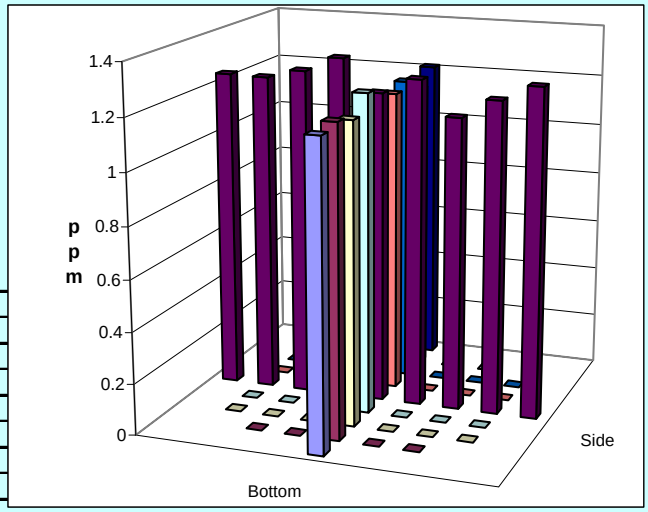
		Side				Bottom			
Order -->		2nd				1st			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.38	1.28	1.17	1.28	1.243	1.12	1.22	1.20	1.180
2	1.24	1.15	1.15	1.25	1.183	1.20	1.22	1.17	1.197
3	2.29	1.11	1.04	1.18	1.110	1.15	1.22	1.15	1.173
4	3.82	1.31	1.28	1.13	1.240	1.15	1.24	1.34	1.243
Center	5.91	1.15	1.19	1.20	1.180	1.22	1.19	1.23	1.214
5	8.00	1.28	1.26	1.36	1.300	1.24	1.17	1.14	1.183
6	9.52	1.16	1.33	1.24	1.243	1.16	1.21	1.24	1.203
7	10.57	1.25	1.18	1.20	1.210	1.13	1.12	1.19	1.147
8	11.31	1.23	1.28	1.13	1.213	1.28	1.16	1.19	1.210
Averages ---------->		1.213	1.209	1.219	1.214	1.183	1.194	1.206	1.195

All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1.20		Mean	1.21	1.19	1.20
Min Point	1.11	-7.8%	Std. Dev.	0.06	0.03	0.05
Max Point	1.30	8.0%	COV as %	5.0	2.6	**3.9**

Avg. Conc. 1.205 ppm

Gas analyzer checked:
6/8/2009
JAG 6/8/09

	Start	Finish	
Tracer tank pressure	300	300	psig
Stack Temp	84.5	85.7	F°
Center Pt. air vel.	2660	2640.0	fpm
Injection flowmeter	59	59	sccm
			JAG 6/8/09
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	989.00	989.00	in Hg
Ambient humidity	35	30	RH
B&K vapor correction	Y	Y	Y/N
Back-Gd gas ppb	15,11,4,4	8,11,3,5	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	79.7	83.3	



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	6/30/2009
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes: Before starting readings, gas analyzer response seemed slow. Joints were checked and sampling lines were flushed. Then, response was quick (1-minute).

Entries made by:	John Glissmeyer	Technical Data Review performed by:	Ernest Antonio
Signature/date	*on file with original* 6/8/2009	Signature/date	Signature on File 8 July 2010
			TI-RPP-WTP678

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LB-C2 Model**	Run No.	**GT-13**
Date	6/8/2009	Fan Configuration	**A On, B damper closed**
Testers	JAG, JEF	Fan Setting	**35 Hz**
Stack Dia.	11.813 in.	Stack Temp	85 deg F
Stack X-Area	109.6 $in.^2$	Start/End Time	1600 / 1710
Test Port	3	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	100 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**A Center**

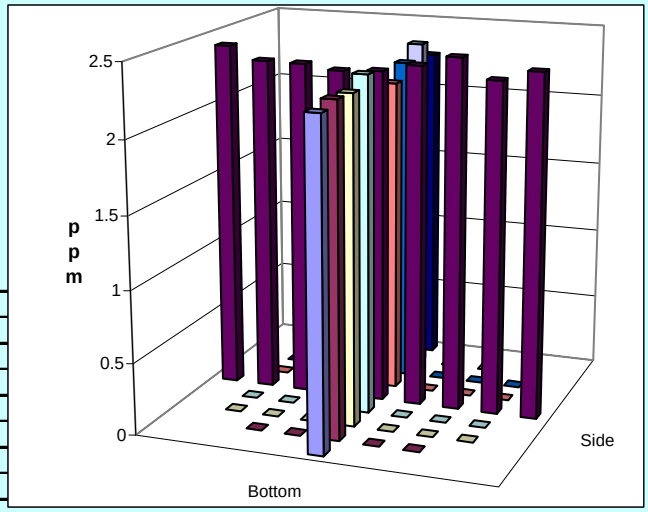
Order -->	1st				2nd			
Traverse-->	Side				Bottom			
Trial ---->	1	2	3	Mean	1	2	3	Mean
Point / Depth, in.	ppm				ppm			
1 / 0.38	2.41	2.26	2.32	2.330	2.25	2.37	2.12	2.247
2 / 1.24	2.34	2.28	2.15	2.257	2.25	2.30	2.29	2.280
3 / 2.29	2.32	2.48	2.37	2.390	2.41	2.08	2.32	2.270
4 / 3.82	2.45	2.14	2.37	2.320	2.32	2.34	2.37	2.343
Center / 5.91	2.35	2.25	2.20	2.267	2.39	2.25	2.31	2.317
5 / 8.00	2.14	2.29	2.33	2.253	2.29	2.13	2.14	2.187
6 / 9.52	2.38	2.37	2.10	2.283	2.29	2.25	2.30	2.280
7 / 10.57	2.26	2.26	2.34	2.287	2.54	2.31	2.26	2.370
8 / 11.31	2.57	2.25	2.30	2.373	2.25	2.09	2.41	2.250
Averages ---------->	2.358	2.287	2.276	2.307	2.332	2.236	2.280	2.283

All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	2.29		Mean	2.29	2.29	2.29
Min Point	2.19	-4.7%	Std. Dev.	0.05	0.06	0.05
Max Point	2.39	4.2%	COV as %	2.1	2.6	**2.3**

Avg. Conc. 2.295 ppm

Gas analyzer checked:
6/8/2009
JAG 6/8/09

	Start	Finish	
Tracer tank pressure	300	300	psig
Stack Temp	85	85	F°
Center Pt. air vel.	1350	1330.0	fpm
Injection flowmeter	59	59	sccm
			JAG 6/8/09
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	989.00	989.00	in Hg
Ambient humidity	30	29	RH
B&K vapor correction	Y	Y	Y/N
Back-Gd gas ppb	7, 7, 9, 7	14, 13, 17, 8	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	82	82	



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	6/30/2009
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes:

Entries made by: John Glissmeyer
Signature/date *on file with original* 6/8/2009

Technical Data Review performed by: Ernest Antonio
Signature/date Signature on File 8 July 2010
TI-RPP-WTP678

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LB-C2 Model**	Run No.	**GT-14**
Date	6/9/2009	Fan Configuration	**A on (B damper closed)**
Testers	JAG, JEF	Fan Setting	**35 Hz**
Stack Dia.	11.813 in.	Stack Temp	76.55 deg F
Stack X-Area	109.6 in.^{2}	Start/End Time	0950 / 1050
Test Port	3	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	100 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**A Center**

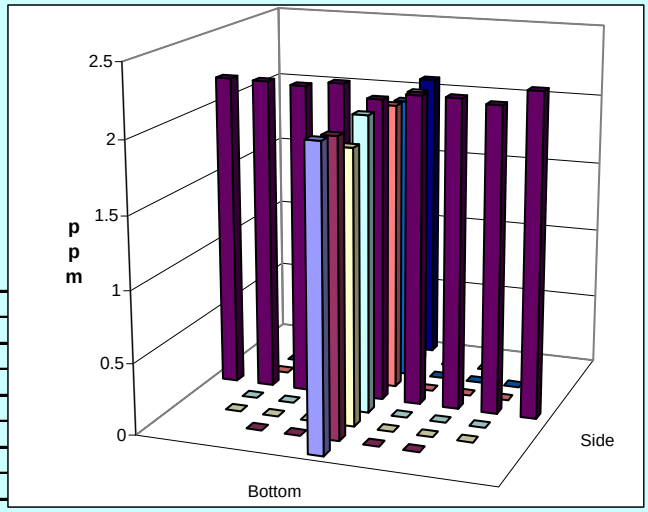
Order -->		2nd				1st				
Traverse-->		Side				Bottom				
Trial ---->		1	2	3	Mean	1	2	3	Mean	
Point	Depth, in.	ppm				ppm				
1	0.38	2.27	2.05	2.14	2.153	1.95	1.96	2.31	2.073	
2	1.24	1.97	2.12	2.05	2.047	2.10	1.97	2.07	2.047	
3	2.29	2.01	2.07	2.14	2.073	1.95	1.88	1.91	1.913	
4	3.82	2.02	2.21	1.99	2.073	2.08	2.12	2.02	2.073	
Center	5.91	1.94	2.02	2.13	2.030	2.20	2.15	2.03	2.127	
5	8.00	2.23	2.03	2.09	2.117	1.90	2.13	2.07	2.033	
6	9.52	2.07	2.07	2.11	2.083	1.86	2.02	2.15	2.010	
7	10.57	2.21	1.95	2.13	2.097	1.94	1.94	2.19	2.023	
8	11.31	2.19	2.09	2.02	2.100	2.03	2.15	2.02	2.067	
Averages ---------->		2.101	2.068	2.089	2.086	2.001	2.036	2.086	2.041	

All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	2.06		Mean	2.07	2.03	2.05
Min Point	1.91	-7.3%	Std. Dev.	0.03	0.07	0.05
Max Point	2.15	4.4%	COV as %	1.4	3.2	**2.6**

Avg. Conc. 2.061 ppm

Gas analyzer checked:
6/8/2009
JAG 6/9/09

	Start	Finish	
Tracer tank pressure	300	300	psig
Stack Temp	76.5	76.6	F°
Center Pt. air vel.	1350	1390.0	fpm
Injection flowmeter	59	59	sccm
			JAG 6/9/09
Sampling flowmeter	10	9	lpm Sierra
Ambient pressure	991.00	991.00	in Hg
Ambient humidity	40	37	RH
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	30, 34, 29, 35	44, 47, 49, 45	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	71	73	



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	6/30/2009
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes:

JAG 6/9/09

Entries made by: John Glissmeyer
Signature/date *on file with original* 6/9/2009

Technical Data Review performed by: Ernest Antonio
Signature/date Signature on File 8 July 2010
TI-RPP-WTP678

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06	Site	**LB-C2 Model**	Run No.	**GT-15**	
	Date	6/9/2009	Fan Configuration	**B on (A damper closed)**	
	Testers	JAG, JEF	Fan Setting	**35 Hz**	
	Stack Dia.	11.813 in.	Stack Temp	78.8 deg F	
	Stack X-Area	109.6 $in.^2$	Start/End Time	1105 / 11:50	
	Test Port	3	Center 2/3 from	1.08 to: 10.73	
	Distance to disturbance	100 inches	Points in Center 2/3	2 to: 7	
	Measurement units	ppm SF6	Injection Point	**B Center**	

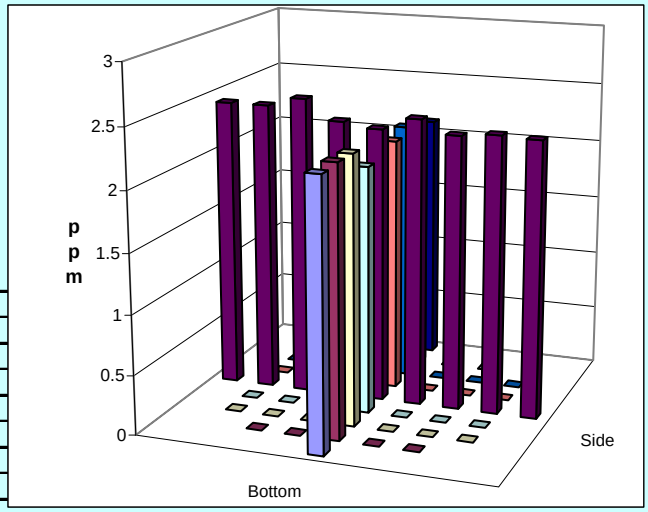
		Side				Bottom			
Order -->		1st				2nd			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.38	1.99	2.16	2.17	2.107	2.18	2.26	2.27	2.237
2	1.24	2.14	2.15	2.07	2.120	2.33	2.21	2.22	2.253
3	2.29	2.08	2.19	2.01	2.093	2.14	2.23	2.38	2.250
4	3.82	2.25	2.22	2.11	2.193	2.03	2.04	2.14	2.070
Center	5.91	2.17	2.00	2.12	2.097	2.32	2.36	2.24	2.307
5	8.00	2.20	2.05	2.15	2.133	1.98	2.23	2.21	2.140
6	9.52	2.29	2.21	2.35	2.283	2.16	2.16	2.25	2.190
7	10.57	2.17	2.12	2.35	2.213	2.21	2.02	2.29	2.173
8	11.31	2.27	2.19	2.18	2.213	2.29	2.06	1.97	2.107
Averages ---------->		2.173	2.143	2.168	2.161	2.182	2.174	2.219	2.192

All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	2.18		Mean	2.16	2.20	2.18
Min Point	2.07	-4.9%	Std. Dev.	0.07	0.08	0.07
Max Point	2.31	6.0%	COV as %	3.3	3.6	**3.4**

Avg. Conc. 2.174 ppm

Gas analyzer checked:
6/8/2009
JAG 6/9/09

	Start	Finish	
Tracer tank pressure	300	300	psig
Stack Temp	76.6	81	F°
Center Pt. air vel.	1260	1310.0	fpm
Injection flowmeter	59	59	sccm
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	991.00	991.00	in Hg
Ambient humidity	36	32	RH
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	34, 35, 33, 32	44, 48, 40, 42	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	74	77	



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	6/30/2009
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes:
JAG 6/9/09

Entries made by:	John Glissmeyer
Signature/date	*on file with original* 6/9/2009

Technical Data Review performed by:	Ernest Antonio
Signature/date	Signature on File 8 July 2010
	TI-RPP-WTP678

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LB-C2 Model**	Run No.	**GT-16**
Date	6/9/2009	Fan Configuration	**B only (A damper closed)**
Testers	DMT, JEF	Fan Setting	**35 Hz**
Stack Dia.	11.781 in.	Stack Temp	87 deg F
Stack X-Area	109.0 $in.^2$	Start/End Time	1315 / 1405
Test Port	2	Center 2/3 from	1.08 to: 10.70
Distance to disturbance	160 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**B Center**

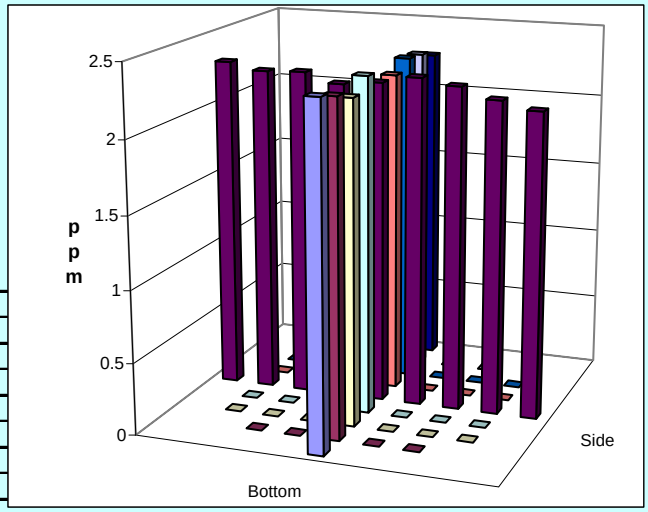
Order -->	1st				2nd			
Traverse-->	Side				Bottom			
Trial ---->	1	2	3	Mean	1	2	3	Mean
Point / Depth, in.	ppm				ppm			
1 / 0.38	1.77	2.23	2.26	2.087	2.30	2.46	2.28	2.347
2 / 1.24	1.97	2.20	2.25	2.140	2.21	2.25	2.44	2.300
3 / 2.29	2.13	2.23	2.28	2.213	2.21	2.35	2.16	2.240
4 / 3.82	2.18	2.21	2.37	2.253	2.45	2.31	2.24	2.333
Center / 5.91	2.14	2.25	2.22	2.203	2.28	2.21	2.23	2.240
5 / 8.00	2.19	2.22	2.12	2.177	2.28	2.26	2.19	2.243
6 / 9.52	2.26	2.21	2.25	2.240	2.29	2.30	2.35	2.313
7 / 10.57	2.31	2.27	2.11	2.230	2.32	2.28	2.29	2.297
8 / 11.31	2.32	2.28	2.23	2.277	2.42	2.11	2.21	2.247
Averages ---------->	2.141	2.233	2.232	2.202	2.307	2.281	2.266	2.284

All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	2.24		Mean	2.21	2.28	2.24
Min Point	2.09	-7.0%	Std. Dev.	0.04	0.04	0.05
Max Point	2.35	4.6%	COV as %	1.8	1.7	**2.4**

Avg. Conc. 2.246 ppm

Gas analyzer checked:
6/8/2009
JEF 6/9/09

	Start	Finish	
Tracer tank pressure	350	350	psig
Stack Temp	87	87	Fº
Center Pt. air vel.	1290	1300.0	fpm
Injection flowmeter	59	59	sccm
			JEF 6/9/09
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	990.00	989.00	in Hg
Ambient humidity	29	29	RH
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	42, 44, 42, 43	47, 47, 47, 42	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	80.6	82.4	



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	6/30/2009
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes:

JEF 6/9/09

Entries made by: Julia Flaherty
Signature/date *on file with original* 6/9/2009

Technical Data Review performed by: Ernest Antonio
Signature/date Signature on File 8 July 2010
TI-RPP-WTP678

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LB-C2 Model**	Run No.	**GT-17**
Date	6/9/2009	Fan Configuration	**B Only (A damper closed)**
Testers	DMT, JEF	Fan Setting	**35 Hz**
Stack Dia.	11.875 in.	Stack Temp	87.8 deg F
Stack X-Area	110.8 $in.^2$	Start/End Time	1407 / 1455
Test Port	1	Center 2/3 from	1.09 to: 10.79
Distance to disturbance	220.5 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**B Center**

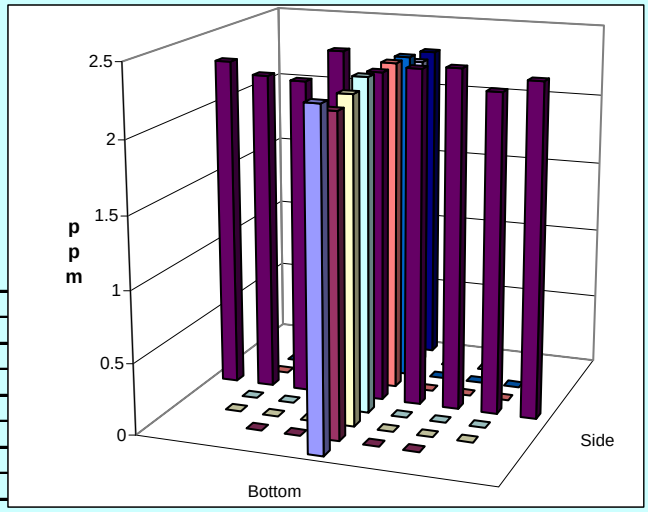
Order -->		1st				2nd			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.38	2.27	2.32	2.22	2.270	2.30	2.29	2.33	2.307
2	1.24	2.13	2.27	2.15	2.183	2.28	2.12	2.22	2.207
3	2.29	2.26	2.24	2.46	2.320	2.23	2.21	2.35	2.263
4	3.82	2.24	2.29	2.37	2.300	2.28	2.41	2.29	2.327
Center	5.91	2.22	2.21	2.35	2.260	2.27	2.42	2.24	2.310
5	8.00	2.35	2.39	2.41	2.383	2.32	2.30	2.36	2.327
6	9.52	2.21	2.12	2.17	2.167	2.21	2.31	2.45	2.323
7	10.57	2.19	2.23	2.14	2.187	2.23	2.30	2.20	2.243
8	11.31	2.24	2.34	2.22	2.267	2.29	2.27	2.25	2.270
Averages ---------->		2.234	2.268	2.277	2.260	2.268	2.292	2.299	2.286

All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	2.27		Mean	2.26	2.29	2.27
Min Point	2.17	-4.7%	Std. Dev.	0.08	0.05	0.07
Max Point	2.38	4.9%	COV as %	3.6	2.1	**2.9**

Avg. Conc. 2.271 ppm

Gas analyzer checked:
6/8/2009
JEF 6/9/09

	Start	Finish	
Tracer tank pressure	350	350	psig
Stack Temp	87	88.6	F°
Center Pt. air vel.	1300	1270.0	fpm
Injection flowmeter	59	59	sccm
			JEF 6/9/09
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	989.00	988.00	in Hg
Ambient humidity	29	29	RH
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	47, 47, 47, 42	45, 44, 44, 40	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	82.4	83.3	



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	6/30/2009
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes:

JEF 6/9/09

Entries made by: Julia Flaherty
Signature/date *on file with original* 6/9/2009

Technical Data Review performed by: Ernest Antonio
Signature/date Signature on File 8 July 2010
TI-RPP-WTP678

Rev. 0

TRACER GAS TRAVERSE DATA FORM

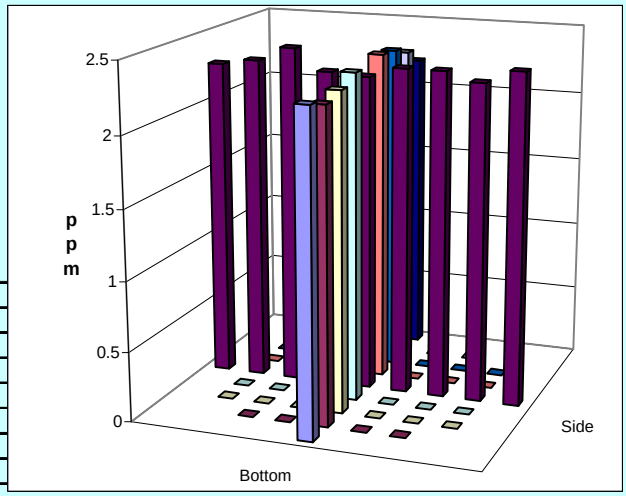
31-Jul-06	Site	**LB-C2 Model**		Run No.	**GT-18**				
	Date	6/9/2009		Fan Configuration	**B Only (A damper closed)**				
	Testers	DMT, JEF		Fan Setting	**35**	**Hz**			
	Stack Dia.	11.875 in.		Stack Temp	89.5	deg F			
	Stack X-Area	110.8 in.^{2}		Start/End Time	1456 / 1542				
	Test Port	1		Center 2/3 from	1.09	to:	10.79		
	Distance to disturbance	220.5 inches		Points in Center 2/3	2	to:	7		
	Measurement units	ppm SF6		Injection Point	**B Center**				
Order -->		2nd			1st				
Traverse-->		Side			Bottom				
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.38	2.23	2.51	2.29	2.343	2.34	2.26	2.24	2.280
2	1.24	2.29	2.21	2.25	2.250	2.25	2.20	2.24	2.230
3	2.29	2.37	2.28	2.29	2.313	2.22	2.31	2.29	2.273
4	3.82	2.36	2.32	2.26	2.313	2.36	2.33	2.34	2.343
Center	5.91	2.16	2.28	2.28	2.240	2.27	2.24	2.29	2.267
5	8.00	2.20	2.30	2.27	2.257	2.42	2.39	2.32	2.377
6	9.52	2.58	2.35	2.29	2.407	2.25	2.37	2.46	2.360
7	10.57	2.32	2.31	2.28	2.303	2.28	2.10	2.53	2.303
8	11.31	2.13	2.32	2.34	2.263	2.19	2.13	2.27	2.197
Averages --------->		2.293	2.320	2.283	2.299	2.287	2.259	2.331	2.292

All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	2.30		Mean	2.30	2.31	2.30
Min Point	2.20	-4.3%	Std. Dev.	0.06	0.05	0.05
Max Point	2.41	4.8%	COV as %	2.5	2.4	**2.3**

Avg. Conc. 2.301 ppm

Gas analyzer checked:
6/8/2009
JEF 6/9/09

	Start	Finish	
Tracer tank pressure	350	350	psig
Stack Temp	88.6	90.4	F°
Center Pt. air vel.	1270	1260.0	fpm
Injection flowmeter	59	59	sccm
			DMT 6/9/09
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	988.00	988.00	in Hg
Ambient humidity	29	27	RH
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	45, 44, 44, 49	47, 40, 38, 38	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	83.3	84.2	



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	6/30/2009
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes:

DMT 6/9/09

Entries made by: Donna Trott
Signature/date *on file with original* 6/9/2009

Technical Data Review performed by: Ernest Antonio
Signature/date Signature on File 8 July 2010
TI-RPP-WTP678

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LB-C2 Model**	Run No.	**GT-19**
Date	6/9/2009	Fan Configuration	**B only (A Damper Closed)**
Testers	DMT, JEF	Fan Setting	**35 Hz**
Stack Dia.	11.875 in.	Stack Temp	90.3 deg F
Stack X-Area	110.8 $in.^2$	Start/End Time	1542 / 1620
Test Port	1	Center 2/3 from	1.09 to: 10.79
Distance to disturbance	220.5 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**B Center**

Order -->	1st				2nd			
Traverse-->	Side				Bottom			
Trial ---->	1	2	3	Mean	1	2	3	Mean
Point / Depth, in.	ppm				ppm			
1 / 0.38	2.39	2.36	2.20	2.317	2.59	2.26	2.34	2.397
2 / 1.24	2.31	2.33	2.26	2.300	2.18	2.16	2.27	2.203
3 / 2.29	2.29	2.29	2.31	2.297	2.40	2.21	2.36	2.323
4 / 3.82	2.30	2.20	2.40	2.300	2.41	2.43	2.19	2.343
Center / 5.91	2.44	2.30	2.24	2.327	2.26	2.42	2.33	2.337
5 / 8.00	2.37	2.40	2.34	2.370	2.12	2.30	2.45	2.290
6 / 9.52	2.38	2.16	2.40	2.313	2.47	2.49	2.42	2.460
7 / 10.57	2.23	2.23	2.33	2.263	2.32	2.31	2.44	2.357
8 / 11.31	2.28	2.30	2.41	2.330	2.17	2.25	2.35	2.257
Averages ---------->	2.332	2.286	2.321	2.313	2.324	2.314	2.350	2.330

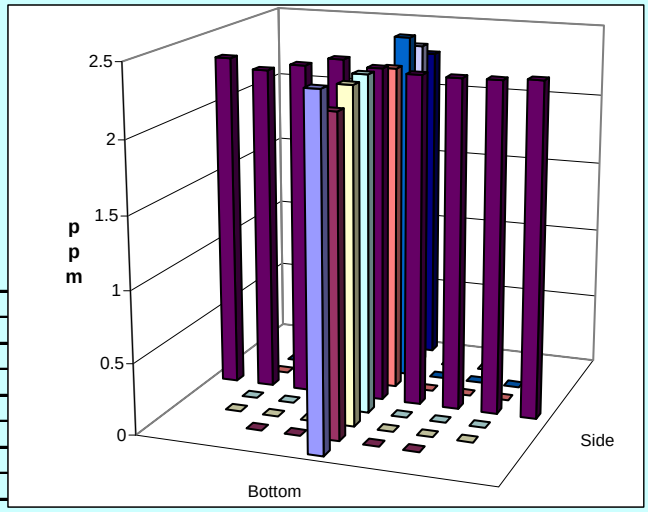
All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	2.32		Mean	2.31	2.33	2.32
Min Point	2.20	-5.1%	Std. Dev.	0.03	0.08	0.06
Max Point	2.46	6.0%	COV as %	1.4	3.3	**2.5**

Avg. Conc. 2.320 ppm

Gas analyzer checked:
6/8/2009

DMT 6/9/09

	Start	Finish	
Tracer tank pressure	350	350	psig
Stack Temp	90.4	90.2	Fº
Center Pt. air vel.	1260	1260.0	fpm
Injection flowmeter	59	59	sccm
			DMT 6/9/09
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	988.00	987.00	in Hg
Ambient humidity	27	25	RH
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	48, 40, 38, 38	42, 41, 46, 46	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	84.2	85.1	



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	6/30/2009
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes:

DMT 6/9/09

Entries made by: Donna Trott
Signature/date *on file with original* 6/9/2009

Technical Data Review performed by: Ernest Antonio
Signature/date Signature on File 8 July 2010
TI-RPP-WTP678

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	LB-C2 Model	Run No.	GT-20
Date	6/16/2009	Fan Configuration	A & B
Testers	DMT, JEF	Fan Setting	35 Hz
Stack Dia.	11.781 in.	Stack Temp	84.8 deg F
Stack X-Area	109.0 in.^{2}	Start/End Time	1010 / 1110
Test Port	2	Center 2/3 from	1.08 to: 10.70
Distance to disturbance	160 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	B Center

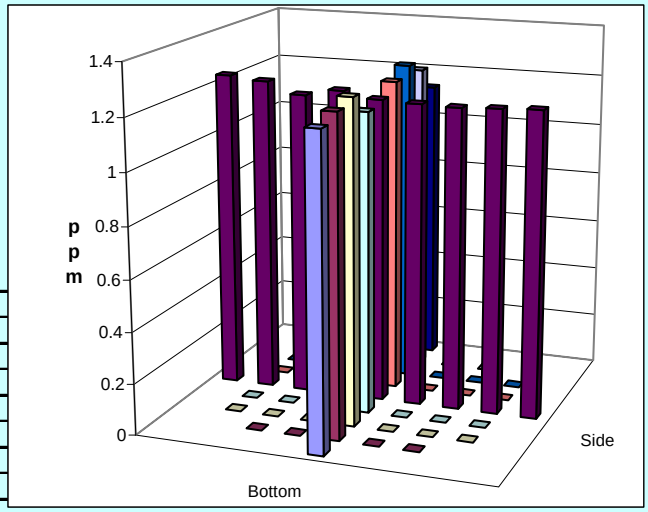
Order -->		1st				2nd			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.38	1.16	1.18	1.24	1.193	1.14	1.14	1.30	1.193
2	1.24	1.15	1.16	1.25	1.187	1.20	1.21	1.26	1.223
3	2.29	1.23	1.22	1.09	1.180	1.27	1.15	1.32	1.247
4	3.82	1.22	1.11	1.22	1.183	1.13	1.16	1.20	1.163
Center	5.91	1.24	1.16	1.17	1.190	1.20	1.15	1.19	1.180
5	8.00	1.18	1.20	1.26	1.213	1.22	1.26	1.18	1.220
6	9.52	1.24	1.23	1.09	1.187	1.18	1.36	1.23	1.257
7	10.57	1.23	1.21	1.25	1.230	1.17	1.21	1.26	1.213
8	11.31	1.24	1.27	1.22	1.243	1.12	1.12	1.11	1.117
Averages ---------->		1.210	1.193	1.199	1.201	1.181	1.196	1.228	1.201

All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1.20		Mean	1.20	1.21	1.21
Min Point	1.12	-7.0%	Std. Dev.	0.02	0.03	0.03
Max Point	1.26	4.6%	COV as %	1.6	2.8	**2.3**

Avg. Conc. 1.203 ppm

Gas analyzer checked:
6/15/2009
DMT 6/16/09

	Start	Finish	
Tracer tank pressure	400	400	psig
Stack Temp	83	86.6	F°
Center Pt. air vel.	2700	2810.0	fpm
Injection flowmeter	59	59	sccm
			DMT 6/19/09
Sampling flowmeter	10	9.5	lpm Sierra
Ambient pressure	992.00	991.00	in Hg
Ambient humidity	33	30	RH
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	40, 36, 37, 34	44, 41, 41, 37	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	80.6	84.2	



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	6/30/2009
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes: Upon start-up, gas analyzer "pump failure" msg repeatedly shown. Resolved, but don't know why. (JEF 6/16/09)

Lost flow at side trial 1 point 7. Remeasured.

New/replaced flow regulator on SF6 tank - adjusted. (DMT 6/16/09)

Entries made by: Donna Trott
Signature/date *on file with original* 6/16/2009

Technical Data Review performed by: Ernest Antonio
Signature/date Signature on File 8 July 2010
TI-RPP-WTP678

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LB-C2 Model**	Run No.	**GT-21**
Date	6/19/2009	Fan Configuration	**A & B**
Testers	JEF, DMT	Fan Setting	**35 Hz**
Stack Dia.	11.781 in.	Stack Temp	86.6 deg F
Stack X-Area	109.0 $in.^2$	Start/End Time	1115 / 1200
Test Port	2	Center 2/3 from	1.08 to: 10.70
Distance to disturbance	160 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**B Near**

Order -->		2nd				1st				
Traverse-->		Side				Bottom				
Trial ---->		1	2	3	Mean	1	2	3	Mean	
Point	Depth, in.	ppm				ppm				
1	0.38	1.27	1.29	1.08	1.213	1.02	1.24	1.21	1.157	
2	1.24	1.35	1.31	1.09	1.250	1.25	1.20	1.32	1.257	
3	2.29	1.16	1.31	1.11	1.193	1.24	1.17	1.30	1.237	
4	3.82	1.18	1.11	1.14	1.143	1.24	1.14	1.13	1.170	
Center	5.91	1.22	1.29	1.30	1.270	1.25	1.30	1.19	1.247	
5	8.00	1.14	1.29	1.12	1.183	1.12	1.24	1.17	1.177	
6	9.52	1.27	1.18	1.23	1.227	1.26	1.25	1.23	1.247	
7	10.57	1.27	1.18	1.12	1.190	1.17	1.36	1.10	1.210	
8	11.31	1.17	1.10	1.14	1.137	1.11	1.24	1.32	1.223	
Averages ---------->		1.226	1.229	1.148	1.201	1.184	1.238	1.219	1.214	

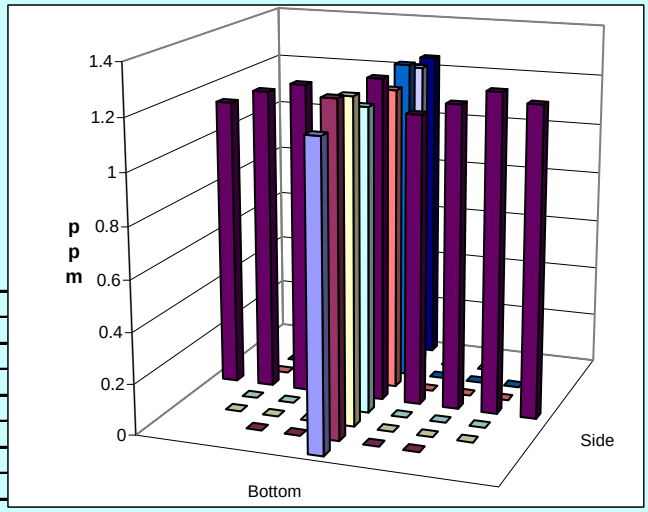
All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1.21		Mean	1.21	1.22	1.21
Min Point	1.14	-5.8%	Std. Dev.	0.04	0.04	0.04
Max Point	1.27	5.2%	COV as %	3.6	2.9	**3.2**

Avg. Conc. 1.201 ppm

Gas analyzer checked:
6/15/2009

JEF 6/16/09

	Start	Finish	
Tracer tank pressure	400	400	psig
Stack Temp	86.6	86.6	F°
Center Pt. air vel.	2810	2760.0	fpm
Injection flowmeter	59	59	sccm
			JEF 6/16/09
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	991.00	991.00	in Hg
Ambient humidity	30	29	RH
B&K vapor correction	N	M	Y/N
Back-Gd gas ppb	44, 41, 41, 37	39, 37, 42, 43	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	84.2	84.2	



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	6/30/2009
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes:

JEF 6/16/09

Entries made by:	Julia Flaherty
Signature/date	*on file with original* 6/16/2009

Technical Data Review performed by:	Ernest Antonio
Signature/date	Signature on File 8 July 2010
	TI-RPP-WTP678

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LB-C2 Model**	Run No.	**GT-22**
Date	6/16/2009	Fan Configuration	**A & B**
Testers	DMT, XYY	Fan Setting	**35 Hz**
Stack Dia.	11.781 in.	Stack Temp	95.15 deg F
Stack X-Area	109.0 in.^{2}	Start/End Time	1335 / 1445
Test Port	2	Center 2/3 from	1.08 to: 10.70
Distance to disturbance	160 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**B Far**

Order -->		1st				2nd			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.38	1.23	1.48	1.30	1.337	1.36	1.36	1.16	1.293
2	1.24	1.29	1.24	1.34	1.290	1.07	1.29	1.27	1.210
3	2.29	1.26	1.46	1.24	1.320	1.25	1.32	1.26	1.277
4	3.82	1.33	1.36	1.32	1.337	1.23	1.36	1.22	1.270
Center	5.91	1.23	1.19	1.14	1.187	1.12	1.38	1.26	1.253
5	8.00	1.19	1.06	1.36	1.203	1.36	1.25	1.09	1.233
6	9.52	1.13	1.15	1.28	1.187	1.12	1.14	1.30	1.187
7	10.57	1.20	1.47	1.14	1.270	1.41	1.15	1.19	1.250
8	11.31	1.13	1.24	1.32	1.230	1.22	1.26	1.22	1.233
Averages ---------->		1.221	1.294	1.271	1.262	1.238	1.279	1.219	1.245

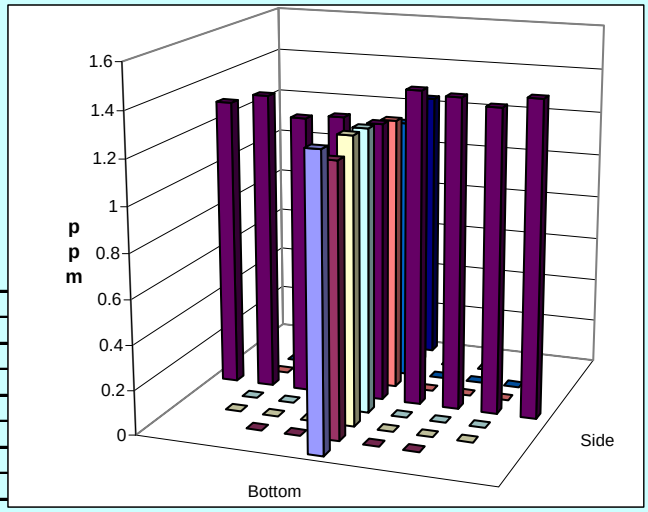
All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1.25		Mean	1.26	1.24	1.25
Min Point	1.19	-5.3%	Std. Dev.	0.06	0.03	0.05
Max Point	1.34	6.6%	COV as %	5.1	2.6	**3.9**

Avg. Conc. 1.258 ppm

Gas analyzer checked:
6/15/2009

XYY 6/16/09

	Start	Finish	
Tracer tank pressure	400	400	psig
Stack Temp	95.3	95	F°
Center Pt. air vel.	2530	2450.0	fpm
Injection flowmeter	59	59	sccm
			XYY 6/16/09
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	990.00	989.00	in Hg
Ambient humidity	27	25	RH
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	33, 35, 31, 29	43, 42, 40, 41	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	86.9	89.6	



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	6/30/2009
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes: XYY 6/16/09
Secondary pressure gauge is ____
that affects the flowmeter i.e. flowmeter drops below 59.
Main valve was not closed when starting experiment.
It should be shut off when done.

Entries made by: Xiao-Ying Yu
Signature/date *on file with original* 6/16/2009

Technical Data Review performed by: Ernest Antonio
Signature/date Signature on File 8 July 2010
TI-RPP-WTP678

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06	Site	**LB-C2 Model**	Run No.	**GT-23**	
	Date	6/16/2009	Fan Configuration	**A & B**	
	Testers	DMT, XYY	Fan Setting	**35**	**Hz**
	Stack Dia.	11.781 in.	Stack Temp	94.65	deg F
	Stack X-Area	109.0 $in.^2$	Start/End Time	1450 / 1550	
	Test Port	2	Center 2/3 from	1.08 to:	10.70
	Distance to disturbance	160 inches	Points in Center 2/3	2 to:	7
	Measurement units	ppm SF6	Injection Point	**A Far**	

		Side				Bottom			
Order -->		2nd				1st			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.38	1.25	1.21	1.24	1.233	1.23	1.32	1.08	1.210
2	1.24	1.38	1.06	1.25	1.230	1.35	1.21	1.12	1.227
3	2.29	1.27	1.19	1.24	1.233	1.24	1.12	1.15	1.170
4	3.82	1.43	1.09	1.34	1.287	1.06	1.38	1.25	1.230
Center	5.91	1.22	1.16	1.20	1.193	1.40	1.24	1.40	1.347
5	8.00	1.28	1.35	1.18	1.270	1.28	1.12	1.10	1.167
6	9.52	1.09	1.31	1.26	1.220	1.36	1.11	1.18	1.217
7	10.57	1.32	1.27	1.38	1.323	1.27	1.25	1.27	1.263
8	11.31	1.33	1.21	1.14	1.227	1.38	1.04	1.18	1.200
Averages ---------->		1.286	1.206	1.248	1.246	1.286	1.199	1.192	1.226

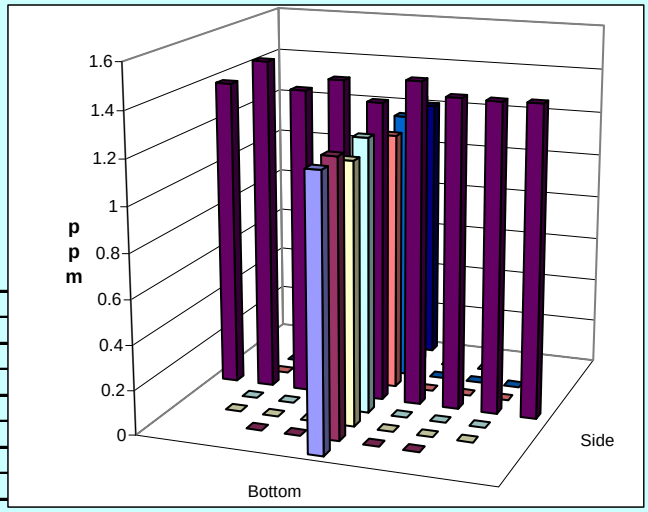
All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1.24		Mean	1.25	1.23	1.24
Min Point	1.17	-5.6%	Std. Dev.	0.04	0.06	0.05
Max Point	1.35	9.0%	COV as %	3.6	5.0	**4.2**

Avg. Conc. 1.232 ppm

Gas analyzer checked:
6/15/2009

XYY 6/16/09

	Start	Finish	
Tracer tank pressure	400	400	psig
Stack Temp	96.5	92.8	Fº
Center Pt. air vel.	2730	2790.0	fpm
Injection flowmeter	59	59	sccm
			XYY 6/16/09
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	989.00	988.00	in Hg
Ambient humidity	25	23	RH
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	35, 35, 33, 37	42, 45, 40, 39	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	90.5	90.5	



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	6/30/2009
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes: XYY 6/16/19
The gas may be close to the end. Need to watch the 2nd gauge and open the main valve a lot. 2nd gauge is set ~9-10 psi.

Entries made by:	Xiao-Ying Yu	Technical Data Review performed by:	Ernest Antonio
Signature/date	*on file with original* 6/16/2009	Signature/date	Signature on File 8 July 2010
			TI-RPP-WTP678

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LB-C2 Model**	Run No.	**GT-24**
Date	6/17/2009	Fan Configuration	**A & B**
Testers	DMT, JEF	Fan Setting	**35 Hz**
Stack Dia.	11.781 in.	Stack Temp	91.55 deg F
Stack X-Area	109.0 $in.^2$	Start/End Time	1330 / 1425
Test Port	2	Center 2/3 from	1.08 to: 10.70
Distance to disturbance	160 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**A Far**

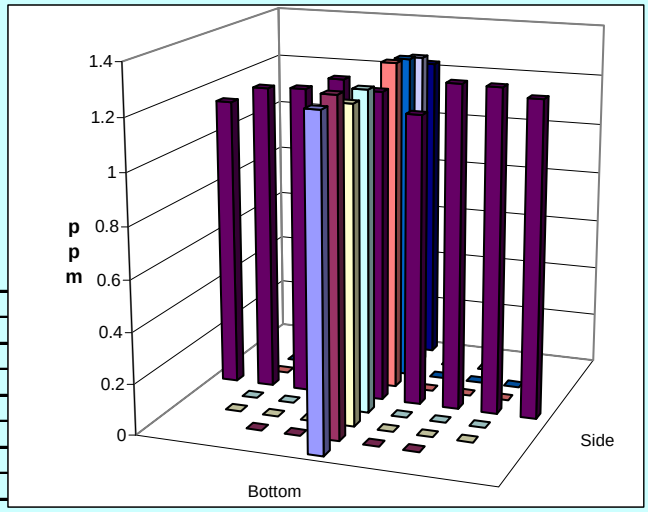
Order -->		1st				2nd			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.38	1.21	1.25	1.20	1.220	1.19	1.31	1.31	1.270
2	1.24	1.21	1.31	1.24	1.253	1.49	1.16	1.23	1.293
3	2.29	1.15	1.32	1.30	1.257	1.23	1.21	1.26	1.233
4	3.82	1.18	1.15	1.06	1.130	1.31	1.31	1.15	1.257
Center	5.91	1.08	1.30	1.24	1.207	1.22	1.11	1.33	1.220
5	8.00	1.32	1.28	1.13	1.243	1.50	1.16	1.25	1.303
6	9.52	1.40	1.11	1.08	1.197	1.17	1.10	1.61	1.293
7	10.57	1.15	1.28	1.14	1.190	1.33	1.09	1.40	1.273
8	11.31	1.22	1.09	1.07	1.127	1.18	1.20	1.29	1.223
Averages ---------->		1.213	1.232	1.162	1.203	1.291	1.183	1.315	1.263

All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1.23		Mean	1.21	1.27	1.24
Min Point	1.13	-8.6%	Std. Dev.	0.04	0.03	0.05
Max Point	1.30	5.7%	COV as %	3.7	2.5	**3.8**

Avg. Conc. 1.235 ppm

Gas analyzer checked:
6/15/2009
JEF 6/17/09

	Start	Finish	
Tracer tank pressure	400	400	psig
Stack Temp	92.8	90.3	F°
Center Pt. air vel.	2620	2620.0	fpm
Injection flowmeter	59	59	sccm
			JEF 6/17/09
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	990.00	990.00	in Hg
Ambient humidity	28	27	RH
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	81, 76, 77, 60	49, 42, 42, 40	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	85.1	85.1	



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	6/30/2009
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes:

JEF 6/17/09

Entries made by:	Julia Flaherty
Signature/date	*on file with original* 6/17/2009

Technical Data Review performed by:	Ernest Antonio
Signature/date	Signature on File 8 July 2010
	TI-RPP-WTP678

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	LB-C2 Model	Run No.	GT-25
Date	6/17/2009	Fan Configuration	A & B
Testers	DMT, JEF	Fan Setting	35 Hz
Stack Dia.	11.781 in.	Stack Temp	92.35 deg F
Stack X-Area	109.0 in.^{2}	Start/End Time	14:30 / 15:17
Test Port	2	Center 2/3 from	1.08 to: 10.70
Distance to disturbance	160 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	8 Center

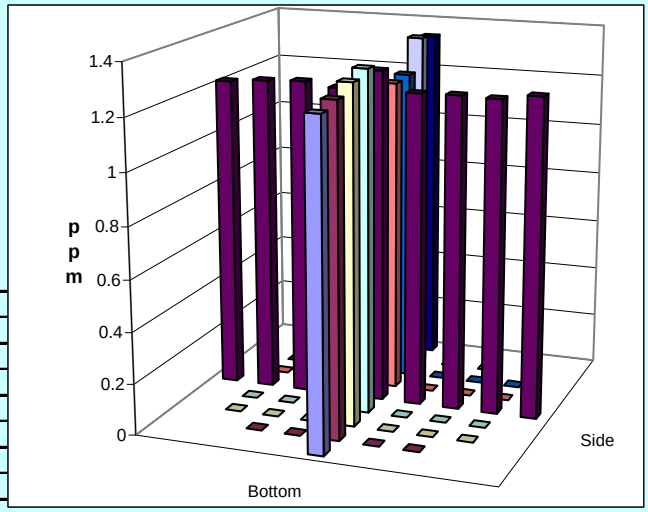
		Side				Bottom			
Order -->		2nd				1st			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.38	1.25	1.25	1.23	1.243	1.18	1.28	1.19	1.217
2	1.24	1.25	1.17	1.25	1.223	1.26	1.19	1.26	1.237
3	2.29	1.21	1.19	1.28	1.227	1.25	1.30	1.26	1.270
4	3.82	1.20	1.15	1.32	1.223	1.27	1.40	1.21	1.293
Center	5.91	1.41	1.29	1.20	1.300	1.16	1.37	1.25	1.260
5	8.00	1.16	1.27	1.24	1.223	1.12	1.22	1.22	1.187
6	9.52	1.24	1.16	1.32	1.240	1.14	1.32	1.12	1.193
7	10.57	1.23	1.31	1.16	1.233	1.42	1.23	1.28	1.310
8	11.31	1.18	1.23	1.25	1.220	1.40	1.18	1.30	1.293
Averages ---------->		1.237	1.224	1.250	1.237	1.244	1.277	1.232	1.251

All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1.24		Mean	1.24	1.25	1.24
Min Point	1.19	-4.6%	Std. Dev.	0.03	0.05	0.04
Max Point	1.31	5.3%	COV as %	2.2	3.8	**3.0**

Avg. Conc. 1.240 ppm

Gas analyzer checked:
6/15/2009
JEF 6/17/09

	Start	Finish	
Tracer tank pressure	400	400	psig
Stack Temp	90.3	94.4	F°
Center Pt. air vel.	2620	2700.0	fpm
Injection flowmeter	59	59	sccm
			JEF 6/17/09
Sampling flowmeter	10	9.5	lpm Sierra
Ambient pressure	990.00	990.00	in Hg
Ambient humidity	27	23	RH
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	49, 42, 42, 40	46, 38, 41, 37	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	85.1	88.7	



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	6/30/2009
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes:

JEF 6/17/09

Entries made by: Julia Flaherty
Signature/date *on file with original* 6/17/2009

Technical Data Review performed by: Ernest Antonio
Signature/date Signature on File 8 July 2010
TI-RPP-WTP678

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LB-C2 Model**	Run No.	**GT-26**
Date	6/17/2009	Fan Configuration	**A & B**
Testers	JEF, DMT	Fan Setting	**35 Hz**
Stack Dia.	11.781 in.	Stack Temp	90.95 deg F
Stack X-Area	109.0 $in.^2$	Start/End Time	15:20 / 16:05
Test Port	2	Center 2/3 from	1.08 to: 10.70
Distance to disturbance	19.5 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**6 Center**

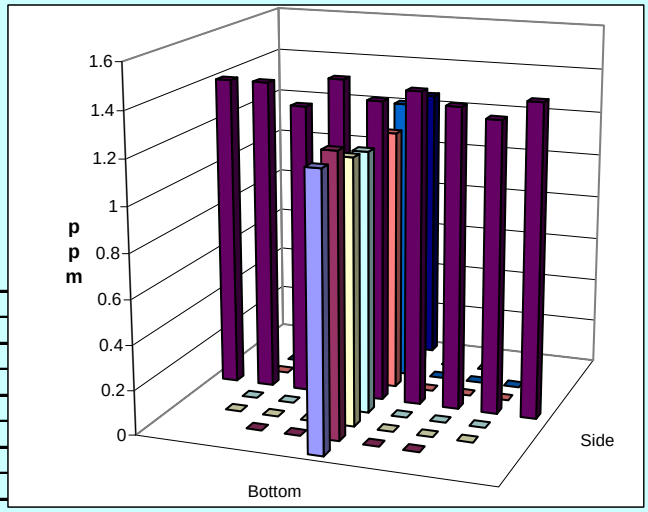
Order -->		1st				2nd			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	1.21	1.17	1.46	1.280	1.21	1.29	1.15	1.217
2	1.39	1.36	1.09	1.15	1.200	1.11	1.33	1.31	1.250
3	2.57	1.15	1.19	1.38	1.240	1.11	1.23	1.21	1.183
4	4.28	1.27	1.30	1.30	1.290	1.16	1.14	1.21	1.170
Center	6.63	1.32	1.19	1.21	1.240	1.37	1.34	1.35	1.353
5	8.97	1.31	1.26	1.38	1.317	1.15	1.13	1.25	1.177
6	10.68	1.18	1.11	1.30	1.197	1.29	1.32	1.21	1.273
7	11.86	1.28	1.29	1.28	1.283	1.30	1.14	1.31	1.250
8	12.75	1.29	1.25	1.31	1.283	1.25	1.26	1.23	1.247
Averages ---------->		1.263	1.206	1.308	1.259	1.217	1.242	1.248	1.236

All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1.25		Mean	1.25	1.24	1.24
Min Point	1.17	-6.2%	Std. Dev.	0.05	0.07	0.06
Max Point	1.35	8.5%	COV as %	3.7	5.3	**4.4**

Avg. Conc. 1.241 ppm

Gas analyzer checked:
6/15/2009
JEF 6/17/09

	Start	Finish	
Tracer tank pressure	400	400	psig
Stack Temp	90.3	91.6	Fº
Center Pt. air vel.	2620	2700.0	fpm
Injection flowmeter	59	59	sccm
			JEF 6/17/09
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	990.00	990.00	in Hg
Ambient humidity	23	25	RH
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	46, 38, 41, 37	42, 39, 39, 36	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	88.7	86	



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	6/30/2009
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes:

JEF 6/17/09

Entries made by: Julia Flaherty
Signature/date *on file with original* 6/17/2009

Technical Data Review performed by: Ernest Antonio
Signature/date Signature on File 28 July 2010
TI-RPP-WTP678

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LB-C2 Model**	Run No.	**GT-27**
Date	6/19/2009	Fan Configuration	**A & B**
Testers	JEF, VRM	Fan Setting	**35** **Hz**
Stack Dia.	11.781 in.	Stack Temp	82.25 deg F
Stack X-Area	109.0 $in.^2$	Start/End Time	10:54 / 12:00
Test Port	2	Center 2/3 from	1.08 to: 10.70
Distance to disturbance	160 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**7 Center**

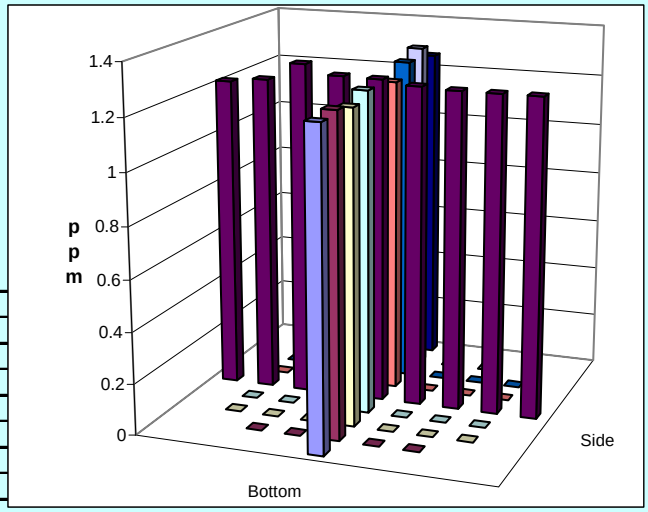
Order -->		2nd				1st				
Traverse-->		Side				Bottom				
Trial ---->		1	2	3	Mean	1	2	3	Mean	
Point	Depth, in.	ppm				ppm				
1	0.38	1.14	1.21	1.38	1.243	1.18	1.26	1.20	1.213	
2	1.24	1.28	1.13	1.32	1.243	1.19	1.31	1.18	1.227	
3	2.29	1.23	1.19	1.31	1.243	1.22	1.18	1.22	1.207	
4	3.82	1.17	1.36	1.22	1.250	1.24	1.20	1.28	1.240	
Center	5.91	1.29	1.32	1.19	1.267	1.29	1.22	1.25	1.253	
5	8.00	1.27	1.23	1.31	1.270	1.31	1.23	1.11	1.217	
6	9.52	1.26	1.34	1.32	1.307	1.29	1.31	1.20	1.267	
7	10.57	1.27	1.18	1.26	1.237	1.27	1.31	1.31	1.297	
8	11.31	1.25	1.22	1.19	1.220	1.21	1.28	1.24	1.243	
Averages ---------->		1.240	1.242	1.278	1.253	1.244	1.256	1.221	1.240	

All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1.25		Mean	1.26	1.24	1.25
Min Point	1.21	-3.2%	Std. Dev.	0.02	0.03	0.03
Max Point	1.31	4.8%	COV as %	1.9	2.5	**2.2**

Avg. Conc. 1.245 ppm

Gas analyzer checked:
6/15/2009
VRM 6/19/09

	Start	Finish	
Tracer tank pressure	350	350	psig
Stack Temp	78.5	86	F°
Center Pt. air vel.	2880	2730.0	fpm
Injection flowmeter	59	59	sccm
	NA	NA	
Sampling flowmeter	10	9.7	lpm Sierra
Ambient pressure	988.00	988.00	in Hg
Ambient humidity	40	33	RH
B&K vapor correction	NA	NA	Y/N
Back-Gd gas ppb	42, 43, 39, 39	48, 45, 45, 37	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	77.9	82.4	



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	6/30/2009
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes: Pump failure notice when first turned on. Hit reset, and didn't hit any other button. Then was able to make measurements.

Entries made by:	Victor Morris	
Signature/date	*on file with original*	6/19/2009

Technical Data Review performed by:	Ernest Antonio
Signature/date	Signature on File 8 July 2010
	TI-RPP-WTP678

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LB-C2 Model**	Run No.	**GT-28**		
Date	6/19/2009	Fan Configuration	**A & B**		
Testers	DMT, XYY	Fan Setting	**35**	**Hz**	
Stack Dia.	11.781 in.	Stack Temp	82.65	deg F	
Stack X-Area	109.0 $in.^2$	Start/End Time	1328 / 1440		
Test Port	2	Center 2/3 from	1.08	to:	10.70
Distance to disturbance	160 inches	Points in Center 2/3	2	to:	7
Measurement units	ppm SF6	Injection Point	**4 Center**		

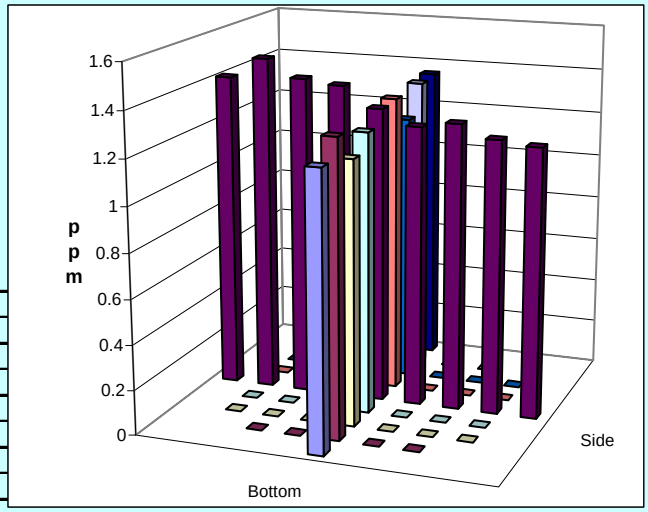
		Order -->	1st				2nd			
		Traverse-->	Side				Bottom			
		Trial ---->	1	2	3	Mean	1	2	3	Mean
Point	Depth, in.		ppm				ppm			
1	0.38		1.16	1.06	1.03	1.083	1.33	1.30	1.03	1.220
2	1.24		1.18	1.02	1.10	1.100	1.51	1.21	1.20	1.307
3	2.29		1.06	1.17	1.22	1.150	1.23	1.14	1.16	1.177
4	3.82		1.22	1.06	1.10	1.127	1.50	1.01	1.25	1.253
Center	5.91		1.21	1.14	1.21	1.187	1.28	1.31	1.37	1.320
5	8.00		1.28	1.06	1.46	1.267	1.33	1.34	1.32	1.330
6	9.52		1.17	1.29	1.39	1.283	1.05	1.52	1.04	1.203
7	10.57		1.40	1.41	1.25	1.353	1.41	1.30	1.30	1.337
8	11.31		1.17	1.24	1.40	1.270	1.06	1.32	1.67	1.350
Averages ---------->			1.206	1.161	1.240	1.202	1.300	1.272	1.260	1.277

All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1.24		Mean	1.21	1.28	1.24
Min Point	1.08	-12.6%	Std. Dev.	0.09	0.06	0.08
Max Point	1.35	9.2%	COV as %	7.7	5.1	**6.8**

Avg. Conc. 1.238 ppm

Gas analyzer checked:
6/15/2009
XYY 6/19/09

	Start	Finish	
Tracer tank pressure	350	350	psig
Stack Temp	83.1	82.2	Fº
Center Pt. air vel.	2440	2630.0	fpm
Injection flowmeter	59	59	sccm
	NA	NA	
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	987.00	987.00	in Hg
Ambient humidity	37	43	RH
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	42, 42, 40, 41	56, 52, 48, 46	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	77.9	77.9	



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305088	6/30/2009
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes: Determined distance b.t. top and bottom @ port 5 to be 29 cm, so the center point is 14.5 cm.
XYY 6/19/09

Entries made by:	Xiao-Ying Yu	Technical Data Review performed by:	Ernest Antonio
Signature/date	*on file with original* 6/19/2009	Signature/date	Signature on File 8 July 2010 TI-RPP-WTP678

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	LB-C2 Model	Run No.	GT-29
Date	6/19/2009	Fan Configuration	A & B
Testers	DMT, XYY	Fan Setting	35 Hz
Stack Dia.	11.781 in.	Stack Temp	83.15 deg F
Stack X-Area	109.0 in.^{2}	Start/End Time	1445 / 1535
Test Port	2	Center 2/3 from	1.08 to: 10.70
Distance to disturbance	160 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	5 Center

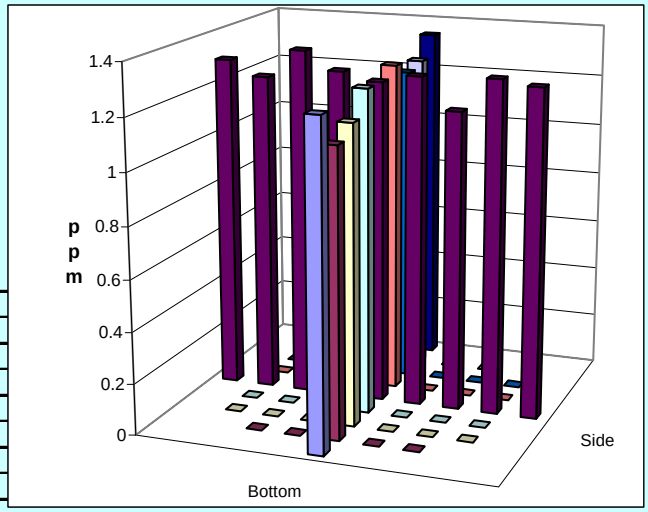
Order -->		2nd				1st				
Traverse-->		Side				Bottom				
Trial ---->		1	2	3	Mean	1	2	3	Mean	
Point	Depth, in.	ppm				ppm				
1	0.38	1.31	1.40	1.07	1.260	1.27	1.51	0.977	1.252	
2	1.24	1.30	1.20	1.34	1.280	1.10	1.09	1.15	1.113	
3	2.29	1.09	1.06	1.30	1.150	0.99	1.33	1.17	1.163	
4	3.82	1.45	1.27	1.09	1.270	1.02	1.48	1.28	1.260	
Center	5.91	1.15	1.28	1.29	1.240	1.28	1.29	1.20	1.257	
5	8.00	1.37	1.31	1.13	1.270	1.32	1.33	1.23	1.293	
6	9.52	1.32	1.37	1.33	1.340	1.15	1.13	1.44	1.240	
7	10.57	1.23	1.27	1.19	1.230	1.36	1.21	1.21	1.260	
8	11.31	1.42	1.22	1.22	1.287	1.28	1.14	1.60	1.340	
Averages ---------->		1.293	1.264	1.218	1.259	1.197	1.279	1.251	1.242	

All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1.25		Mean	1.25	1.23	1.24
Min Point	1.11	-11.0%	Std. Dev.	0.06	0.06	0.06
Max Point	1.34	7.2%	COV as %	4.6	5.2	**4.9**

Avg. Conc. 1.251 ppm

Gas analyzer checked:
6/15/2009
XYY 6/19/09

	Start	Finish	
Tracer tank pressure	350	350	psig
Stack Temp	83.1	83.2	F°
Center Pt. air vel.	2630	2450.0	fpm
Injection flowmeter	59	59	sccm
	NA	NA	
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	987.00	987.00	in Hg
Ambient humidity	38	32	RH
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	36, 38, 37, 41	45, 42, 45, 40	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	81.5	81.5	



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305088	6/30/2009
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes:

A newly calibrated TSI should be used for next week's testing.

Entries made by:	Xiao-Ying Yu	Technical Data Review performed by:	Ernest Antonio
Signature/date	*on file with original* 6/19/2009	Signature/date	Signature on File 8 July 2010
			TI-RPP-WTP678

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06	Site	**LB-C2 Model**	Run No.	**GT-30**	
	Date	6/19/2009	Fan Configuration	**A & B**	
	Testers	DMT, JEF	Fan Setting	**35**	**Hz**
	Stack Dia.	11.844 in.	Stack Temp	87.55	deg F
	Stack X-Area	110.2 $in.^2$	Start/End Time	1537 / 1700	
	Test Port	4	Center 2/3 from	1.09	to: 10.76
	Distance to disturbance	120 inches	Points in Center 2/3	2	to: 7
	Measurement units	ppm SF6	Injection Point	**A Center**	

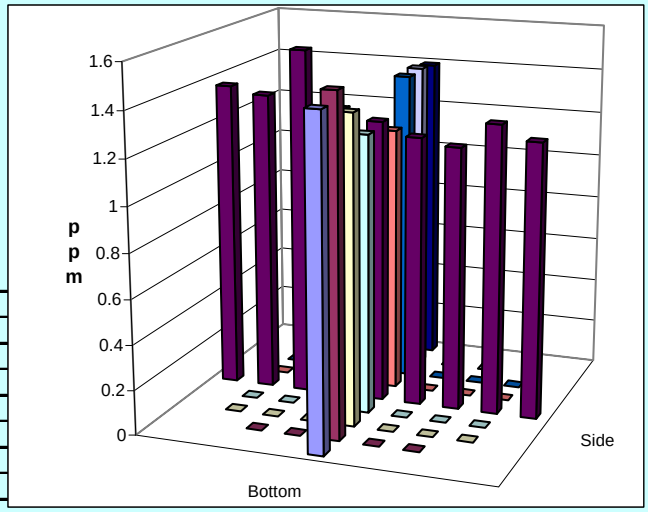
Order -->		2nd				1st			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.38	1.19	1.16	1.33	1.227	1.25	1.36	1.35	1.320
2	1.24	1.33	1.33	1.21	1.290	1.35	1.25	1.48	1.360
3	2.29	1.03	1.27	1.23	1.177	1.25	1.11	1.38	1.247
4	3.82	1.31	1.15	1.16	1.207	1.10	1.14	1.15	1.130
Center	5.91	1.31	1.23	1.25	1.263	1.36	0.983	1.10	1.148
5	8.00	1.38	1.22	1.32	1.307	1.01	1.14	1.09	1.080
6	9.52	1.62	1.49	1.55	1.553	1.15	1.29	1.37	1.270
7	10.57	1.35	1.08	1.60	1.343	1.14	1.41	1.28	1.277
8	11.31	1.40	1.34	1.38	1.373	1.24	1.20	1.35	1.263
Averages ---------->		1.324	1.252	1.337	1.304	1.206	1.209	1.283	1.233

All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1.27		Mean	1.31	1.22	1.26
Min Point	1.08	-14.9%	Std. Dev.	0.12	0.10	0.12
Max Point	1.55	22.4%	COV as %	9.4	8.1	**9.3**

Avg. Conc. 1.276 ppm

Gas analyzer checked:
6/15/2009
XYY 6/19/09

	Start	Finish	
Tracer tank pressure	350	350	psig
Stack Temp	89.4	85.7	F°
Center Pt. air vel.	2630	2700.0	fpm
Injection flowmeter	59	59	sccm
	NA	NA	
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	986.00	986.00	in Hg
Ambient humidity	23	25	RH
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	28, 36, 35, 36	49, 43, 35, 41	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	99.5	88.7	



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305088	6/30/2009
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes:

XYY 6/19/09

Entries made by:	Xiao-Ying Yu	Technical Data Review performed by:	Ernest Antonio
Signature/date	*on file with original* 6/19/2009	Signature/date	Signature on File 28 July 2010 TI-RPP-WTP678

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06	Site	**LB-C2 Model**	Run No. **GT-31**
	Date	6/22/2009	Fan Configuration **A & B**
	Testers	DMT, JEF	Fan Setting **35** **Hz**
	Stack Dia.	11.875 in.	Stack Temp 79.15 deg F
	Stack X-Area	110.8 $in.^2$	Start/End Time 14:20 / 15:10
	Test Port	8	Center 2/3 from 1.09 to: 10.79
	Distance to disturbance	4.5 inches	Points in Center 2/3 2 to: 7
	Measurement units	ppm SF6	Injection Point **A Center**

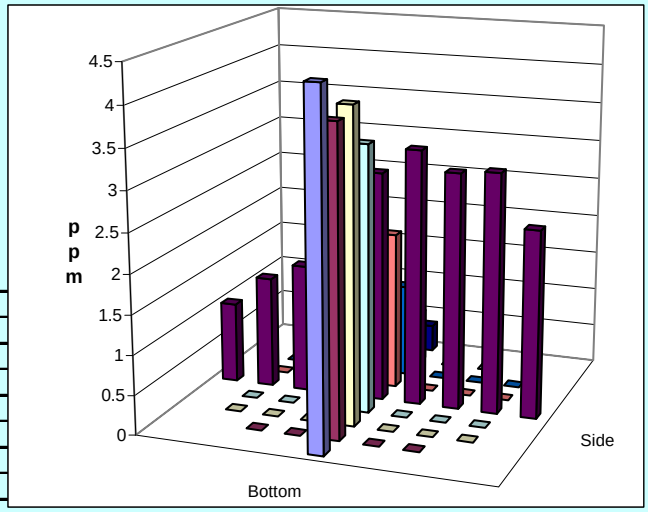
Order -->		2nd				1st				
Traverse-->		Side				Bottom				
Trial ---->		1	2	3	Mean	1	2	3	Mean	
Point	Depth, in.	ppm				ppm				
1	0.38	2.14	2.56	2.34	2.347	4.49	4.32	4.35	4.387	
2	1.24	2.84	3.13	3.02	2.997	3.75	3.91	3.91	3.857	
3	2.29	3.02	2.86	2.98	2.953	3.77	4.24	3.85	3.953	
4	3.82	2.94	3.31	3.33	3.193	2.95	3.85	3.35	3.383	
Center	5.91	2.84	2.81	2.97	2.873	2.77	3.00	2.98	2.917	
5	8.00	2.37	2.13	2.34	2.280	1.95	2.02	2.05	2.007	
6	9.52	1.68	1.47	1.67	1.607	1.26	1.08	1.20	1.180	
7	10.57	1.64	1.11	1.44	1.397	0.587	0.827	0.574	0.663	
8	11.31	0.922	1.08	1.04	1.014	0.424	0.243	0.363	0.343	
Averages ---------->		2.266	2.273	2.348	2.296	2.439	2.610	2.514	2.521	

All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	2.41		Mean	2.47	2.57	2.52
Min Point	0.34	-85.7%	Std. Dev.	0.72	1.31	1.02
Max Point	4.39	82.1%	COV as %	29.2	50.9	**40.3**

Avg. Conc. 2.348 ppm

Gas analyzer checked:
6/22/2009
JEF 6/22/09

	Start	Finish	
Tracer tank pressure	300	300	psig
Stack Temp	79.3	79	F°
Center Pt. air vel.	2610	2590.0	fpm
Injection flowmeter	59	59	sccm
	N/A	N/A	
Sampling flowmeter	10	9.5	lpm Sierra
Ambient pressure	997.00	997.00	in Hg
Ambient humidity	18	23	RH
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	36, 35, 35, 35	50, 56, 54, 58	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	94.1	79.7	



Instuments Used:

B&K 1302 Gas Analyzer SN 1788615	Cat2 MTE
TSI VelociCalc SN 209060	6/12/2009
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes:

JEF 6/22/09

Entries made by:	Julia Flaherty
Signature/date	*on file with original* 6/22/2009

Technical Data Review performed by:	Ernest Antonio
Signature/date	Signature on File 8 July 2010
	TI-RPP-WTP678

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LB-C2 Model**	Run No.	**GT-32**
Date	6/22/2009	Fan Configuration	**A & B**
Testers	DMT, JEF	Fan Setting	**35 Hz**
Stack Dia.	13.25 in.	Stack Temp	79.85 deg F
Stack X-Area	137.9 $in.^2$	Start/End Time	15:25 / 16:25
Test Port	6	Center 2/3 from	1.22 to: 12.03
Distance to disturbance	19.5 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**A Center**

Order -->		1st				2nd			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	0.122	0.127	0.122	0.124	1.610	1.250	1.390	1.417
2	1.39	0.0659	0.0694	0.0876	0.074	1.500	1.390	1.450	1.447
3	2.57	0.0802	0.0714	0.0863	0.079	1.080	1.480	0.958	1.173
4	4.28	0.176	0.150	0.158	0.161	0.802	0.698	0.719	0.740
Center	6.63	0.460	0.531	0.451	0.481	0.333	0.354	0.308	0.332
5	8.97	0.799	0.995	0.855	0.883	0.386	0.228	0.286	0.300
6	10.68	1.370	1.450	1.390	1.403	0.370	0.350	0.286	0.335
7	11.86	1.400	1.580	1.680	1.553	0.521	0.599	0.546	0.555
8	12.75	1.660	1.650	1.490	1.600	0.678	0.515	0.669	0.621
Averages ---------->		0.681	0.736	0.702	0.707	0.809	0.763	0.735	0.769

All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	0.74		Mean	0.66	0.70	0.68
Min Point	0.07	-89.9%	Std. Dev.	0.63	0.45	0.53
Max Point	1.60	116.9%	COV as %	94.7	65.0	**77.4**

Avg. Conc. 0.779 ppm

Gas analyzer checked:
6/22/2009

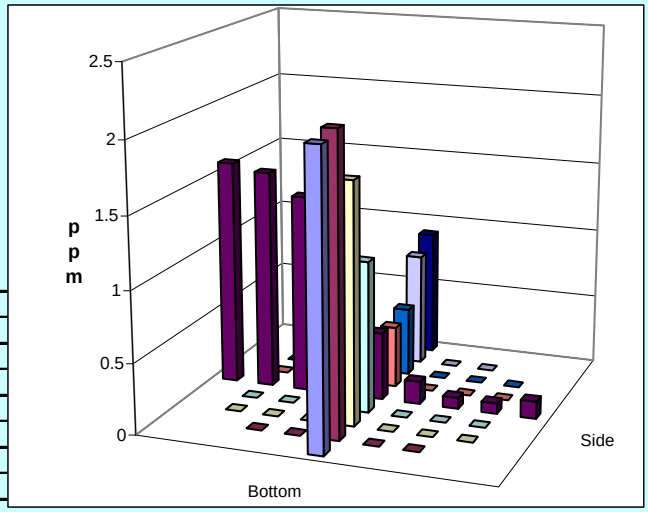
	Start	Finish	
Tracer tank pressure	300	300	psig
Stack Temp	79	80.7	Fº
Center Pt. air vel.	2590	2620.0	fpm
Injection flowmeter	59	59	sccm
	N/A	N/A	
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	997.00	997.00	in Hg
Ambient humidity	16	14	RH
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	50, 56, 54, 58	48, 48, 44, 38	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	104.0	113.0	

Instuments Used:

B&K 1302 Gas Analyzer SN 1788615	Cat2 MTE
TSI VelociCalc SN 209060	6/12/2009
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes: Halfway through bottom trial 3, the gas analyzer screen was filled with junk. (Most of the green "pixels" available were illuminated.) Was able to distinguish necessary data. May be heat related - 118 deg F.

JEF 6/22/09



Entries made by: Julia Flaherty
Signature/date *on file with original* 6/22/2009

Technical Data Review performed by: Ernest Antonio
Signature/date Signature on File 8 July 2010
TI-RPP-WTP678

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LB-C2 Model**	Run No.	**GT-33**
Date	6/23/2009	Fan Configuration	**A & B**
Testers	VRM, JEF	Fan Setting	**35 Hz**
Stack Dia.	13.281 in.	Stack Temp	74.8 deg F
Stack X-Area	138.5 in.^{2}	Start/End Time	09:30 / 10:50
Test Port	5	Center 2/3 from	1.22 to: 12.06
Distance to disturbance	3.625 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**A Center**

Order -->		2nd				1st				
Traverse-->		Side				Bottom				
Trial ---->		1	2	3	Mean	1	2	3	Mean	
Point	Depth, in.	ppm				ppm				
1	0.50	0.383	0.431	0.452	0.422	0.603	0.633	0.579	0.605	
2	1.39	0.324	0.360	0.378	0.354	0.593	0.558	0.547	0.566	
3	2.57	0.376	0.304	0.277	0.319	0.436	0.431	0.452	0.440	
4	4.28	0.292	0.288	0.266	0.282	0.412	0.402	0.422	0.412	
Center	6.63	0.335	0.299	0.278	0.304	0.398	0.360	0.424	0.394	
5	8.97	0.406	0.382	0.429	0.406	0.339	0.451	0.424	0.405	
6	10.68	0.557	0.550	0.534	0.547	0.461	0.462	0.388	0.437	
7	11.86	0.469	0.524	0.468	0.487	0.403	0.332	0.344	0.360	
8	12.75	0.438	0.424	0.429	0.430	0.287	0.303	0.226	0.272	
Averages ---------->		0.398	0.396	0.390	0.395	0.437	0.437	0.423	0.432	

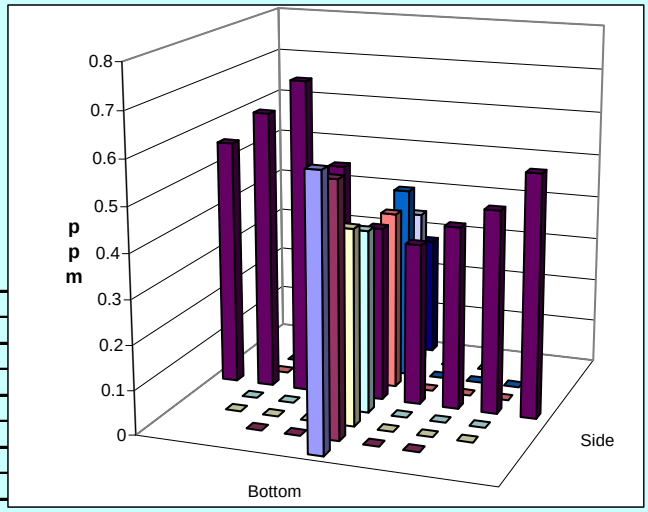
All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	0.41		Mean	0.39	0.43	0.41
Min Point	0.27	-34.2%	Std. Dev.	0.10	0.07	0.08
Max Point	0.61	46.4%	COV as %	25.8	15.2	**20.7**

Avg. Conc. 0.421 ppm

Gas analyzer checked:
6/22/2009

JEF 6/23/09

	Start	Finish	
Tracer tank pressure	300	300	psig
Stack Temp	72.8	76.8	F°
Center Pt. air vel.	2610	2590	fpm
Injection flowmeter	59	59	sccm
	N/A	N/A	
Sampling flowmeter	10	9.5	lpm Sierra
Ambient pressure	997.00	997.00	in Hg
Ambient humidity	35	33	RH
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	36, 31, 34, 35	33, 29, 36, 31	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	65.3	69.8	



Instuments Used:

B&K 1302 Gas Analyzer SN 1788615	Cat2 MTE
TSI VelociCalc SN 209060	6/12/2009
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes:

Entries made by: Julia Flaherty
Signature/date *on file with original* 6/23/2009

Technical Data Review performed by: Ernest Antonio
Signature/date Signature on File 28 July 2010
TI-RPP-WTP678

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06	Site	**LB-C2 Model**	Run No.	**GT-34**	
	Date	6/23/2009	Fan Configuration	**A & B**	
	Testers	VRM, JEF	Fan Setting	**35**	**Hz**
	Stack Dia.	11.969 in.	Stack Temp	78.65	deg F
	Stack X-Area	112.5 $in.^2$	Start/End Time	11:00 / 11:55	
	Test Port	7	Center 2/3 from	1.10	to: 10.87
	Distance to disturbance	5.25 inches	Points in Center 2/3	2	to: 7
	Measurement units	ppm SF6	Injection Point	**B Center**	

Order -->		2nd				1st				
Traverse-->		Side				Bottom				
Trial ---->		1	2	3	Mean	1	2	3	Mean	
Point	Depth, in.	ppm				ppm				
1	0.50	0.598	0.612	0.730	0.647	0.160	0.327	0.248	0.245	
2	1.26	0.508	0.438	0.528	0.491	0.160	0.211	0.175	0.182	
3	2.33	0.234	0.279	0.317	0.277	0.0815	0.125	0.108	0.105	
4	3.88	0.160	0.178	0.131	0.156	0.0924	0.0781	0.0636	0.078	
Center	6.00	0.214	0.173	0.148	0.178	0.0915	0.123	0.133	0.116	
5	8.12	0.441	0.429	0.379	0.416	0.299	0.321	0.316	0.312	
6	9.67	0.967	0.731	0.876	0.858	0.623	0.691	0.562	0.625	
7	10.74	1.210	1.190	1.270	1.223	1.230	1.150	1.230	1.203	
8	11.50	1.670	1.710	1.840	1.740	1.780	1.410	1.610	1.600	
Averages ---------->		0.667	0.638	0.691	0.665	0.502	0.493	0.494	0.496	

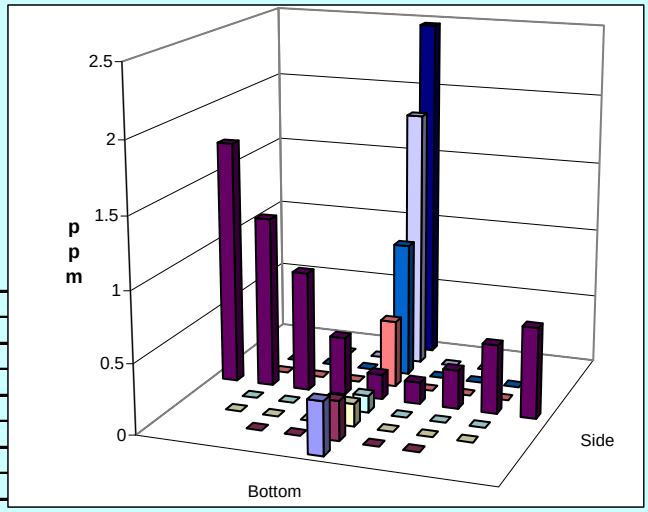
All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	0.58		Mean	0.51	0.37	0.44
Min Point	0.08	-86.6%	Std. Dev.	0.39	0.41	0.39
Max Point	1.74	199.6%	COV as %	76.5	110.0	**88.6**

Avg. Conc. 0.635 ppm

Gas analyzer checked:
6/22/2009

JEF 6/23/09

	Start	Finish	
Tracer tank pressure	300	300	psig
Stack Temp	76.8	80.5	F°
Center Pt. air vel.	2590	2560.0	fpm
Injection flowmeter	59	59	sccm
	N/A	N/A	
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	997.00	996.00	in Hg
Ambient humidity	31	26	RH
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	33, 29, 36, 31	33, 32, 34, 31	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	73.4	77.9	



Instuments Used:

B&K 1302 Gas Analyzer SN 1788615	Cat2 MTE
TSI VelociCalc SN 209060	6/12/2009
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes:

Entries made by: Victor Morris
Signature/date *on file with original* 6/23/2009

Technical Data Review performed by: Ernest Antonio
Signature/date Signature on File 28 July 2010
TI-RPP-WTP678

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06	Site	**LB-C2 Model**	Run No.	**GT-35**	
	Date	6/23/2009	Fan Configuration	**A & B**	
	Testers	VRM, DMT	Fan Setting	**35**	**Hz**
	Stack Dia.	11.781 in.	Stack Temp	85	deg F
	Stack X-Area	109.0 $in.^2$	Start/End Time	1408 / 1516	
	Test Port	2	Center 2/3 from	1.08	to: 10.70
	Distance to disturbance	160 inches	Points in Center 2/3	2	to: 7
	Measurement units	ppm SF6	Injection Point	**3 near wall**	

Order -->		2nd				1st				
Traverse-->		Side				Bottom				
Trial ---->		1	2	3	Mean	1	2	3	Mean	
Point	Depth, in.	ppm				ppm				
1	0.38	0.0422	0.0457	0.0633	0.050	0.0357	0.0337	0.0325	0.034	
2	1.24	0.0360	0.0441	0.0394	0.040	0.0316	0.0293	0.0285	0.030	
3	2.29	0.0336	0.0363	0.0334	0.034	0.0326	0.0337	0.0306	0.032	
4	3.82	0.0313	0.0370	0.0314	0.033	0.0359	0.0306	0.0338	0.033	
Center	5.91	0.0273	0.0392	0.0348	0.034	0.0336	0.0295	0.0330	0.032	
5	8.00	0.0308	0.0345	0.0325	0.033	0.0460	0.0367	0.0359	0.040	
6	9.52	0.0302	0.0351	0.0356	0.034	0.1210	0.0822	0.0637	0.089	
7	10.57	0.0314	0.0335	0.0326	0.033	0.1020	0.1090	0.0781	0.096	
8	11.31	0.0298	0.0367	0.0368	0.034	0.1940	0.1320	0.0906	0.139	
Averages ---------->		0.033	0.038	0.038	0.036	0.070	0.057	0.047	0.058	

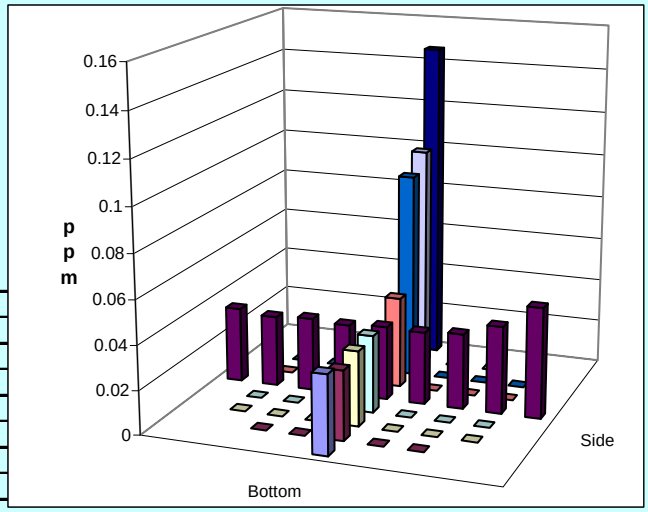
All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	0.05		Mean	0.03	0.05	0.04
Min Point	0.03	-36.9%	Std. Dev.	0.00	0.03	0.02
Max Point	0.14	194.0%	COV as %	7.4	57.9	**50.9**

Avg. Conc. 0.049 ppm

Gas analyzer checked:
6/22/2009

DMT 6/23/09

	Start	Finish	
Tracer tank pressure	375	375	psig
Stack Temp	82.4	87.6	F°
Center Pt. air vel.	2550	2570.0	fpm
Injection flowmeter	59	59	sccm
			DMT 6/23/09
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	995.00	994.00	in Hg
Ambient humidity	26	23	RH
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	30, 27, 29, 31	31, 32, 32, 28	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	80.6	83.3	



Instuments Used:

B&K 1302 Gas Analyzer SN 1788615	Cat2 MTE
TSI VelociCalc SN 209060	6/12/2009
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes: Flowmeter checked several times during all runs
DMT 6/23/09

Entries made by:	Donna Trott	
Signature/date	*on file with original*	6/23/2009

Technical Data Review performed by:	Ernest Antonio
Signature/date	Signature on File 8 July 2010
	TI-RPP-WTP678

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06	Site	**LB-C2 Model**	Run No.	**GT-36**	
	Date	6/23/2009	Fan Configuration	**A & B**	
	Testers	VRM, DMT	Fan Setting	**35**	**Hz**
	Stack Dia.	11.781 in.	Stack Temp	88.15	deg F
	Stack X-Area	109.0 $in.^2$	Start/End Time	15:27 / 16:11	
	Test Port	2	Center 2/3 from	1.08	to: 10.70
	Distance to disturbance	160 inches	Points in Center 2/3	2	to: 7
	Measurement units	ppm SF6	Injection Point	**4 near wall**	

Order -->		1st				2nd			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.38	0.0699	0.0607	0.0693	0.067	0.0978	0.0972	0.0839	0.093
2	1.24	0.0536	0.0534	0.0554	0.054	0.0944	0.0982	0.0598	0.084
3	2.29	0.0565	0.0554	0.0597	0.057	0.0919	0.0690	0.0567	0.073
4	3.82	0.0580	0.0658	0.0706	0.065	0.0770	0.0493	0.0538	0.060
Center	5.91	0.0643	0.0656	0.0800	0.070	0.0769	0.0690	0.0781	0.075
5	8.00	0.0789	0.0710	0.0629	0.071	0.0773	0.0691	0.0795	0.075
6	9.52	0.0694	0.0898	0.0939	0.084	0.0734	0.0755	0.0801	0.076
7	10.57	0.0683	0.0826	0.0967	0.083	0.0509	0.0758	0.0806	0.069
8	11.31	0.0784	0.0956	0.0756	0.083	0.0577	0.0829	0.0815	0.074
Averages ---------->		0.066	0.071	0.074	0.070	0.077	0.076	0.073	0.075

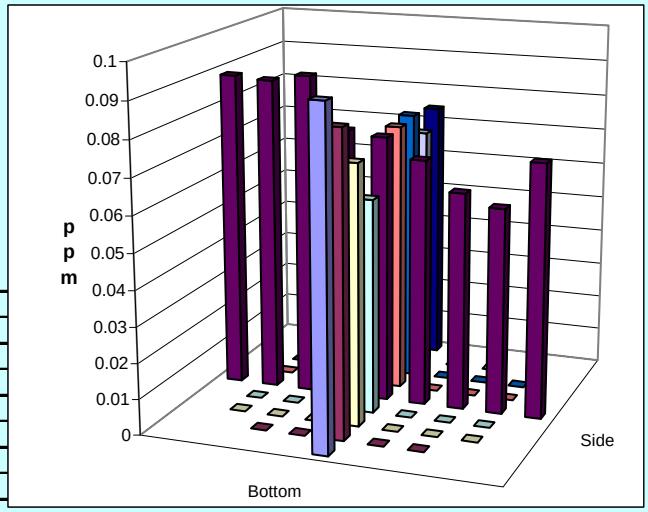
All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	0.07		Mean	0.07	0.07	0.07
Min Point	0.05	-25.8%	Std. Dev.	0.01	0.01	0.01
Max Point	0.09	27.5%	COV as %	16.7	10.1	**13.4**

Avg. Conc. 0.073 ppm

Gas analyzer checked:
6/22/2009

DMT 6/23/09

	Start	Finish	
Tracer tank pressure	390	390	psig
Stack Temp	87.6	88.7	F°
Center Pt. air vel.	2570	2670.0	fpm
Injection flowmeter	59	59	sccm
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	994.00	993.00	in Hg
Ambient humidity	23	22	RH
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	31, 32, 32, 28	38, 39, 32, 38	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	83.3	85.1	



Instuments Used:

B&K 1302 Gas Analyzer SN 1788615	Cat2 MTE
TSI VelociCalc SN 209060	6/12/2009
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes:

DMT 6/23/09

Entries made by:	Victor Morris	Technical Data Review performed by:	Ernest Antonio
Signature/date	*on file with original* 6/23/2009	Signature/date	Signature on File 8 July 2010
			TI-RPP-WTP678

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06	Site	**LB-C2 Model**	Run No. **GT-37**
	Date	6/24/2009	Fan Configuration **A & B**
	Testers	JEF, DMT	Fan Setting **35** **Hz**
	Stack Dia.	11.781 in.	Stack Temp 84.1 deg F
	Stack X-Area	109.0 $in.^2$	Start/End Time 0937 / 1027
	Test Port	2	Center 2/3 from 1.08 to: 10.70
	Distance to disturbance	160 inches	Points in Center 2/3 2 to: 7
	Measurement units	ppm SF6	Injection Point **5 near wall (side)**

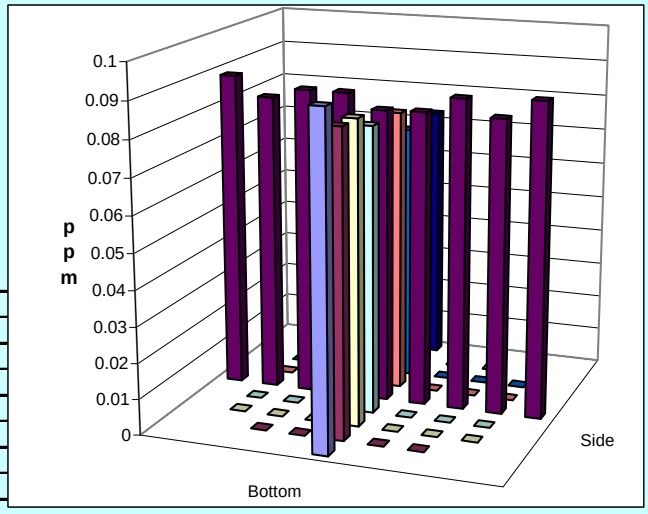
Order -->		2nd				1st				
Traverse-->		Side				Bottom				
Trial ---->		1	2	3	Mean	1	2	3	Mean	
Point	Depth, in.	ppm				ppm				
1	0.38	0.0618	0.0525	0.0616	0.059	0.1200	0.0768	0.0779	0.092	
2	1.24	0.0573	0.0520	0.0555	0.055	0.1050	0.0798	0.0682	0.084	
3	2.29	0.0651	0.0537	0.0553	0.058	0.0861	0.0905	0.0761	0.084	
4	3.82	0.0547	0.0525	0.0580	0.055	0.0977	0.0755	0.0670	0.080	
Center	5.91	0.0581	0.0536	0.0530	0.055	0.0952	0.0824	0.0686	0.082	
5	8.00	0.0568	0.0587	0.0574	0.058	0.0908	0.0819	0.0651	0.079	
6	9.52	0.0566	0.0576	0.0588	0.058	0.0886	0.0654	0.0627	0.072	
7	10.57	0.0540	0.0628	0.0505	0.056	0.0675	0.0611	0.0640	0.064	
8	11.31	0.0652	0.0575	0.0553	0.059	0.0877	0.0676	0.0628	0.073	
Averages ---------->		0.059	0.056	0.056	0.057	0.093	0.076	0.068	0.079	

All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	0.07		Mean	0.06	0.08	0.07
Min Point	0.05	-19.2%	Std. Dev.	0.00	0.01	0.01
Max Point	0.09	34.8%	COV as %	2.5	9.4	**18.4**

Avg. Conc. 0.068 ppm

Gas analyzer checked:
6/22/2009
JEF 6/24/09

	Start	Finish	
Tracer tank pressure	300	350	psig
Stack Temp	83.2	85	F°
Center Pt. air vel.	2510	2640.0	fpm
Injection flowmeter	59	59	sccm
	N/A	N/A	
Sampling flowmeter	10	9.5	lpm Sierra
Ambient pressure	989.00	989.00	in Hg
Ambient humidity	34	30	RH
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	36, 39, 41, 38	41, 36, 37, 36	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	75.2	79.7	



Instuments Used:

B&K 1302 Gas Analyzer SN 1788615	Cat2 MTE
TSI VelociCalc SN 209060	6/12/2009
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes:

JEF 6/24/09

Entries made by:	Julia Flaherty
Signature/date	*on file with original* 6/24/2009

Technical Data Review performed by:	Ernest Antonio
Signature/date	Signature on File 8 July 2010
	TI-RPP-WTP678

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06	Site	**LB-C2 Model**	Run No.	**GT-38**	
	Date	6/24/2009	Fan Configuration	**A & B**	
	Testers	DMT, JEF	Fan Setting	**35**	**Hz**
	Stack Dia.	11.875 in.	Stack Temp	87.4	deg F
	Stack X-Area	110.8 $in.^2$	Start/End Time	10:30 / 11:20	
	Test Port	1	Center 2/3 from	1.09	to: 10.79
	Distance to disturbance	220.5 inches	Points in Center 2/3	2	to: 7
	Measurement units	ppm SF6	Injection Point	**5 near wall (side)**	

		Side				Bottom			
Order -->		1st				2nd			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.38	0.193	0.134	0.136	0.154	0.132	0.108	0.122	0.121
2	1.24	0.164	0.174	0.134	0.157	0.135	0.111	0.121	0.122
3	2.29	0.174	0.126	0.134	0.145	0.123	0.118	0.109	0.117
4	3.82	0.156	0.158	0.140	0.151	0.123	0.108	0.122	0.118
Center	5.91	0.126	0.133	0.142	0.134	0.117	0.108	0.120	0.115
5	8.00	0.147	0.135	0.136	0.139	0.128	0.103	0.108	0.113
6	9.52	0.147	0.137	0.119	0.134	0.123	0.0964	0.103	0.107
7	10.57	0.162	0.121	0.141	0.141	0.109	0.102	0.0987	0.103
8	11.31	0.142	0.132	0.141	0.138	0.125	0.123	0.0998	0.116
Averages ---------->		0.157	0.139	0.136	0.144	0.124	0.109	0.112	0.115

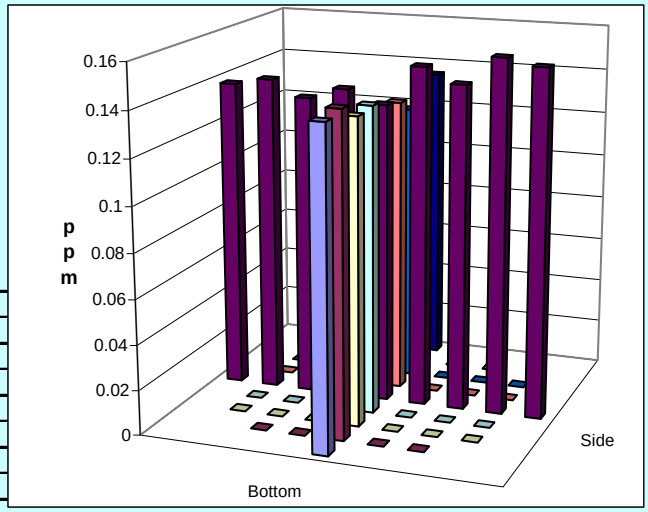
All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	0.13		Mean	0.14	0.11	0.13
Min Point	0.10	-20.1%	Std. Dev.	0.01	0.01	0.02
Max Point	0.16	21.7%	COV as %	6.1	5.7	**13.2**

Avg. Conc. 0.130 ppm

Gas analyzer checked:
6/22/2009

JEF 6/24/09

	Start	Finish	
Tracer tank pressure	350	390	psig
Stack Temp	85.0	89.8	Fº
Center Pt. air vel.	2640	2590	fpm
Injection flowmeter	100	77	sccm
	N/A	N/A	
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	989.00	989.00	in Hg
Ambient humidity	29	27	RH
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	41, 36, 37, 36	42, 40, 40 ,39	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	81.5	84.2	



Instuments Used:

B&K 1302 Gas Analyzer SN 1788615	Cat2 MTE
TSI VelociCalc SN 209060	6/12/2009
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes: At end of Bottom, Trial 2, noticed the flow controller delivering ~80 sccm. Regulator is max-ed out, so the controller can't deliver to set point.

Entries made by:	Julia Flaherty	Technical Data Review performed by:	Ernest Antonio
Signature/date	*on file with original* 6/24/2009	Signature/date	Signature on File 8 July 2010 TI-RPP-WTP678

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06	Site	**LB-C2 Model**	Run No.	**GT-39**	
	Date	6/25/2009	Fan Configuration	**A & B**	
	Testers	MSP, JEF	Fan Setting	**35**	**Hz**
	Stack Dia.	11.781 in.	Stack Temp	87.95	deg F
	Stack X-Area	109.0 $in.^2$	Start/End Time	13:30 / 14:38	
	Test Port	2	Center 2/3 from	1.08	to: 10.70
	Distance to disturbance	160 inches	Points in Center 2/3	2	to: 7
	Measurement units	ppm SF6	Injection Point	**5 near wall (side)**	

Order -->		2nd				1st				
Traverse-->		Side				Bottom				
Trial ---->		1	2	3	Mean	1	2	3	Mean	
Point	Depth, in.	ppm				ppm				
1	0.38	1.22	1.26	0.727	1.069	1.40	1.24	1.48	1.373	
2	1.24	1.14	0.722	1.10	0.987	1.07	0.944	1.44	1.151	
3	2.29	0.936	0.959	0.736	0.877	1.27	1.37	1.24	1.293	
4	3.82	1.04	1.33	0.963	1.111	1.20	1.42	1.07	1.230	
Center	5.91	1.15	1.25	1.36	1.253	1.32	1.32	1.06	1.233	
5	8.00	1.38	1.28	0.986	1.215	0.983	1.03	1.14	1.051	
6	9.52	1.26	1.59	1.65	1.500	1.01	1.03	1.31	1.117	
7	10.57	1.87	1.38	1.60	1.617	1.11	1.21	1.09	1.137	
8	11.31	1.44	0.879	1.14	1.153	0.599	1.15	0.773	0.841	
Averages ---------->		1.271	1.183	1.140	1.198	1.107	1.190	1.178	1.158	

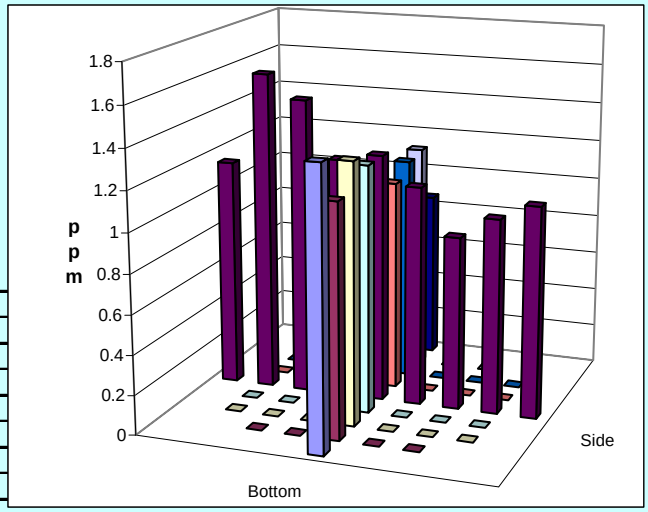
All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1.18		Mean	1.22	1.17	1.20
Min Point	0.84	-28.7%	Std. Dev.	0.26	0.08	0.19
Max Point	1.62	37.2%	COV as %	21.6	7.1	**15.9**

Avg. Conc. 1.170 ppm

Gas analyzer checked:
6/24/2009

JEF 6/25/09

	Start	Finish	
Tracer tank pressure	400	400	psig
Stack Temp	86.3	89.6	F°
Center Pt. air vel.	2530	2440.0	fpm
Injection flowmeter	59	59	sccm
	N/A	N/A	
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	996.00	996.00	in Hg
Ambient humidity	27	24	RH
B&K vapor correction	Y	Y	Y/N
Back-Gd gas ppb	5, 4, 6, 5	11, 13, 14, 11	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	82.4	84.2	



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 209060	6/12/2010
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes: Repeat Gt-37 after confirming instruments
provide correct output.
Comfirmed all dampers open.

Entries made by:	Julia Flaherty
Signature/date	*on file with original* 6/25/2009

Technical Data Review performed by:	Ernest Antonio
Signature/date	Signature on File 8 July 2010
	TI-RPP-WTP678

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06	Site	**LB-C2 Model**	Run No.	**GT-40**	
	Date	6/25/2009	Fan Configuration	**A & B**	
	Testers	MSP, JEF	Fan Setting	**35**	**Hz**
	Stack Dia.	11.875 in.	Stack Temp	89.15	deg F
	Stack X-Area	110.8 $in.^2$	Start/End Time	14:50 / 16:00	
	Test Port	1	Center 2/3 from	1.09	to: 10.79
	Distance to disturbance	220.5 inches	Points in Center 2/3	2	to: 7
	Measurement units	ppm SF6	Injection Point	**5 near wall (side)**	

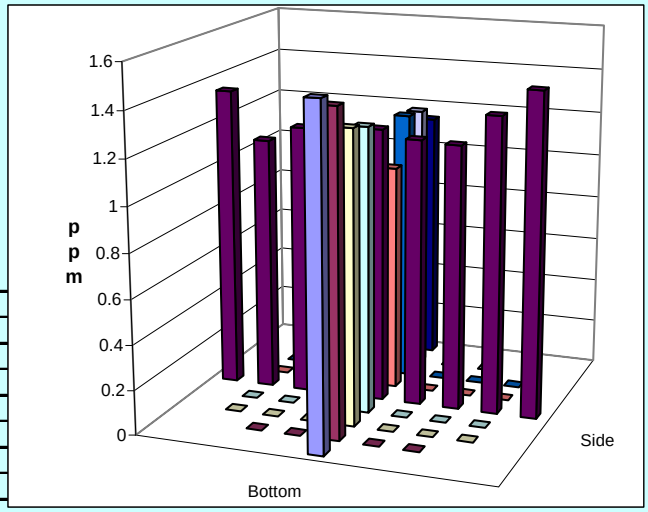
		Side				Bottom			
Order -->		1st				2nd			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.38	1.50	1.15	1.69	1.447	1.27	1.49	1.73	1.497
2	1.24	1.12	1.52	1.34	1.327	1.37	1.44	1.49	1.433
3	2.29	1.20	1.22	1.14	1.187	1.16	1.30	1.46	1.307
4	3.82	1.03	1.30	1.26	1.197	1.37	1.31	1.15	1.277
Center	5.91	1.23	1.20	1.26	1.230	1.26	1.25	1.18	1.230
5	8.00	1.12	1.15	1.13	1.133	1.08	0.977	0.997	1.018
6	9.52	1.04	1.32	1.27	1.210	1.24	1.19	1.23	1.220
7	10.57	1.12	1.14	1.16	1.140	1.44	1.14	1.04	1.207
8	11.31	1.43	1.52	1.10	1.350	0.987	1.12	1.30	1.136
Averages ---------->		1.199	1.280	1.261	1.247	1.242	1.246	1.286	1.258

All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1.25		Mean	1.20	1.24	1.22
Min Point	1.02	-18.7%	Std. Dev.	0.06	0.13	0.10
Max Point	1.50	19.5%	COV as %	5.4	10.1	**8.0**

Avg. Conc. 1.255 ppm

Gas analyzer checked:
6/24/2009
JEF 6/25/09

	Start	Finish	
Tracer tank pressure	400	400	psig
Stack Temp	88	90.3	F°
Center Pt. air vel.	2460	2550	fpm
Injection flowmeter	59	59	sccm
	N/A	N/A	
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	996.00	995.00	in Hg
Ambient humidity	24	23	RH
B&K vapor correction	Y	Y	Y/N
Back-Gd gas ppb	6, 5, 4, 5	12, 15, 12, 8	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	84.2	85.1	



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 209060	6/12/2010
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes: Repeat GT-38

JEF 6/25/09

Entries made by:	Julia Flaherty
Signature/date	*on file with original* 6/25/2009

Technical Data Review performed by:	Ernest Antonio
Signature/date	Signature on File 8 July 2010
	TI-RPP-WTP678

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LB-C2 Model**	Run No.	**GT-41**
Date	6/26/2009	Fan Configuration	**A & B**
Testers	MSP, JEF	Fan Setting	**35 Hz**
Stack Dia.	13.281 in.	Stack Temp	81.6 deg F
Stack X-Area	138.5 $in.^2$	Start/End Time	10:03 / 11:40
Test Port	5	Center 2/3 from	1.22 to: 12.06
Distance to disturbance	3.625 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**A Center**

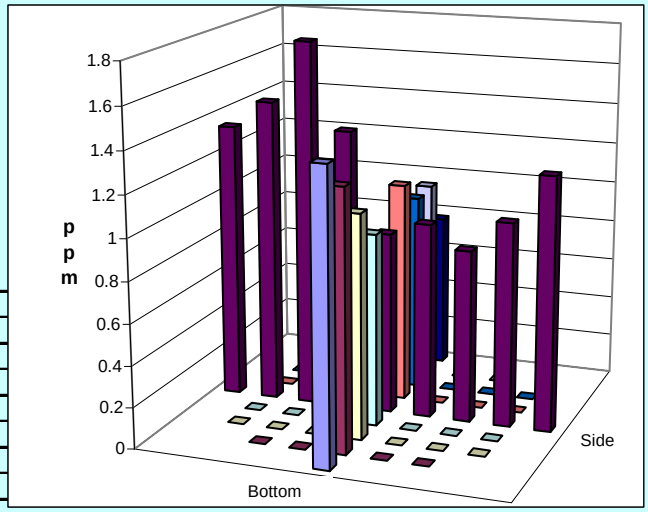
Order -->		1st				2nd			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	0.937	1.48	1.18	1.199	1.56	1.43	1.22	1.403
2	1.39	0.795	1.26	0.85	0.967	1.41	1.18	1.18	1.257
3	2.57	0.773	1.00	0.678	0.817	1.11	1.01	1.14	1.087
4	4.28	0.953	0.897	0.921	0.924	0.982	1.04	0.788	0.937
Center	6.63	0.837	0.933	0.811	0.860	0.835	0.897	0.927	0.886
5	8.97	1.35	1.27	1.36	1.327	0.991	1.170	1.07	1.077
6	10.68	1.72	1.64	1.83	1.730	0.865	0.874	1.16	0.966
7	11.86	1.48	1.45	1.38	1.437	0.896	0.920	1.13	0.982
8	12.75	1.51	1.17	1.24	1.307	0.822	0.674	0.792	0.763
Averages ---------->		1.151	1.233	1.138	1.174	1.052	1.022	1.045	1.040

All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1.11		Mean	1.15	1.03	1.09
Min Point	0.76	-31.1%	Std. Dev.	0.35	0.12	0.26
Max Point	1.73	56.3%	COV as %	30.3	12.1	**23.8**

Avg. Conc. 1.136 ppm

Gas analyzer checked:
6/24/2009
JEF 6/29/09

	Start	Finish	
Tracer tank pressure	390	390	psig
Stack Temp	80.1	83.1	Fº
Center Pt. air vel.	2600	2580	fpm
Injection flowmeter	59	59	sccm
	N/A	N/A	
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	998	998	in Hg
Ambient humidity	31	31	RH
B&K vapor correction	Y	Y	Y/N
Back-Gd gas ppb	3,6,2,5	9,8,5,7	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	70.7	73.4	



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 209060	6/12/2010
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes: Repeat GT-33
Conc was fairly low, ~ 600 ppb, so we switched SF6 tank.
JEF 6/26/09

Entries made by:	Julia Flaherty
Signature/date	*on file with original* 6/26/2009

Technical Data Review performed by:	Ernest Antonio
Signature/date	Signature on File 8 July 2010
	TI-RPP-WTP678

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06	Site	**LB-C2 Model**	Run No.	**GT-42**	
	Date	6/26/2009	Fan Configuration	**A & B**	
	Testers	DMT, XYY	Fan Setting	**35**	**Hz**
	Stack Dia.	11.781 in.	Stack Temp	89.2	deg F
	Stack X-Area	109.0 $in.^2$	Start/End Time	13:30/15:16	
	Test Port	2	Center 2/3 from	1.08 to:	10.70
	Distance to disturbance	160 inches	Points in Center 2/3	2 to:	7
	Measurement units	ppm SF6	Injection Point	**3 near wall**	

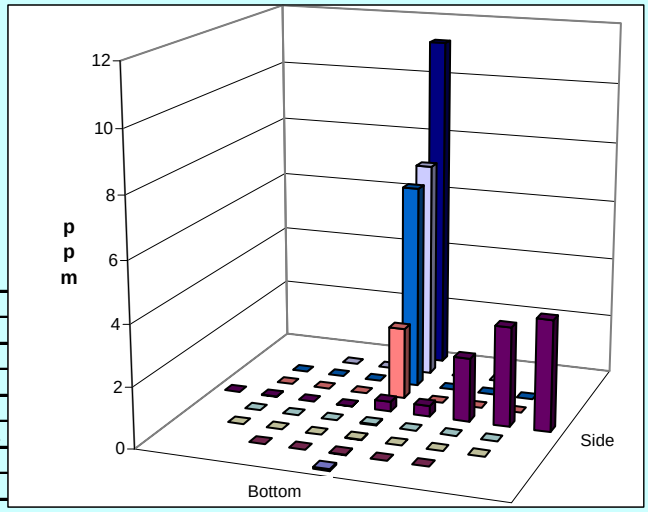
		Side				Bottom			
Order -->		1st				2nd			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	6.04	1.33	3.66	3.677	0.000742	0.0155	0.0361	0.017
2	1.39	2.64	3.02	4.2	3.287	0.00394	0.00654	0.00537	0.005
3	2.57	1.87	2.11	2.34	2.107	0.000337	0.00951	0.00328	0.004
4	4.28	0.438	0.264	0.361	0.354	0.00173	0.0066	0.0158	0.008
Center	6.63	0.899	0.0329	0.0529	0.328	0.0754	0.102	0.1	0.092
5	8.97	0.0151	0.00452	0.00634	0.009	0.802	0.62	0.594	0.672
6	10.68	0.00379	0.00193	0.0124	0.006	2.17	1.25	2.31	1.910
7	11.86	0.0036	0.0365	0.00366	0.015	1.81	2.39	1.91	2.037
8	12.75	0.00354	0.00287	0.0145	0.007	1.24	4.55	3.65	3.147
Averages ---------->		1.324	0.756	1.183	1.088	0.678	0.994	0.958	0.877

All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	0.98		Mean	0.87	0.68	0.77
Min Point	0.00	-99.6%	Std. Dev.	1.30	0.92	1.09
Max Point	3.68	274.3%	COV as %	149.1	136.0	**140.4**

Avg. Conc. 1.079 ppm

Gas analyzer checked:
6/24/2009
XYY 6/29/09

	Start	Finish	
Tracer tank pressure	350	350	psig
Stack Temp	88.6	89.8	F°
Center Pt. air vel.	2570	2560	fpm
Injection flowmeter	59	59	sccm
	N/A	N/A	
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	998	997	in Hg
Ambient humidity	24	22	RH
B&K vapor correction	Y	Y	Y/N
Back-Gd gas ppb	12,1,3,6	12,5,32,6	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	82.4	84.2	



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 209060	6/12/2010
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes: Repeat GT-35

Using the old SF6 cylinder. Side 3rd run, pt 6: -999e6 ppm, repeated.

XYY 6/26/09

Entries made by:	Xiao-Ying Yu	Technical Data Review performed by:	Ernest Antonio
Signature/date	*on file with original* 6/26/2009	Signature/date	Signature on File 8 July 2010
			TI-RPP-WTP678

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LB-C2 Model**	Run No.	**GT-43**
Date	6/26/2009	Fan Configuration	**A & B**
Testers	DMT, XYY	Fan Setting	**35 Hz**
Stack Dia.	11.781 in.	Stack Temp	88.95 deg F
Stack X-Area	109.0 $in.^2$	Start/End Time	15:16/16:45
Test Port	2	Center 2/3 from	1.08 to: 10.70
Distance to disturbance	160 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**4 near wall**

Order -->		2nd				1st			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	0.766	0.766	0.791	0.774	1.29	1.22	1.38	1.297
2	1.39	0.749	0.927	1	0.892	1.34	1.19	1.26	1.263
3	2.57	0.886	0.969	0.952	0.936	1.13	1.35	1.25	1.243
4	4.28	0.965	1.03	0.946	0.980	1.1	1.1	1.14	1.113
Center	6.63	1.2	1.09	1.14	1.143	1.03	1.12	1.23	1.127
5	8.97	1.31	1.48	1.46	1.417	1.16	1.28	1.3	1.247
6	10.68	1.48	1.59	1.59	1.553	1.27	1.18	1.04	1.163
7	11.86	1.7	1.68	1.7	1.693	1.08	1.02	1.23	1.110
8	12.75	1.98	1.61	1.88	1.823	1.2	1.02	1.15	1.123
Averages ---------->		1.226	1.238	1.273	1.246	1.178	1.164	1.220	1.187

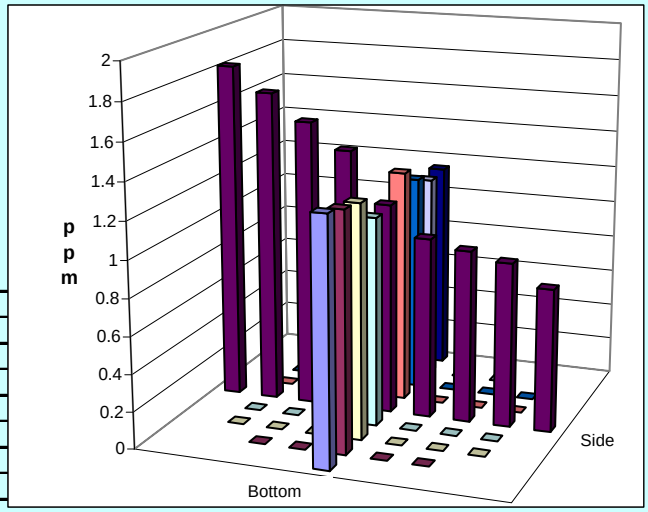
All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1.22		Mean	1.23	1.18	1.21
Min Point	0.77	-36.4%	Std. Dev.	0.32	0.07	0.23
Max Point	1.82	49.9%	COV as %	26.2	5.8	**18.7**

Avg. Conc. 1.227 ppm

Gas analyzer checked:
6/24/2009

XYY 6/29/09

	Start	Finish	
Tracer tank pressure	350	350	psig
Stack Temp	88.3	89.6	F°
Center Pt. air vel.	2430	2560	fpm
Injection flowmeter	59	59	sccm
	N/A	N/A	
Sampling flowmeter	10	9.5	lpm Sierra
Ambient pressure	997	997	in Hg
Ambient humidity	22	22	RH
B&K vapor correction	Y	Y	Y/N
Back-Gd gas ppb	8,4,5,2	24,17,15,4.5	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	84.2	85.1	



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 209060	6/12/2010
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes: Repeat GT-36

Main valve was not turned open properly, so redo the first run from bottom, i.e., pt. 5 - pt 8.

XYY 6/26/09

Entries made by:	Xiao-Ying Yu
Signature/date	*on file with original* 6/26/2009

Technical Data Review performed by:	Ernest Antonio
Signature/date	Signature on File 8 July 2010
	TI-RPP-WTP678

Sulfur hexafluoride Gas Calibration performed on B&K on 6/1/2009 **by** JAG, JEF, DMT, MSP, XYY

B&K Model 1302: Serial No. 1765299 Property No. WD17210

Setup:
- 6.5 ft B&K sample inlet tube length
- 991 mbar station pressure
- 71.6 deg F ambient temp analyzer corrects to 20 deg C
- 39 percent RH

0.0996 ppm					
Cylinder	SV17680	start P =	1900	psi	
		end P =	1850	psi	
B&K					
Calibration readings: (ppm)					
0.0972	Compensating for water vapor				
0.0995					
0.0969					
0.0982					
0.0995					
0.1020	Not compensating for water vapor				
0.0973					
0.1010					
0.0986					
0.0994					
0.0990 = avg					

4.998 ppm					
Cylinder	SV17805	start P =	1900	psi	
		end P =	1850	psi	
B&K					
Calibration readings: (ppm)					
5.02	Compensating for water vapor				
5.02					
5.01					
5.01					
5.01					
5.00	Not compensating for water vapor				
4.99					
4.98					
4.99					
4.97					
5.00 = avg					

Pre-Test Room background, ppb

Not compensating for water vapor, monitoring task 2

43.9 49.8 42.8 44.8 49.3

Compensating for water vapor, monitoring task 1

8.3 11.5 10.5 4.98 6.7

Standards Used:	Expiration date:
SV 17680	6/19/2010
SV 17805	6/19/2010

Entries made by:	John Glissmeyer		Technical Data Review performed by:	Ernest Antonio
Signature/date	*on file with original*	6/1/2009	Signature/date	*on file with original*
				TI-RPP-WTP-678
				7/8/2010

Sulfur hexafluoride Gas Calibration performed on B&K on 6/8/2009 **by** JEF

B&K Model 1302: Serial No. 1765299 Property No. WD17210

Setup:
- 6.5 ft B&K sample inlet tube length
- 991 mbar station pressure
- 72.5 deg F ambient temp — analyzer corrects to 20 deg C
- 39 percent RH

0.0996 ppm				4.998 ppm			
Cylinder	SV17680	start P =	1850 psi	Cylinder	SV17805	start P =	1850 psi
		end P =	1800 psi			end P =	1800 psi
B&K				B&K			
Calibration readings: (ppm)				Calibration readings: (ppm)			
0.0970	Compensating for water vapor			4.97	Compensating for water vapor		
0.0967				4.98			
0.0968				4.99			
0.0969				4.98			
0.0972				4.98			
0.0979	Not compensating for water vapor			4.96	Not compensating for water vapor		
0.0960				4.97			
0.0971				4.98			
0.0978				4.96			
0.1000				4.96			
0.0973 = avg				**4.97** = avg			

Pre-Test Room background, ppb

Not compensating for water vapor, monitoring task 2

39.0 42.6 38.3 41.9 41.3

Compensating for water vapor, monitoring task 1

3.42 3.06 3.69 4.19 2.97

Standards Used:	Expiration date:
SV 17680	6/19/2010
SV 17805	6/19/2010

Entries made by:	Julia Flaherty	
Signature/date	*on file with original*	6/8/2009

Technical Data Review performed by:	Ernest Antonio
Signature/date	*on file with original*
	TI-RPP-WTP-678
	7/8/2010

Sulfur hexafluoride Gas Calibration performed on B&K on 6/15/2009 **by** JEF

B&K Model 1302: Serial No. 1765299 Property No. WD17210

Setup:
- 6.5 ft B&K sample inlet tube length
- 989 mbar station pressure
- 73.4 deg F ambient temp — analyzer corrects to 20 deg C
- 43 percent RH

0.0996 ppm					4.998 ppm				
Cylinder	SV17680	start P =	1800	psi	Cylinder	SV17805	start P =	1800	psi
		end P =	1800	psi			end P =	1700	psi
B&K					B&K				
Calibration readings: (ppm)					Calibration readings: (ppm)				
0.1020	Compensating for water vapor				4.99	Compensating for water vapor			
0.0955					4.99				
0.1010					4.99				
0.1020					4.99				
0.0995					5.00				
0.0970	Not compensating for water vapor				4.98	Not compensating for water vapor			
0.0964					4.97				
0.0968					4.98				
0.0971					4.97				
0.0979					4.97				
0.0985 = avg					**4.98** = avg				

Pre-Test Room background, ppb

Not compensating for water vapor, monitoring task 2				
52.8	52.8	55.0	51.0	50.8
Compensating for water vapor, monitoring task 1				
1.41	1.76	6.02	3.29	2.60

Standards Used:	Expiration date:
SV 17680	6/19/2010
SV 17805	6/19/2010

Entries made by:	Julia Flaherty	
Signature/date	*on file with original*	6/15/2009

Technical Data Review performed by:	Ernest Antonio	
Signature/date	*on file with original*	
	TI-RPP-WTP-678	
	7/8/2010	

Sulfur hexafluoride Gas Calibration performed on B&K on 6/22/2009 **by** XYY, DMT, VRM, JEF

B&K Model 1302: Serial No. 1788615 Property No. WD54624

Setup:

6.5	ft	B&K sample inlet tube length
996	mbar	station pressure
70.7	deg F	ambient temp analyzer corrects to 20 deg C
41	percent	RH

0.0996 ppm					
Cylinder	SV17680	start P =	1720	psi	
		end P =	1610	psi	
B&K					
Calibration readings: (ppm)					
0.1010	Compensating for water vapor				
0.1020					
0.1050					
0.1010					
0.0990					
0.0996	Not compensating for water vapor				
0.1030					
0.0984					
0.0978					
0.0991					
0.1006	= avg				

4.998 ppm					
Cylinder	SV17805	start P =	1700	psi	
		end P =	1660	psi	
B&K					
Calibration readings: (ppm)					
4.96	Compensating for water vapor				
4.97					
4.97					
4.97					
4.96					
4.95	Not compensating for water vapor				
4.95					
4.95					
4.94					
4.97					
4.96	= avg				

Pre-Test Room background, ppb

Not compensating for water vapor, monitoring task 2

41.3	44.2	39.7	40.0	40.3	37.1	34.9

Compensating for water vapor, monitoring task 1

14.5	14.3	10.6	12.6	8.1	11.4

Standards Used:	Expiration date:
SV 17680	6/19/2010
SV 17805	6/19/2010

Entries made by:	Victor Morris	
Signature/date	*on file with original*	6/22/2009

Technical Data Review performed by:	Ernest Antonio
Signature/date	*on file with original*
	TI-RPP-WTP-678
	7/8/2010

Sulfur hexafluoride Gas Calibration performed on B&K on 6/24/2009 **by** MSP, VRM

B&K Model 1302: Serial No. 1788615 Property No. WD54624

Setup:

6.5	ft	B&K sample inlet tube length
988	mbar	station pressure
74.3	deg F	ambient temp analyzer corrects to 20 deg C
37	percent	RH

0.0996 ppm					
Cylinder	SV17680	start P =	1650	psi	
		end P =	1610	psi	
B&K					
Calibration readings: (ppm)					
0.0974	Compensating for water vapor				
0.0980					
0.0957					
0.0985					
0.0992					
0.0999	Not compensating for water vapor				
0.0987					
0.0957					
0.1010					
0.0957					
0.0980 = avg					

4.998 ppm					
Cylinder	SV 17805	start P =	1690	psi	
		end P =	1650	psi	
B&K					
Calibration readings: (ppm)					
4.96	Compensating for water vapor				
4.97					
4.95					
4.96					
4.95					
4.95	Not compensating for water vapor				
4.97					
4.96					
4.96					
4.94					
4.96 = avg					

Pre-Test Room background, ppb

Not compensating for water vapor, monitoring task 2				
47.2	47.5	45.7	44.1	42.3
Compensating for water vapor, monitoring task 1				
3.40	4.33	5.83	3.57	6.59

Standards Used:	Expiration date:
SV 17680	6/19/2010
SV 17805	6/19/2010

Entries made by:	Victor Morris		Technical Data Review performed by:	Ernest Antonio
Signature/date	*on file with original*	6/24/2009	Signature/date	*on file with original*
				TI-RPP-WTP-678
				7/8/2010

Sulfur hexafluoride Gas Calibration performed on B&K on 6/24/2009 **by** MSP, VRM

B&K Model 1302: Serial No. 1788615 Property No. WD54624

Setup:
- 6.5 ft B&K sample inlet tube length
- 987 mbar station pressure
- 74.3 deg F ambient temp — analyzer corrects to 20 deg C
- 37 percent RH

0.0996 ppm				4.998 ppm			
Cylinder	SV17680	start P =	1650 psi	Cylinder	SV17805	start P =	1690 psi
		end P =	1610 psi			end P =	1650 psi

B&K

Calibration readings: (ppm)

		B&K		
0.0974	Compensating for water vapor	4.96	Compensating for water vapor	
0.0980		4.97		
0.0957		4.95		
0.0987		4.96		
0.0992		4.95		
0.0999	Not compensating for water vapor	4.95	Not compensating for water vapor	
0.0987		4.97		
0.0957		4.96		
0.1010		4.96		
0.0957		4.94		
0.0980	= avg	**4.96**	= avg	

Pre-Test Room background, ppb

Not compensating for water vapor, monitoring task 2				
47.2	47.5	45.7	44.1	42.3
Compensating for water vapor, monitoring task 1				
3.40	4.33	5.83	3.57	6.59

Standards Used:	Expiration date:
SV 17680	6/19/2010
SV 17805	6/19/2010

Entries made by:	Victor Morris		Technical Data Review performed by:	Ernest Antonio
Signature/date	*on file with original*	6/24/2009	Signature/date	*on file with original*
				TI-RPP-WTP-678
				7/8/2010

Sulfur hexafluoride Gas Calibration performed on B&K on 6/24/2009 **by** MSP, VRM

B&K Model 1302: Serial No. 1765299 Property No. WD17210

Setup:
- 6.5 ft B&K sample inlet tube length
- 987 mbar station pressure
- 74.3 deg F ambient temp — analyzer corrects to 20 deg C
- 39 percent RH

0.0996 ppm				4.998 ppm			
Cylinder	SV17680	start P =	1610 psi	Cylinder	SV17805	start P =	1650 psi
		end P =	1600 psi			end P =	1620 psi

B&K Calibration readings: (ppm)		B&K Calibration readings: (ppm)	
0.0974	Compensating for water vapor	4.97	Compensating for water vapor
0.0961		4.97	
0.0996		4.97	
0.0956		4.96	
0.1000		4.97	
0.101	Not compensating for water vapor	4.98	Not compensating for water vapor
0.0995		4.97	
0.0962		4.97	
0.0976		4.97	
0.1000		4.97	
0.0983	= avg	**4.97**	= avg

Pre-Test Room background, ppb

Not compensating for water vapor, monitoring task 2				
43.8	48.4	48.1	47.9	46.2
Compensating for water vapor, monitoring task 1				
7.27	5.91	4.83	7.81	5.59

Standards Used:	Expiration date:
SV 17680	6/19/2010
SV 17805	6/19/2010

Entries made by:	Victor Morris		Technical Data Review performed by: Ernest Antonio
Signature/date	*on file with original*	6/24/2009	Signature/date *on file with original*
			TI-RPP-WTP-678
			7/28/2010

Sulfur hexafluoride Gas Calibration performed on B&K on 6/29/2009 **by** DMT, JEF

B&K Model 1302: Serial No. 1765299 Property No. WD17210

Setup:

6.5	ft	B&K sample inlet tube length
996	mbar	station pressure
70.7	deg F	ambient temp analyzer corrects to 20 deg C
35	percent	RH

0.0996 ppm					4.998 ppm				
Cylinder	SV17680	start P =	1500	psi	Cylinder	SV17805	start P =	1590	psi
		end P =	1500	psi			end P =	1500	psi
B&K					B&K				
Calibration readings: (ppm)					Calibration readings: (ppm)				
0.0989	Compensating for water vapor				4.98	Compensating for water vapor			
0.0982					4.98				
0.1010					4.98				
0.0997					4.99				
0.1020					4.99				
0.1020	Not compensating for water vapor				4.96	Not compensating for water vapor			
0.1010					4.96				
0.1020					4.97				
0.1040					4.96				
0.0987					4.96				
0.1008 = avg					**4.97** = avg				

Pre-Test Room background, ppb

Not compensating for water vapor, monitoring task 2				
16.2	36.1	25.7	29.1	19.1
Compensating for water vapor, monitoring task 1				
5.02	6.22	7.41	6.12	8.5

Standards Used:	Expiration date:
SV 17680	6/19/2010
SV 17805	6/19/2010

Entries made by:	Julia Flaherty		Technical Data Review performed by:	Ernest Antonio
Signature/date	*on file with original*	6/29/2009	Signature/date	*on file with original*
				TI-RPP-WTP-678
				7/28/2010

Appendix A.5: LB-C2 Tracer Particle Uniformity Data Sheets

Rev. 0
3 Aug. 2006

PARTICLE TRACER TRAVERSE DATA FORM

Site	**LB-C2 Model**	Run No.	**PT-1**
Date	6/30/2009	Fan configuration	**A & B**
Tester	JEF XYY	Fan Setting	**35** **Hz**
Stack Dia.	11.781 in.	Stack Temp	81.8 deg F
Stack X-Area	109.0 in.2	Start/End Time	0830/1138
Test Port	2	Center 2/3 from	1.08 to: 10.70
Distance to disturbance	160 inches	Points in Center 2/3	2 to: 7
Measurement units	particles/ft3	Injection Point	**A Center**
Order ----->	1st		2nd

Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	particles/ft3				particles/ft3			
1	0.38	760	870	898	842.7	779	845	871	831.7
2	1.24	982	926	1025	977.7	902	1049	971	974.0
3	2.29	1018	1047	1051	1038.7	1090	1165	971	1075.3
4	3.82	1005	1145	970	1040.0	1123	1164	1026	1104.3
Center	5.91	892	1054	1080	1008.7	1096	1101	1071	1089.3
5	8.00	586	802	979	789.0	1148	1186	1133	1155.7
6	9.52	954	929	955	946.0	1017	1121	1080	1072.7
7	10.57	949	734	877	853.3	960	952	1025	979.0
8	11.31	754	741	882	792.3	837	830	914	860.3
Averages ---------->		877.8	916.4	968.6	920.9	994.7	1045.9	1006.9	1015.8

All	pt/ft3	Dev. from mean
Mean	968.4	
Min Point	789.0	-18.5%
Max Point	1155.7	19.3%

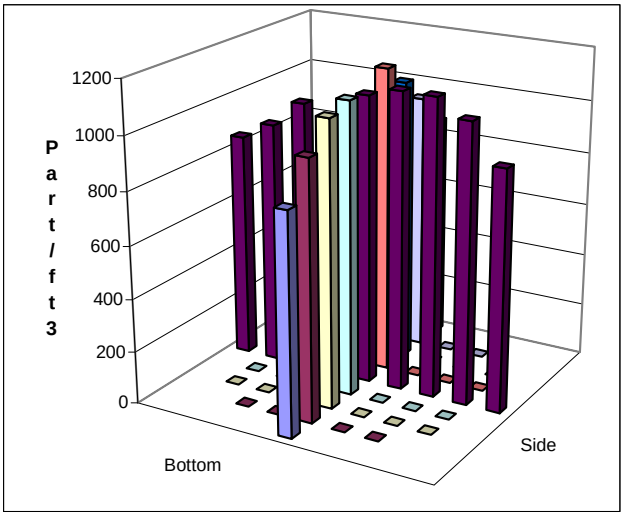
Center 2/3	Side	Bottom	All	Normlzd
Mean	950.5	1064.3	1007.4	1045.41
Std. Dev.	96.1	66.1	98.8	85.88
COV as %	10.1	6.2	**9.8**	**8.22**

Avg Conc 958 pt/ft3

	Start	Finish	
Generator Inlet Press	1.52	1.55	psig
Stack Temp	80.2	83.4	F
Centerline vel.	2530	2503	fpm
Ambient pressure	29.38	29.38	inHg
Ambient humidity	27%	22%	RH
Ambient temp	76.1	83.3	F
Back-Gd aerosol	19,13,20,32	5,5,6,17	pt/ft3
No. Bk-Gd samples	4	4	
Compressor output	120	110	psig

Instuments Used:

		Cal. Due
Solomat	SN12951472	3/17/2010
Met One A2408	96258675	4/16/2010
Fisher Scientific	61876141	4/9/2010



Notes: Started aerosol generator for ~ 30 min centerline ~ 1100 particles @ 9 um. Restart aerosol after blanks, 1061 pt/ft3. Pressure output dropped from 120 to 95 after 1 hr running. Bottom pt 3 Run 2 Side cap on. XYY 6/30/09

Oil Used: FisherBrand 19

XYY 6/30/09

Entries made by: Xiao-Ying Yu
Signature/date *On File with Original* 6/30/2009

Technical Data Review performed by: Ernest Antonio
Signature/date *On File with Original TI-RPP-WTP-679* 1-Jul-10

Rev. 0
3 Aug. 2006

PARTICLE TRACER TRAVERSE DATA FORM

Site	**LB-C2 Model**	Run No.	**PT-2**
Date	6/30/2009	Fan configuration	**A & B**
Tester	DMT VRM	Fan Setting	**35** **Hz**
Stack Dia.	11.781 in.	Stack Temp	85.25 deg F
Stack X-Area	109.0 in.2	Start/End Time	1156/1335
Test Port	2	Center 2/3 from	1.08 to: 10.70
Distance to disturbance	160 inches	Points in Center 2/3	2 to: 7
Measurement units	particles/ft3	Injection Point	**A Center**
Order ----->	2nd		1st

		Side				Bottom			
Traverse-->									
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	particles/ft3				particles/ft3			
1	0.38	704	948	950	867.3	990	897	957	948.0
2	1.24	657	943	936	845.3	1075	1036	1035	1048.7
3	2.29	693	1088	1014	931.7	1189	1050	1076	1105.0
4	3.82	610	1139	1050	933.0	1139	1130	1087	1118.7
Center	5.91	1179	935	965	1026.3	1130	1094	1078	1100.7
5	8.00	813	841	830	828.0	1094	1096	1108	1099.3
6	9.52	772	906	923	867.0	1063	1117	1144	1108.0
7	10.57	1242	859	861	987.3	1009	994	1024	1009.0
8	11.31	692	780	786	752.7	874	936	894	901.3
Averages ---------->		818.0	937.7	923.9	893.2	1062.6	1038.9	1044.8	1048.7

All	pt/ft3	Dev. from mean
Mean	971.0	
Min Point	752.7	-22.5%
Max Point	1118.7	15.2%

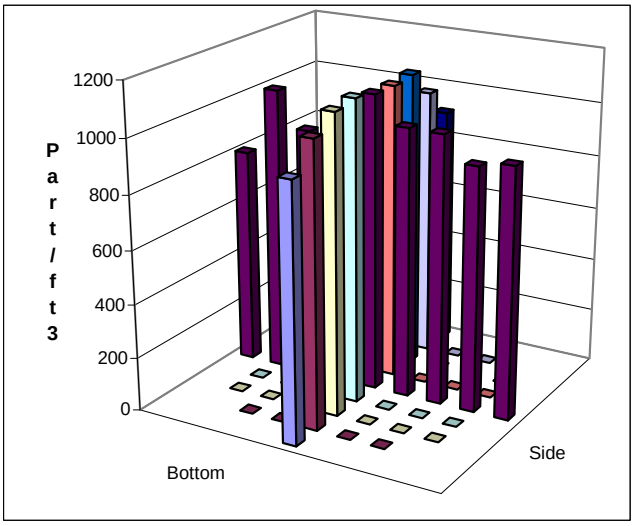
Center 2/3	Side	Bottom	All	Normlzd
Mean	917.0	1084.2	1000.6	1033.78
Std. Dev.	74.1	40.0	103.9	79.93
COV as %	8.1	3.7	**10.4**	**7.73**

Avg Conc 959 pt/ft3

	Start	Finish	
Generator Inlet Press	1.6	1.6	psig
Stack Temp	83.4	87.1	F
Centerline vel.	2480	2537	fpm
Ambient pressure	29.38	29.38	inHg
Ambient humidity	20%	20%	RH
Ambient temp	84.2	86	F
Back-Gd aerosol	8,9,21,8	5,8,10,5	pt/ft3
No. Bk-Gd samples	4	4	
Compressor output	115	110	psig

Instuments Used:

		Cal. Due
Solomat	SN12951472	3/17/2010
Met One A2408	96258675	4/16/2010
Fisher Scientific	61876141	4/9/2010



Notes: Changed sampling probes from bottom to side probe. Reseated probe into particle counter (became dislodged) between side point 4 and center, Run 1.

DMT 6/30/09

Oil Used: FisherBrand 19

DMT 6/30/09

Entries made by:	Victor Morris	Technical Data Review performed by:	Ernest Antonio
Signature/date	*On File with Original* 6/30/2009	Signature/date	*On File with Original TI-RPP-WTP-679* 1-Jul-10

Rev. 0
3 Aug. 2006

PARTICLE TRACER TRAVERSE DATA FORM

Site	**LB-C2 Model**	Run No.	**PT-3**
Date	6/30/2009	Fan configuration	**A & B**
Tester	DMT VRM	Fan Setting	**35** **Hz**
Stack Dia.	11.781 in.	Stack Temp	88.05 deg F
Stack X-Area	109.0 in.2	Start/End Time	1345/1511
Test Port	2	Center 2/3 from	1.08 to: 10.70
Distance to disturbance	160 inches	Points in Center 2/3	2 to: 7
Measurement units	particles/ft3	Injection Point	**A Center**
Order ----->	1st		2nd

		Side				Bottom			
Traverse-->									
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	particles/ft3				particles/ft3			
1	0.38	825	884	687	798.7	1690	935	1077	1234.0
2	1.24	936	904	843	894.3	1836	1074	1298	1402.7
3	2.29	1074	931	827	944.0	2057	1195	1288	1513.3
4	3.82	1195	994	767	985.3	2114	1333	1440	1629.0
Center	5.91	898	864	857	873.0	2116	1336	1477	1643.0
5	8.00	869	800	961	876.7	2147	1452	1543	1714.0
6	9.52	807	806	822	811.7	2128	1417	1481	1675.3
7	10.57	805	678	740	741.0	1946	1371	1499	1605.3
8	11.31	792	639	688	706.3	1365	1204	1324	1297.7
Averages ---------->		911.2	833.3	799.1	847.9	1933.2	1257.4	1380.8	1523.8

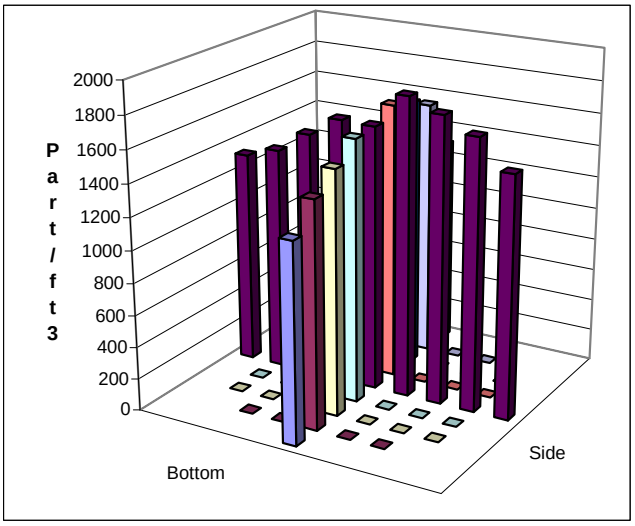
All	pt/ft3	Dev. from mean	***Center 2/3***	Side	Bottom	All	Normlzd
Mean	1185.9		Mean	875.1	1597.5	1236.3	1622.28
Min Point	706.3	-40.4%	Std. Dev.	80.9	106.3	385.7	128.76
Max Point	1714.0	44.5%	COV as %	9.2	6.7	**31.2**	**7.94**

Avg Conc 1177 pt/ft3

	Start	Finish	
Generator Inlet Press	1.6	1.6	psig
Stack Temp	87.1	89	F
Centerline vel.	2537	2477	fpm
Ambient pressure	29.38	29.38	inHg
Ambient humidity	20%	19%	RH
Ambient temp	86	88.7	F
Back-Gd aerosol	5,8,10,5	10,13,18,20	pt/ft3
No. Bk-Gd samples	4	4	
Compressor output	120	115	psig

Instuments Used: Cal. Due

Solomat	SN12951472	3/17/2010
Met One A2408	96258675	4/16/2010
Fisher Scientific	61876141	4/9/2010



Notes:

VRM 6/30/09

Oil Used: FisherBrand 19

DMT 6/30/09

Entries made by:	Victor Morris		Technical Data Review performed by: Ernest Antonio
Signature/date	*On File With Original*	6/30/2009	Signature/date *On File with Original TI-RPP-WTP-679* 1-Jul-10

Rev. 0

3 Aug. 2006

PARTICLE TRACER TRAVERSE DATA FORM

Site	**LB-C2 Model**	Run No.	**PT-4**
Date	7/1/2009	Fan configuration	**A & B**
Tester	DMT JEF	Fan Setting	**35** **Hz**
Stack Dia.	11.813 in.	Stack Temp	80.2 deg F
Stack X-Area	109.6 in.2	Start/End Time	0900/1030
Test Port	3	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	100 inches	Points in Center 2/3	2 to: 7
Measurement units	particles/ft3	Injection Point	**A Center**
Order ----->	1st		2nd

Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	particles/ft3				particles/ft3			
1	0.38	988	988	903	959.7	906	862	891	886.3
2	1.24	1018	1070	914	1000.7	1106	1012	1151	1089.7
3	2.29	1027	987	1003	1005.7	1211	1109	1142	1154.0
4	3.82	1084	1081	895	1020.0	1144	1083	1090	1105.7
Center	5.91	1123	980	952	1018.3	1192	1220	1159	1190.3
5	8.00	1030	736	959	908.3	1156	1083	1176	1138.3
6	9.52	866	710	765	780.3	1223	1198	1210	1210.3
7	10.57	744	970	955	889.7	1212	1202	1144	1186.0
8	11.31	715	795	884	798.0	991	979	977	982.3
Averages ---------->		955.0	924.1	914.4	931.2	1126.8	1083.1	1104.4	1104.8

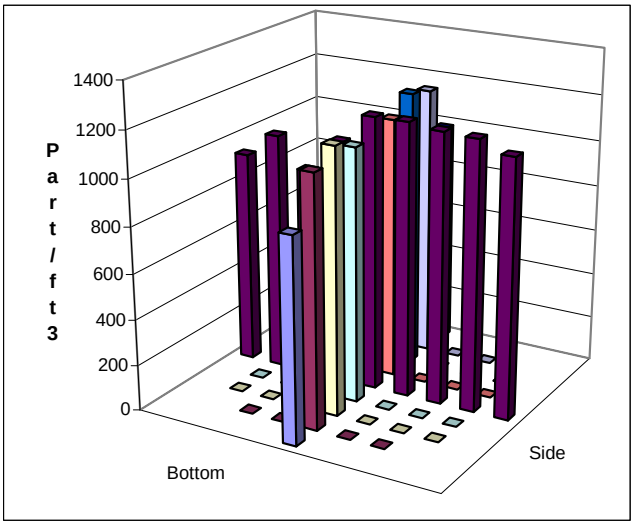
All	pt/ft3	Dev. from mean	***Center 2/3***	Side	Bottom	All	Normlzd
Mean	1018.0		Mean	946.1	1153.5	1049.8	1129.71
Min Point	780.3	-23.3%	Std. Dev.	90.6	45.2	127.7	82.04
Max Point	1210.3	18.9%	COV as %	9.6	3.9	**12.2**	**7.26**

Avg Conc 1007 pt/ft3

	Start	Finish	
Generator Inlet Press	1.6	1.6	psig
Stack Temp	78.4	82	F
Centerline vel.	2599	2558	fpm
Ambient pressure	29.38	29.41	inHg
Ambient humidity	25%	23%	RH
Ambient temp	75.2	79.7	F
Back-Gd aerosol	21,18,21,35	29,23,23,20	pt/ft3
No. Bk-Gd samples	4	4	
Compressor output	120	130	psig

Instuments Used:

		Cal. Due
Solomat	SN12951472	3/17/2010
Met One A2408	96258675	4/16/2010
Fisher Scientific	61876141	4/9/2010



Notes:

JEF 7/1/09

Oil Used: FisherBrand 19

JEF 7/1/09

Entries made by:	Julia Flaherty	Technical Data Review performed by:	Ernest Antonio
Signature/date	*On File with Original* 7/1/2009	Signature/date	*On File with Original TI-RPP-WTP-679* 1-Jul-10

Rev. 0
3 Aug. 2006

PARTICLE TRACER TRAVERSE DATA FORM

Site	**LB-C2 Model**	Run No.	**PT-5**
Date	7/1/2009	Fan configuration	**A only**
Tester	DMT, JEF, VRM	Fan Setting	**35** **Hz**
Stack Dia.	11.813 in.	Stack Temp	85.6 deg F
Stack X-Area	109.6 in.2	Start/End Time	1040/1217
Test Port	3	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	100 inches	Points in Center 2/3	2 to: 7
Measurement units	particles/ft3	Injection Point	**A Center**
Order ----->	2nd		1st

		Side				Bottom			
Traverse-->									
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	particles/ft3				particles/ft3			
1	0.38	1273	1235	1680	1396.0	2013	2435	2061	2169.7
2	1.24	1260	1257	1058	1191.7	2084	2508	2192	2261.3
3	2.29	1347	1240	1099	1228.7	1990	2280	2253	2174.3
4	3.82	1640	1113	1187	1313.3	2117	2247	2313	2225.7
Center	5.91	1232	1184	1329	1248.3	2024	2279	2221	2174.7
5	8.00	1231	1078	1310	1206.3	2112	2430	2117	2219.7
6	9.52	1950	1111	1124	1395.0	2157	2357	2218	2244.0
7	10.57	1109	1053	1038	1066.7	2139	2148	2244	2177.0
8	11.31	1101	1011	988	1033.3	2094	2058	2227	2126.3
Averages ---------->		1349.2	1142.4	1201.4	1231.0	2081.1	2304.7	2205.1	2197.0

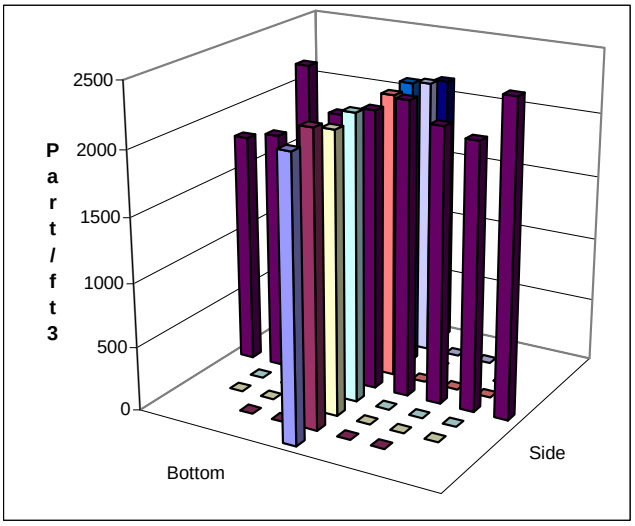
All	pt/ft3	Dev. from mean	***Center 2/3***	Side	Bottom	All	Normlzd
Mean	1714.0		Mean	1235.7	2211.0	1723.3	2181.82
Min Point	1033.3	-39.7%	Std. Dev.	102.5	35.9	511.4	127.33
Max Point	2261.3	31.9%	COV as %	8.3	1.6	**29.7**	**5.84**

Avg Conc 1714 pt/ft3

	Start	Finish	
Generator Inlet Press	1.6	1.6	psig
Stack Temp	83.8	87.4	F
Centerline vel.	1068	1297	fpm
Ambient pressure	29.41	29.41	inHg
Ambient humidity	23%	20%	RH
Ambient temp	79.7	84.2	F
Back-Gd aerosol	22,32,24,25	6,6,14,8	pt/ft3
No. Bk-Gd samples	4	4	
Compressor output	115	110	psig

Instuments Used:

		Cal. Due
Solomat	SN12951472	3/17/2010
Met One A2408	96258675	4/16/2010
Fisher Scientific	61876141	4/9/2010



Notes: Starting at Bottom, Trial 3, Vic took over for Donna. Dampers open .

JEF 7/1/09

Oil Used: FisherBrand 19

JEF 7/1/09

Entries made by:	Julia Flaherty	Technical Data Review performed by:	Ernest Antonio
Signature/date	*On File with Original* 7/1/2009	Signature/date	*On File with Original TI-RPP-WTP-679* 1-Jul-10

Rev. 0
3 Aug. 2006

PARTICLE TRACER TRAVERSE DATA FORM

Site	**LB-C2 Model**	Run No.	**PT-6**
Date	7/1/2009	Fan configuration	**B Only**
Tester	DMT VRM	Fan Setting	**35** **Hz**
Stack Dia.	11.813 in.	Stack Temp	90 deg F
Stack X-Area	109.6 in.2	Start/End Time	1230/1406
Test Port	3	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	100 inches	Points in Center 2/3	2 to: 7
Measurement units	particles/ft3	Injection Point	**B Center**
Order ----->	1st		2nd

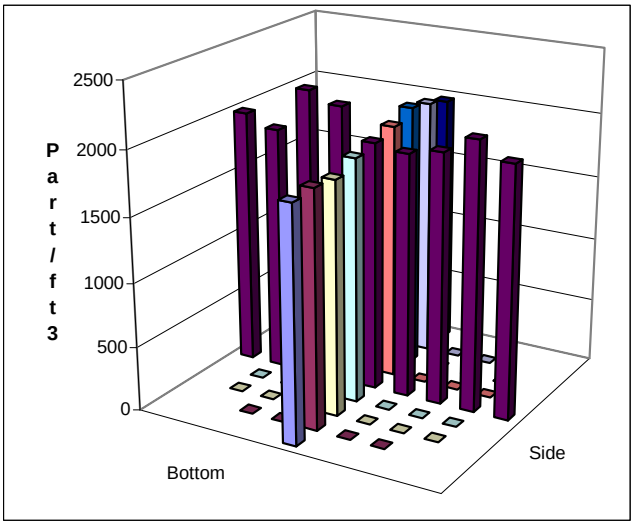
		Side				Bottom			
Traverse-->									
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	particles/ft3				particles/ft3			
1	0.38	1254	1195	1181	1210.0	1802	1740	1897	1813.0
2	1.24	1522	1169	1182	1291.0	1797	1699	2009	1835.0
3	2.29	1209	1102	1308	1206.3	1719	1763	1959	1813.7
4	3.82	1263	1078	1176	1172.3	1796	1963	1923	1894.0
Center	5.91	1313	1151	1122	1195.3	1879	1976	1937	1930.7
5	8.00	1261	1264	1497	1340.7	1963	2026	1956	1981.7
6	9.52	1324	1271	1579	1391.3	2081	2008	2075	2054.7
7	10.57	1143	1216	1178	1179.0	2032	1964	2058	2018.0
8	11.31	1038	1415	1247	1233.3	1926	1960	2018	1968.0
Averages ---------->		1258.6	1206.8	1274.4	1246.6	1888.3	1899.9	1981.3	1923.2

All	pt/ft3	Dev. from mean	***Center 2/3***	Side	Bottom	All	Normlzd
Mean	1584.9		Mean	1253.7	1932.5	1593.1	1978.74
Min Point	1172.3	-26.0%	Std. Dev.	87.3	91.1	362.5	123.73
Max Point	2054.7	29.6%	COV as %	7.0	4.7	**22.8**	**6.25**

Avg Conc 1588 pt/ft3

	Start	Finish	
Generator Inlet Press	1.6	1.6	psig
Stack Temp	88.8	91.2	F
Centerline vel.	1232	1250	fpm
Ambient pressure	29.41	29.41	inHg
Ambient humidity	20%	19%	RH
Ambient temp	86	89.6	F
Back-Gd aerosol	9,13,7,7	4,13,9,13	pt/ft3
No. Bk-Gd samples	4	4	
Compressor output	120	112	psig

Instuments Used:		Cal. Due
Solomat	SN12951472	3/17/2010
Met One A2408	96258675	4/16/2010
Fisher Scientific	61876141	4/9/2010



Notes: Fan A damper closed

VRM 7/1/09

Oil Used: FisherBrand 19

VRM 7/1/09

Entries made by:	Victor Morris	Technical Data Review performed by:	Ernest Antonio
Signature/date	*On File with Original* 7/1/2009	Signature/date	*On File with Original TI-RPP-WTP-679* 9-Jul-10

Rev. 0

3 Aug. 2006

PARTICLE TRACER TRAVERSE DATA FORM

Site	**LB-C2 Model**	Run No.	**PT-7**
Date	7/12009	Fan configuration	**B only. A damper closed**
Tester	DMT VRM	Fan Setting	**35 Hz**
Stack Dia.	11.813 in.	Stack Temp	92.35 deg F
Stack X-Area	109.6 in.2	Start/End Time	1407/1531
Test Port	3	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	100 inches	Points in Center 2/3	2 to: 7
Measurement units	particles/ft3	Injection Point	**B Center**
Order ----->	2nd		1st

Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	particles/ft3				particles/ft3			
1	0.38	2070	2021	2740	2277.0	1974	2093	2013	2026.7
2	1.24	2149	2442	2361	2317.3	2066	2015	2143	2074.7
3	2.29	2024	2290	1608	1974.0	2042	1958	2108	2036.0
4	3.82	2525	2269	2234	2342.7	2127	2042	2169	2112.7
Center	5.91	2406	2637	1475	2172.7	2252	2054	2233	2179.7
5	8.00	2188	2679	1775	2214.0	2225	2139	2158	2174.0
6	9.52	2289	2768	2244	2433.7	2198	2167	2301	2222.0
7	10.57	2384	2422	2415	2407.0	2407	2243	2410	2353.3
8	11.31	2769	2545	2573	2629.0	2393	2160	2135	2229.3
Averages ---------->		2311.6	2452.6	2158.3	2307.5	2187.1	2096.8	2185.6	2156.5

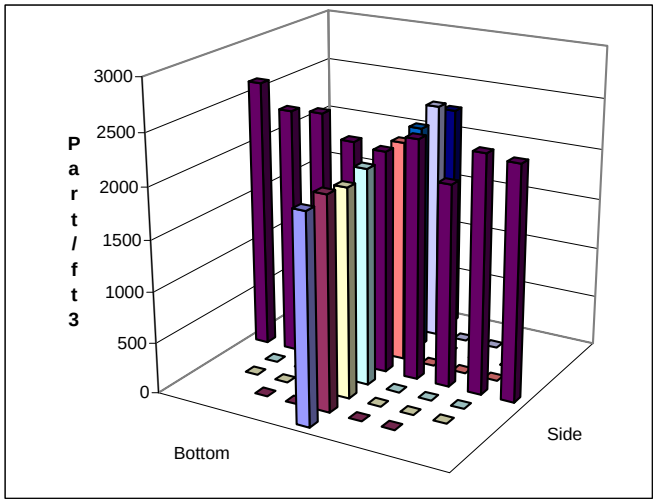
All	pt/ft3	Dev. from mean	***Center 2/3***	Side	Bottom	All	Normlzd
Mean	2232.0		Mean	2265.9	2164.6	2215.3	2218.91
Min Point	1974.0	-11.6%	Std. Dev.	159.8	105.3	140.2	141.96
Max Point	2629.0	17.8%	COV as %	7.1	4.9	**6.3**	**6.40**

Avg Conc 2239 pt/ft3

	Start	Finish	
Generator Inlet Press	1.6	1.6	psig
Stack Temp	91.2	93.5	F
Centerline vel.	1250	1233	fpm
Ambient pressure	29.41	29.38	inHg
Ambient humidity	19%	19%	RH
Ambient temp	89.6	92.3	F
Back-Gd aerosol	4,13,9,13	7.10,20,8	pt/ft3
No. Bk-Gd samples	4	4	
Compressor output	122	118	psig

Instuments Used:

		Cal. Due
Solomat	SN12951472	3/17/2010
Met One A2408	96258675	4/16/2010
Fisher Scientific	61876141	4/9/2010



Notes:

VRM 7/1/09

Oil Used: FisherBrand 19

VRM 7/1/09

Entries made by: Victor Morris

Signature/date *On File with Original* 7/1/2009

Technical Data Review performed by: Ernest Antonio

Signature/date *On File with Original TI-RPP-WTP-679* 9-Jul-10

Rev. 0

3 Aug. 2006

PARTICLE TRACER TRAVERSE DATA FORM

Site	LB-C2 Model	Run No.	PT-8
Date	7/2/2009	Fan configuration	B only - damper A closed
Tester	VRM, JEF	Fan Setting	35 Hz
Stack Dia.	11.813 in.	Stack Temp	93.1 deg F
Stack X-Area	109.6 in.2	Start/End Time	12:25 / 14:05
Test Port	3	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	100 inches	Points in Center 2/3	2 to: 7
Measurement units	particles/ft3	Injection Point	B Center
Order ----->	1st		2nd

Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	particles/ft3				particles/ft3			
1	0.38	2607	2466	2470	2514.3	2839	2938	2992	2923.0
2	1.24	2669	2556	1357	2194.0	2966	2912	3061	2979.7
3	2.29	2416	2050	1429	1965.0	3002	3028	3000	3010.0
4	3.82	2307	2214	1892	2137.7	3051	3154	3127	3110.7
Center	5.91	2089	1984	2105	2059.3	2984	3145	3090	3073.0
5	8.00	2187	2032	2243	2154.0	3116	3152	3212	3160.0
6	9.52	2040	2275	1901	2072.0	3041	3073	3179	3097.7
7	10.57	2492	1706	1772	1990.0	2998	3160	3185	3114.3
8	11.31	1529	2481	1555	1855.0	3035	3085	2980	3033.3
Averages ---------->		2259.6	2196.0	1858.2	2104.6	3003.6	3071.9	3091.8	3055.7

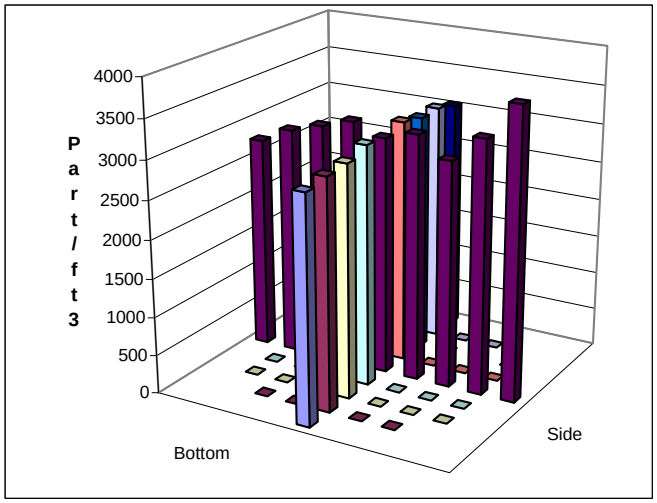
All	pt/ft3	Dev. from mean	***Center 2/3***	Side	Bottom	All	Normlzd
Mean	2580.2		Mean	2081.7	3077.9	2579.8	3092.15
Min Point	1855.0	-28.1%	Std. Dev.	85.2	63.0	521.9	97.56
Max Point	3160.0	22.5%	COV as %	4.1	2.0	**20.2**	**3.16**

Avg Conc 2582 pt/ft3

	Start	Finish	
Generator Inlet Press	1.6	1.6	psig
Stack Temp	91.4	94.8	F
Centerline vel.	1211	1215	fpm
Ambient pressure	29.32	29.32	inHg
Ambient humidity	22%	19%	RH
Ambient temp	86	92.3	F
Back-Gd aerosol	16,17,10,16	17,16,13,17	pt/ft3
No. Bk-Gd samples	4	4	
Compressor output	114	112	psig

Instuments Used:

		Cal. Due
Solomat	SN12951472	3/17/2010
Met One A2408	96258675	4/16/2010
Fisher Scientific	61876141	4/9/2010



Notes:

JEF 7/2/09

Oil Used: FisherBrand 19

JEF 7/2/09

Entries made by:	Julia Flaherty		Technical Data Review performed by: Ernest Antonio
Signature/date	*On File With Original*	7/2/2009	Signature/date *On File with Original TI-RPP-WTP-679* 9-Jul-10

Rev. 0

3 Aug. 2006

PARTICLE TRACER TRAVERSE DATA FORM

Site	LB-C2 Model	Run No.	PT-9
Date	7/2/2009	Fan configuration	B Only - damper A Closed
Tester	VRM, JEF	Fan Setting	35 Hz
Stack Dia.	11.781 in.	Stack Temp	95.7 deg F
Stack X-Area	109.0 in.2	Start/End Time	14:10 / 15:30
Test Port	2	Center 2/3 from	1.08 to: 10.70
Distance to disturbance	160 inches	Points in Center 2/3	2 to: 7
Measurement units	particles/ft3	Injection Point	B Center
Order ----->	1st		2nd

Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	particles/ft3				particles/ft3			
1	0.38	1851	2408	2215	2158.0	1848	1963	2070	1960.3
2	1.24	1820	2296	2243	2119.7	1973	1917	1891	1927.0
3	2.29	1981	2430	2218	2209.7	2019	1890	1960	1956.3
4	3.82	1606	2234	2177	2005.7	2058	1982	1976	2005.3
Center	5.91	1663	1697	2239	1866.3	2104	2032	1975	2037.0
5	8.00	1460	1574	2089	1707.7	2166	2173	2076	2138.3
6	9.52	1287	1404	2613	1768.0	2386	2172	2056	2204.7
7	10.57	1411	1527	1899	1612.3	2226	2293	2068	2195.7
8	11.31	1542	1748	1821	1703.7	2033	2092	2022	2049.0
Averages ---------->		1624.6	1924.2	2168.2	1905.7	2090.3	2057.1	2010.4	2052.6

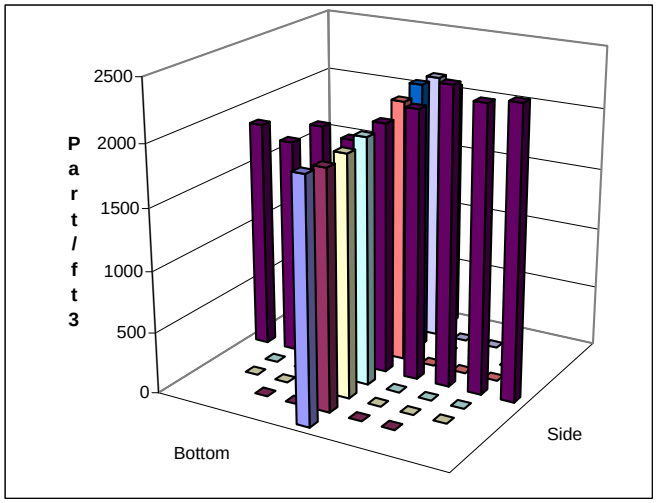
All	pt/ft3	Dev. from mean	***Center 2/3***	Side	Bottom	All	Normlzd
Mean	1979.1		Mean	1898.5	2066.3	1982.4	2069.21
Min Point	1612.3	-18.5%	Std. Dev.	221.2	113.4	190.0	181.24
Max Point	2209.7	11.6%	COV as %	11.7	5.5	**9.6**	**8.76**

Avg Conc 1983 pt/ft3

	Start	Finish	
Generator Inlet Press	1.6	1.6	psig
Stack Temp	94.8	96.6	F
Centerline vel.	1215	1141	fpm
Ambient pressure	29.32	29.29	inHg
Ambient humidity	19%	18%	RH
Ambient temp	92.3	95	F
Back-Gd aerosol	17,16,13,17	18,21,21,6	pt/ft3
No. Bk-Gd samples	4	4	
Compressor output	95	95	psig

Instuments Used:

		Cal. Due
Solomat	SN12951472	3/17/2010
Met One A2408	96258675	4/16/2010
Fisher Scientific	61876141	4/9/2010



Notes:

JEF 7/2/09

Oil Used: FisherBrand 19

JEF 7/2/09

Entries made by: Julia Flaherty

Signature/date *On File With Original* 7/2/2009

Technical Data Review performed by: Ernest Antonio

Signature/date *On File with Original TI-RPP-WTP-679* 9-Jul-10

Rev. 0

3 Aug. 2006

PARTICLE TRACER TRAVERSE DATA FORM

Site	LB-C2 Model	Run No.	PT-10
Date	7/7/2009	Fan configuration	A Only, B Dampers Closed
Tester	MSP, JEF	Fan Setting	35 Hz
Stack Dia.	11.781 in.	Stack Temp	86.5 deg F
Stack X-Area	109.0 in.2	Start/End Time	14:15 / 16:15
Test Port	2	Center 2/3 from	1.08 to: 10.70
Distance to disturbance	160 inches	Points in Center 2/3	2 to: 7
Measurement units	particles/ft3	Injection Point	A Center
Order ----->	2nd		1st

		Side				Bottom			
Traverse-->									
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	particles/ft3				particles/ft3			
1	0.38	1560	2386	2350	2098.7	1928	2100	2045	2024.3
2	1.24	1830	2422	2490	2247.3	2163	2236	2032	2143.7
3	2.29	2476	2451	2573	2500.0	2234	2220	2003	2152.3
4	3.82	2369	2243	2575	2395.7	2255	2272	2049	2192.0
Center	5.91	2253	2382	2444	2359.7	2288	2199	2032	2173.0
5	8.00	2280	2523	2438	2413.7	2274	2112	2103	2163.0
6	9.52	2637	2612	2123	2457.3	2238	2072	2123	2144.3
7	10.57	2495	2474	2427	2465.3	2063	1966	2037	2022.0
8	11.31	2341	2363	2207	2303.7	1951	2078	2272	2100.3
Averages ---------->		2249.0	2428.4	2403.0	2360.1	2154.9	2139.4	2077.3	2123.9

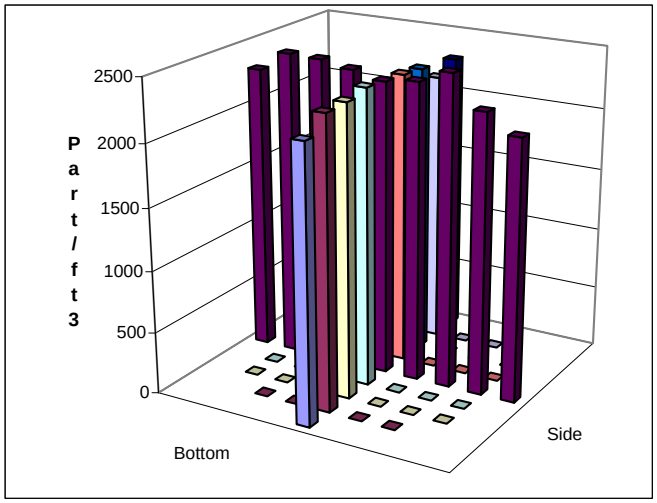
All	pt/ft3	Dev. from mean	***Center 2/3***	Side	Bottom	All	Normlzd
Mean	2242.0		Mean	2405.6	2141.5	2273.5	2365.50
Min Point	2022.0	-9.8%	Std. Dev.	84.1	55.4	153.2	81.65
Max Point	2500.0	11.5%	COV as %	3.5	2.6	**6.7**	**3.45**

Avg Conc 2239 pt/ft3

	Start	Finish	
Generator Inlet Press	1.6	1.6	psig
Stack Temp	87	86	F
Centerline vel.	1226	1352	fpm
Ambient pressure	29.29	29.26	inHg
Ambient humidity	28%	23%	RH
Ambient temp	82.4	85.1	F
Back-Gd aerosol	6,13,10,16	14,9,16,16	pt/ft3
No. Bk-Gd samples	4	4	
Compressor output	95	95	psig

Instuments Used:

		Cal. Due
Solomat	SN12951472	3/17/2010
Met One A2408	96258675	4/16/2010
Fisher Scientific	61876141	4/9/2010



Notes:

JEF 7/7/09

Oil Used: FisherBrand 19

JEF 7/7/09

Entries made by:	Julia Flaherty		Technical Data Review performed by: Ernest Antonio
Signature/date	*On File With Original*	7/7/2009	Signature/date *On File with Original TI-RPP-WTP-679* 9-Jul-10

Rev. 0
3 Aug. 2006

PARTICLE TRACER TRAVERSE DATA FORM

Site	LB-C2 Model	Run No.	PT-11
Date	7/8/2009	Fan configuration	A Only - Dampers on B Closed
Tester	MSP, JEF	Fan Setting	35 Hz
Stack Dia.	11.875 in.	Stack Temp	78.85 deg F
Stack X-Area	110.8 in.2	Start/End Time	0935 / 1135
Test Port	1	Center 2/3 from	1.09 to: 10.79
Distance to disturbance	220.5 inches	Points in Center 2/3	2 to: 7
Measurement units	particles/ft3	Injection Point	A Center
Order ----->	1st		2nd

Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	particles/ft3				particles/ft3			
1	0.38	1056	861	858	925.0	2258	2456	2343	2352.3
2	1.24	970	903	860	911.0	2294	2536	2439	2423.0
3	2.29	881	1079	922	960.7	2419	2548	2458	2475.0
4	3.82	942	1047	971	986.7	2503	2498	2437	2479.3
Center	5.91	1001	971	954	975.3	2397	2750	2452	2533.0
5	8.00	976	827	870	891.0	2448	2631	2357	2478.7
6	9.52	1621	794	1200	1205.0	2475	2767	2387	2543.0
7	10.57	1742	1059	960	1253.7	2342	2364	2161	2289.0
8	11.31	1378	1026	1203	1202.3	2396	2181	2122	2233.0
Averages ---------->		1174.1	951.9	977.6	1034.5	2392.4	2525.7	2350.7	2422.9

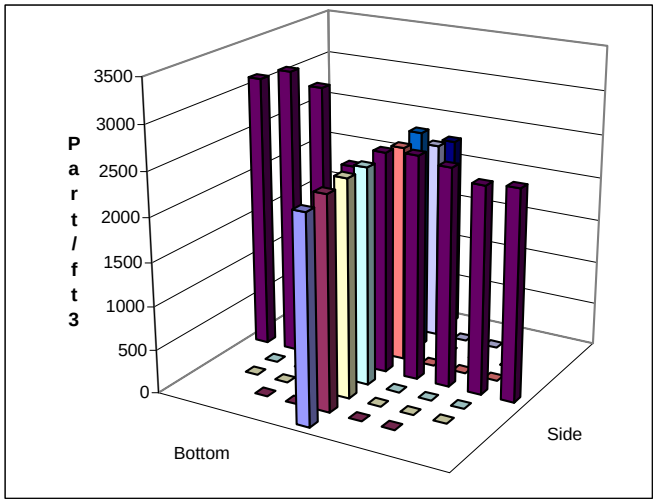
All	pt/ft3	Dev. from mean	***Center 2/3***	Side	Bottom	All	Normlzd
Mean	1728.7		Mean	1026.2	2460.1	1743.2	2562.61
Min Point	891.0	-48.5%	Std. Dev.	143.6	85.4	752.6	280.81
Max Point	2543.0	47.1%	COV as %	14.0	3.5	**43.2**	**10.96**

Avg Conc 1726 pt/ft3

	Start	Finish	
Generator Inlet Press	1.6	1.6	psig
Stack Temp	78.2	79.5	F
Centerline vel.	1285	1314	fpm
Ambient pressure	29.32	29.35	inHg
Ambient humidity	32%	30%	RH
Ambient temp	70.7	75.2	F
Back-Gd aerosol	11,2,4,16	10,8,8,9	pt/ft3
No. Bk-Gd samples	4	4	
Compressor output	100	115	psig

Instuments Used:

		Cal. Due
Solomat	SN12951472	3/17/2010
Met One A2408	96258675	4/16/2010
Fisher Scientific	61876141	4/9/2010



Notes: Centerline velocity taken at Port 2 - side.

JEF 7/8/09

Oil Used: FisherBrand 19

JEF 7/8/09

Entries made by: Julia Flaherty
Signature/date *On File With Original* 7/8/2009

Technical Data Review performed by: Ernest Antonio
Signature/date *On File with Original TI-RPP-WTP-679* 9-Jul-10

Rev. 0

3 Aug. 2006

PARTICLE TRACER TRAVERSE DATA FORM

Site	**LB-C2 Model**	Run No.	**PT-12**
Date	7/8/2009	Fan configuration	**A only - Dampers on B Closed**
Tester	MSP, JEF	Fan Setting	**35** **Hz**
Stack Dia.	11.875 in.	Stack Temp	82.25 deg F
Stack X-Area	110.8 in.2	Start/End Time	1200 / 1330
Test Port	1	Center 2/3 from	1.09 to: 10.79
Distance to disturbance	220.5 inches	Points in Center 2/3	2 to: 7
Measurement units	particles/ft3	Injection Point	**A Center**
Order ----->	2nd		1st

Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	particles/ft3				particles/ft3			
1	0.38	976	1003	1234	1071.0	2103	2665	2564	2444.0
2	1.24	983	1022	951	985.3	2213	2696	2762	2557.0
3	2.29	1114	1132	885	1043.7	2530	2828	2835	2731.0
4	3.82	926	1173	995	1031.3	2594	2932	2766	2764.0
Center	5.91	1099	1215	975	1096.3	2493	2870	2731	2698.0
5	8.00	955	1202	956	1037.7	2311	2754	2548	2537.7
6	9.52	908	1300	965	1057.7	2365	2738	2506	2536.3
7	10.57	931	1172	1032	1045.0	2264	2430	2272	2322.0
8	11.31	854	1036	1045	978.3	2211	2385	2320	2305.3
Averages ---------->		971.8	1139.4	1004.2	1038.5	2342.7	2699.8	2589.3	2543.9

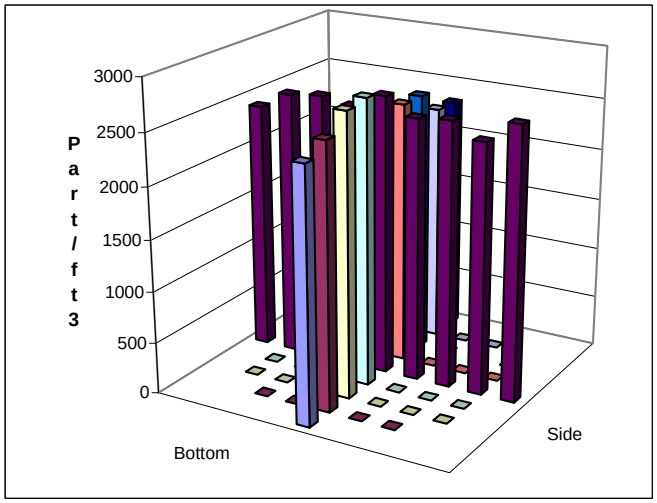
All	pt/ft3	Dev. from mean	***Center 2/3***	Side	Bottom	All	Normlzd
Mean	1791.2		Mean	1042.4	2592.3	1817.4	2578.81
Min Point	978.3	-45.4%	Std. Dev.	33.0	152.9	811.2	118.50
Max Point	2764.0	54.3%	COV as %	3.2	5.9	**44.6**	**4.59**

Avg Conc 1778 pt/ft3

	Start	Finish	
Generator Inlet Press	1.6	1.6	psig
Stack Temp	81.6	82.9	F
Centerline vel.	1391	1306	fpm
Ambient pressure	29.35	29.35	inHg
Ambient humidity	30%	28%	RH
Ambient temp	77.9	79.7	F
Back-Gd aerosol	18,3,14,12	13,6,10,15	pt/ft3
No. Bk-Gd samples	4	4	
Compressor output	95	95	psig

Instuments Used:

		Cal. Due
Solomat	SN12951472	3/17/2010
Met One A2408	96258675	4/16/2010
Fisher Scientific	61876141	4/9/2010



Notes:

JEF 7/8/09

Oil Used: FisherBrand 19

JEF 7/8/09

Entries made by:	Julia Flaherty		Technical Data Review performed by: Ernest Antonio
Signature/date	*On File With Original*	7/8/2009	Signature/date *On File with Original TI-RPP-WTP-679* 9-Jul-10

Rev. 0

3 Aug. 2006

PARTICLE TRACER TRAVERSE DATA FORM

Site	LB-C2 Model	Run No.	PT-13
Date	7/8/2009	Fan configuration	A Only - Damper B Closed
Tester	MSP, JEF	Fan Setting	35 Hz
Stack Dia.	11.875 in.	Stack Temp	84.35 deg F
Stack X-Area	110.8 in.2	Start/End Time	14:30 / 16:05
Test Port	1	Center 2/3 from	1.09 to: 10.79
Distance to disturbance	220.5 inches	Points in Center 2/3	2 to: 7
Measurement units	particles/ft3	Injection Point	A Center
Order ----->	1st		2nd

		Side				Bottom			
Traverse-->									
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	particles/ft3				particles/ft3			
1	0.38	1308	2010	1041	1453.0	2274	1885	1972	2043.7
2	1.24	1319	1047	957	1107.7	2395	1970	2068	2144.3
3	2.29	1342	1329	1239	1303.3	2338	1886	2089	2104.3
4	3.82	1844	1134	2236	1738.0	2409	1998	2159	2188.7
Center	5.91	1141	1153	1157	1150.3	2435	1981	2117	2177.7
5	8.00	1267	1113	1555	1311.7	2409	1968	2211	2196.0
6	9.52	1113	1551	1302	1322.0	2398	1906	2121	2141.7
7	10.57	1112	1071	1484	1222.3	2570	1806	2125	2167.0
8	11.31	1324	1325	1101	1250.0	2250	1883	2007	2046.7
Averages ---------->		1307.8	1303.7	1341.3	1317.6	2386.4	1920.3	2096.6	2134.4

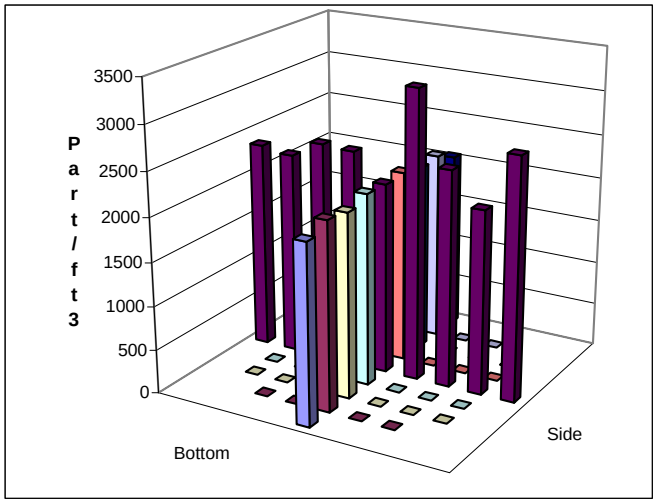
All	pt/ft3	Dev. from mean	***Center 2/3***	Side	Bottom	All	Normlzd
Mean	1726.0		Mean	1307.9	2160.0	1733.9	2317.96
Min Point	1107.7	-35.8%	Std. Dev.	207.1	32.0	464.5	313.58
Max Point	2196.0	27.2%	COV as %	15.8	1.5	**26.8**	**13.53**

Avg Conc 1734 pt/ft3

	Start	Finish	
Generator Inlet Press	1.6	1.6	psig
Stack Temp	84.7	84	F
Centerline vel.	1278	1230	fpm
Ambient pressure	29.35	29.35	inHg
Ambient humidity	25%	24%	RH
Ambient temp	81.5	82.4	F
Back-Gd aerosol	7,6,9,15	14,14,16,7	pt/ft3
No. Bk-Gd samples	4	4	
Compressor output	95	105	psig

Instuments Used:

		Cal. Due
Solomat	SN12951472	3/17/2010
Met One A2408	96258675	4/16/2010
Fisher Scientific	61876141	4/9/2010



Notes:

JEF 7/8/09

Oil Used: FisherBrand 19

JEF 7/8/09

Entries made by:	Julia Flaherty		Technical Data Review performed by: Ernest Antonio
Signature/date	*On File With Original*	7/8/2009	Signature/date *On File with Original TI-RPP-WTP-679* 9-Jul-10

Rev. 0

3 Aug. 2006

PARTICLE TRACER TRAVERSE DATA FORM

Site	LB-C2 Model	Run No.	PT-14
Date	7/8/2009	Fan configuration	A & B
Tester	MSP, JEF	Fan Setting	35 Hz
Stack Dia.	11.875 in.	Stack Temp	83.9 deg F
Stack X-Area	110.8 in.2	Start/End Time	16:08 / 18:10
Test Port	1	Center 2/3 from	1.09 to: 10.79
Distance to disturbance	220.5 inches	Points in Center 2/3	2 to: 7
Measurement units	particles/ft3	Injection Point	A Center
Order ----->	2nd		1st

Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	particles/ft3				particles/ft3			
1	0.38	492	570	503	521.7	866	795	852	837.7
2	1.24	566	681	538	595.0	966	891	951	936.0
3	2.29	549	624	689	620.7	1056	1049	1031	1045.3
4	3.82	664	634	768	688.7	1074	1109	1081	1088.0
Center	5.91	799	740	962	833.7	1070	1068	1006	1048.0
5	8.00	866	626	924	805.3	1048	1071	1067	1062.0
6	9.52	701	569	873	714.3	936	1106	921	987.7
7	10.57	646	556	689	630.3	868	1029	821	906.0
8	11.31	680	502	784	655.3	852	1004	786	880.7
Averages ---------->		662.6	611.3	747.8	673.9	970.7	1013.6	946.2	976.8

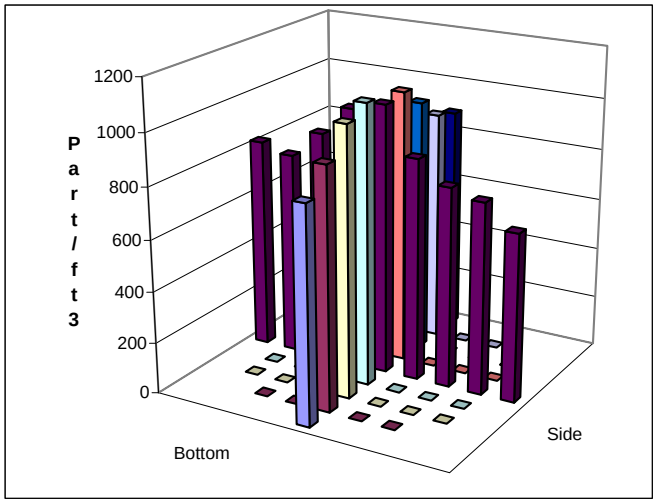
All	pt/ft3	Dev. from mean	***Center 2/3***	Side	Bottom	All	Normlzd
Mean	825.4		Mean	698.3	1010.4	854.4	944.12
Min Point	521.7	-36.8%	Std. Dev.	92.6	68.6	179.9	114.73
Max Point	1088.0	31.8%	COV as %	13.3	6.8	**21.1**	**12.15**

Avg Conc 811 pt/ft3

	Start	Finish	
Generator Inlet Press	1.6	1.6	psig
Stack Temp	85.1	82.7	F
Centerline vel.	2072	2448	fpm
Ambient pressure	29.35	29.32	inHg
Ambient humidity	24%	24%	RH
Ambient temp	83.3	83.3	F
Back-Gd aerosol	17,13,26,19	13,18,20,8	pt/ft3
No. Bk-Gd samples	4	4	
Compressor output	95	95	psig

Instuments Used:

		Cal. Due
Solomat	SN12951472	3/17/2010
Met One A2408	96258675	4/16/2010
Fisher Scientific	61876141	4/9/2010



Notes: Side port measurements used same probe from bottom port.

JEF 7/8/09

Oil Used: FisherBrand 19

JEF 7/8/09

Entries made by: Julia Flaherty
Signature/date *On File With Original* 7/8/2009

Technical Data Review performed by: Ernest Antonio
Signature/date *On File with Original TI-RPP-WTP-679* 1-Jul-10

Rev. 0

3 Aug. 2006

PARTICLE TRACER TRAVERSE DATA FORM

Site	LB-C2 Model	Run No.	PT-15
Date	7/9/2009	Fan configuration	B only - Damper A Closed
Tester	VRM, JEF	Fan Setting	35 Hz
Stack Dia.	11.875 in.	Stack Temp	87.5 deg F
Stack X-Area	110.8 in.2	Start/End Time	14:30 / 16:30
Test Port	1	Center 2/3 from	1.09 to: 10.79
Distance to disturbance	220.5 inches	Points in Center 2/3	2 to: 7
Measurement units	particles/ft3	Injection Point	B Center
Order ----->	1st		2nd

Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	particles/ft3				particles/ft3			
1	0.38	2332	1508	1750	1863.3	2238	2198	1900	2112.0
2	1.24	2074	1880	2027	1993.7	2426	2308	2109	2281.0
3	2.29	2114	1884	1849	1949.0	2654	2293	2256	2401.0
4	3.82	2241	2191	1955	2129.0	2519	2285	2306	2370.0
Center	5.91	2252	2314	2023	2196.3	2597	2343	2361	2433.7
5	8.00	1991	2180	2164	2111.7	2438	2286	2548	2424.0
6	9.52	1764	2085	1936	1928.3	2485	2360	2574	2473.0
7	10.57	1756	2116	2126	1999.3	2399	2096	2429	2308.0
8	11.31	1802	2023	2123	1982.7	2245	2062	2397	2234.7
Averages ---------->		2036.2	2020.1	1994.8	2017.0	2444.6	2247.9	2320.0	2337.5

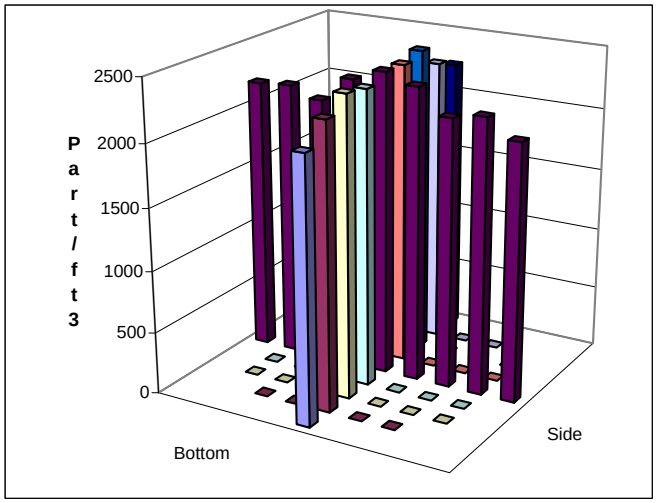
All	pt/ft3	Dev. from mean	***Center 2/3***	Side	Bottom	All	Normlzd
Mean	2177.3		Mean	2043.9	2384.4	2214.1	2324.57
Min Point	1863.3	-14.4%	Std. Dev.	101.6	69.4	195.4	109.19
Max Point	2473.0	13.6%	COV as %	5.0	2.9	**8.8**	**4.70**

Avg Conc 2160 pt/ft3

	Start	Finish	
Generator Inlet Press	1.6	1.6	psig
Stack Temp	86.5	88.5	F
Centerline vel.	1204	1206	fpm
Ambient pressure	29.41	29.41	inHg
Ambient humidity	25%	23%	RH
Ambient temp	86	87.8	F
Back-Gd aerosol	8,14,3,4	6,7,10,8	pt/ft3
No. Bk-Gd samples	4	1	
Compressor output	105	100	psig

Instuments Used:

		Cal. Due
Solomat	SN12951472	3/17/2010
Met One A2408	96258675	4/16/2010
Fisher Scientific	61876141	4/9/2010



Notes: Both counters started simultaneously.
Velocity measurements made at port 2, centerline.
Fixed at this position during testing.
JEF 7/9/09

Oil Used: FisherBrand 19
Bottom, Trial 3. Accidentally wrote #4 twice, (incorrectly the second time) on line for #5. Shift #'s up by one to fix.
JEF 7/9/09

Entries made by:	Julia Flaherty		Technical Data Review performed by: Ernest Antonio
Signature/date	*On File With Original*	7/9/2009	Signature/date *On File with Original TI-RPP-WTP-679* 9-Jul-10

Appendix B

LV-S1 Data Sheets

Appendix B.1: LV-S1 Calibration of Ventilation Flow Controller Data Sheets

VELOCITY TRAVERSE DATA FORM

Site	**LV-S1 (C3) Model**	Run No.	**VC-1**
Date	**8/5/09**	Fan Configuration	**A Only, Damper B Closed**
Testers	VRM, JEF	Fan Setting	**30** **Hz**
Stack Dia.	11.844 in.	Stack Temp	85.8 deg F
Stack X-Area	110.2 in.2	Start/End Time	09:54 / 10:40
Test Port	2	Center 2/3 from	1.09 to: 10.76
ce to disturbance	149.25 inches	Points in Center 2/3	2 to: 7
Velocity units	ft/min	Data Files:	NA

Order -->	1st				2nd			
Traverse-->	Side				Top			
Trial ---->	1	2	3	Mean	1	2	3	Mean
Point	epth,	Velocity				Velocity			
1	###	1236	1228	1138	1200.7	1104	1157	1147	1136.0
2	###	1282	1268	1192	1247.3	1297	1294	1305	1298.7
3	###	1314	1295	1314	1307.7	1375	1281	1277	1311.0
4	###	1346	1295	1352	1331.0	1337	1349	1294	1326.7
Center	###	1313	1342	1295	1316.7	1320	1301	1297	1306.0
5	###	1366	1372	1332	1356.7	1347	1343	1293	1327.7
6	###	1353	1402	1308	1354.3	1349	1340	1338	1342.3
7	###	1263	1289	1261	1271.0	1306	1296	1315	1305.7
8	###	910	1114	992	1005.3	1273	1171	1089	1177.7
Averages ---------		1264.8	1289.4	1242.7	1265.6	1300.9	1281.3	1261.7	1281.3

All	ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1273.5		Mean	1312.1	1316.9	1314.5
Min Point	1005.3	-21.1%	Std. Dev.	40.9	15.7	29.9
Max Point	1356.7	6.5%	COV as %	3.1	1.2	**2.3**

Flow w/o C-Pt 971 acfm

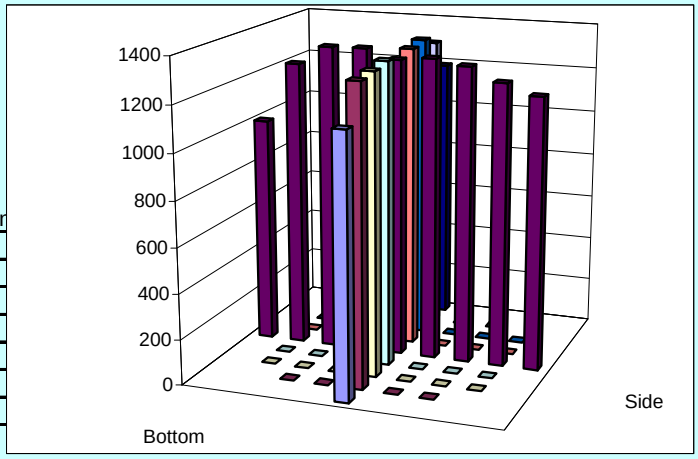
el Avg w/o C-Pt 1269 fpm

Instuments Used: Cal Due

Solomat Zephyr SN 12951472 03/17/10

Fisher Scientific SN 61876141 4/9/2010

	Start	Finish	
Stack temp	84.5	87	F
Equipment temp	81.3	89.2	F
Ambient temp	102	89.6	F
Stack static	0.03	0.03	mbars
Ambient pressur	29.26	29.26	in Hg
Total Stack pres	990.90	990.90	mbars
Ambient humidity	18%	21%	RH



Notes: Ambient temperature too high - sitting ir
@ start.

JEF 8/5/09

Entries made by: Julia Flaherty
Signature/date *On File With Original* 8/5/2009

Technical Data Review performed by: Ernest Antonio
Signature/date Signature on file 7/09/2010
TI-RPP-WTP_687

VELOCITY TRAVERSE DATA FORM

Site	**LV-S1 (C3) Model**	Run No.	**VC-2**
Date	**8/5/09**	Fan Configuration	**B only, Damper A Closed**
Testers	VRM, JEF	Fan Setting	**30 Hz**
Stack Dia.	11.844 in.	Stack Temp	87.9 deg F
Stack X-Area	110.2 in.2	Start/End Time	10:45 / 11:30 16:22
Test Port	2	Center 2/3 from	1.09 to: 10.76
Distance to disturbance	149.25 inches	Points in Center 2/3	2 to: 7
Velocity units	ft/min	Data Files:	NA

Order -->		2nd				1st				
Traverse-->		Side				Top				
Trial ---->		1	2	3	Mean	1	2	3	Mean	
Point	Depth, in.	Velocity				Velocity				
1	0.50	892	907	907	902.0	903	1070	975	982.7	
2	1.24	953	966	945	954.7	1054	1059	1057	1056.7	
3	2.29	933	973	964	956.7	1105	1083	1110	1099.3	
4	3.82	940	981	974	965.0	1102	1091	1121	1104.7	
Center	5.91	949	994	1013	985.3	1069	1092	1082	1081.0	
5	8.00	978	979	991	982.7	1104	1077	1091	1090.7	
6	9.52	972	988	988	982.7	1074	1067	1092	1077.7	
7	10.57	920	923	916	919.7	1035	1046	1041	1040.7	
8	11.31	737	723	706	722.0	983	951	981	971.7	
Averages ---------->		919.3	937.1	933.8	930.1	1047.7	1059.6	1061.1	1056.1	

All	ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	993.1		Mean	963.8	1078.7	1021.2
Min Point	722.0	-27.3%	Std. Dev.	23.3	23.0	63.6
Max Point	1104.7	11.2%	COV as %	2.4	2.1	**6.2**

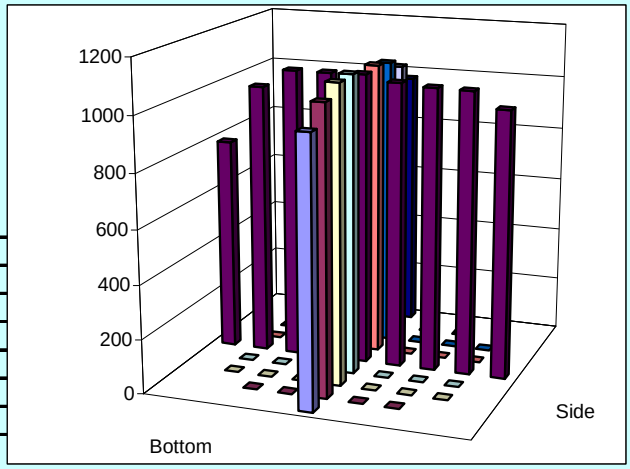
Flow w/o C-Pt 756 acfm

Vel Avg w/o C-Pt 988 fpm

Instuments Used:

	Cal Due
Solomat Zephyr SN 12951472	03/17/10
Fisher Scientific SN 61876141	4/9/2010

	Start	Finish	
Stack temp	87	88.8	F
Equipment temp	89.2	89.2	F
Ambient temp	89.6	88.7	F
Stack static	0.03	0.20	mbars
Ambient pressure	29.26	29.26	in Hg
Total Stack pressure	990.90	991.05	mbars
Ambient humidity	21%	26%	RH



Notes:

JEF 8/5/09

Entries made by:	Victor Morris	
Signature/date	*On File With Original*	8/5/2009

Technical Data Review performed by: Ernest Antonio
Signature/date Signature on file 7/09/2010
TI-RPP-WTP_687

VELOCITY TRAVERSE DATA FORM

Site	**LV-S1 (C3) Model**	Run No.	**VC-3**
Date	**8/21/09**	Fan Configuration	**A only, damper B closed**
Testers	JEF, DMT	Fan Setting	**30 Hz**
Stack Dia.	11.84 in.	Stack Temp	86.7 deg F
Stack X-Area	110.1 in.2	Start/End Time	0920/1040 16:22
Test Port	2	Center 2/3 from	1.09 to: 10.75
Distance to disturbance	149.25 inches	Points in Center 2/3	2 to: 7
Velocity units	ft/min	Data Files:	NA

Order -->		1st				2nd			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1		1060	1060	1070	1063.3	1150	1140	1130	1140.0
2		1150	1160	1150	1153.3	1180	1210	1170	1186.7
3		1230	1210	1210	1216.7	1220	1250	1220	1230.0
4		1220	1190	1220	1210.0	1210	1220	1200	1210.0
Center		1180	1180	1200	1186.7	1190	1200	1160	1183.3
5		1190	1170	1220	1193.3	1180	1190	1150	1173.3
6		1160	1160	1140	1153.3	1180	1190	1150	1173.3
7		1090	1120	1130	1113.3	1150	1170	1090	1136.7
8		1040	995	1030	1021.7	1070	1130	1030	1076.7
Averages ---------->		1146.7	1138.3	1152.2	1145.7	1170.0	1188.9	1144.4	1167.8

All	ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1156.8		Mean	1175.2	1184.8	1180.0
Min Point	1021.7	-11.7%	Std. Dev.	36.9	29.6	32.5
Max Point	1230.0	6.3%	COV as %	3.1	2.5	**2.8**

Flow w/o C-Pt 882 acfm

Vel Avg w/o C-Pt 1153 fpm

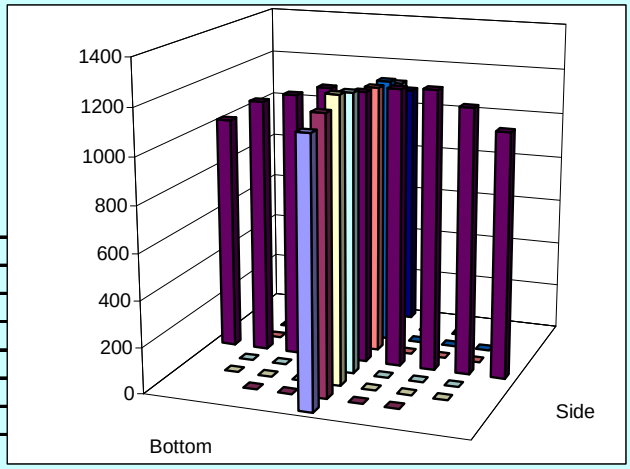
Instuments Used: Cal Due

Velocicalc TSI SN305039 06/23/09

Fisher Scientific SN 61876141 4/9/2010

JEF 08/21/09

	Start	Finish	
Stack temp	82.5	90.9	F
Equipment temp	n/a	n/a	F
Ambient temp	84.2	85.1	F
Stack static	n/a	n/a	mbars
Ambient pressure	29.06	29.09	in Hg
Total Stack pressure	n/a	n/a	mbars
Ambient humidity	32%	29%	RH



Notes: Butterfly valves upstream of A and B are both open. TSI gives standard ft/min.

JEF 8/21/09

Entries made by:	Julia Flahert 8/21/2009
Signature/date	On file with original

Technical Data Review performed by: Ernest Antonio

Signature/date Signature on file 7/09/2010

TI-RPP-WTP_687

VELOCITY TRAVERSE DATA FORM

Site	**LV-S1 (C3) Model**	Run No.	**VC-4**
Date	**8/21/09**	Fan Configuration	**B only, Damper A closed**
Testers	JEF, DMT	Fan Setting	**30 Hz**
Stack Dia.	11.844 in.	Stack Temp	94.6 deg F
Stack X-Area	110.2 in.2	Start/End Time	1210/1255
Test Port	2	Center 2/3 from	1.09 to: 10.76
Distance to disturbance	149.25 inches	Points in Center 2/3	2 to: 7
Velocity units	ft/min	Data Files:	NA

Order -->		1st				2nd			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1		1070	1150	1050	1090.0	1030	1040	1100	1056.7
2		1190	1150	1170	1170.0	1140	1150	1150	1146.7
3		1190	1200	1210	1200.0	1180	1130	1160	1156.7
4		1220	1200	1200	1206.7	1190	1170	1180	1180.0
Center		1160	1190	1170	1173.3	1180	1150	1150	1160.0
5		1140	1140	1160	1146.7	1180	1150	1160	1163.3
6		1100	1120	1090	1103.3	1110	1120	1120	1116.7
7		1080	1060	1030	1056.7	1060	1070	1050	1060.0
8		960	1010	1010	993.3	990	1020	1020	1010.0
Averages ---------->		1123.3	1135.6	1121.1	1126.7	1117.8	1111.1	1121.1	1116.7

All	ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1121.7		Mean	1151.0	1140.5	1145.7
Min Point	993.3	-11.4%	Std. Dev.	54.1	40.4	46.2
Max Point	1206.7	7.6%	COV as %	4.7	3.5	**4.0**

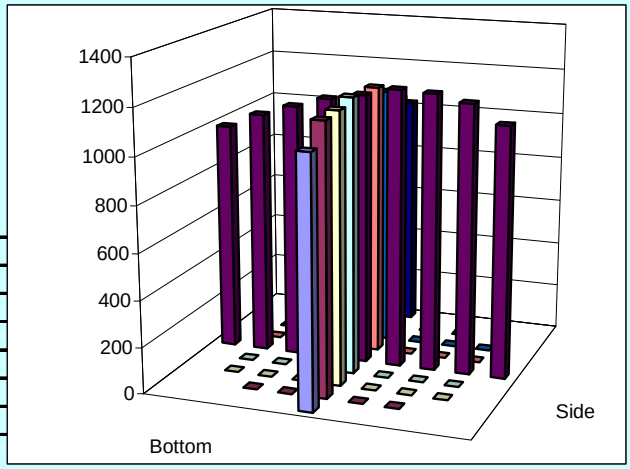
Flow w/o C-Pt 854 acfm

Vel Avg w/o C-Pt 1116 fpm

Instuments Used:

	Cal Due
Velocicalc TSI SN305039	06/23/09
Fisher Scientific SN 61876141	4/9/2010

	Start	Finish	
Stack temp	93.3	95.8	F
Equipment temp	n/a	n/a	F
Ambient temp	86.9	89.6	F
Stack static	n/a	n/a	mbars
Ambient pressure	29.09	29.12	in Hg
Total Stack pressure	n/a	na/	mbars
Ambient humidity	28%	27%	RH



Notes: Butterfly valves upstream of A and B are both open. TSI gives standard ft/min.

JEF 8/21/09

Entries made by:	Julia Flahert 8/21/2009	Technical Data Review performed by: Ernest Antonio
Signature/date	On file with original	Signature/date Signature on file 7/09/2010
		TI-RPP-WTP_687

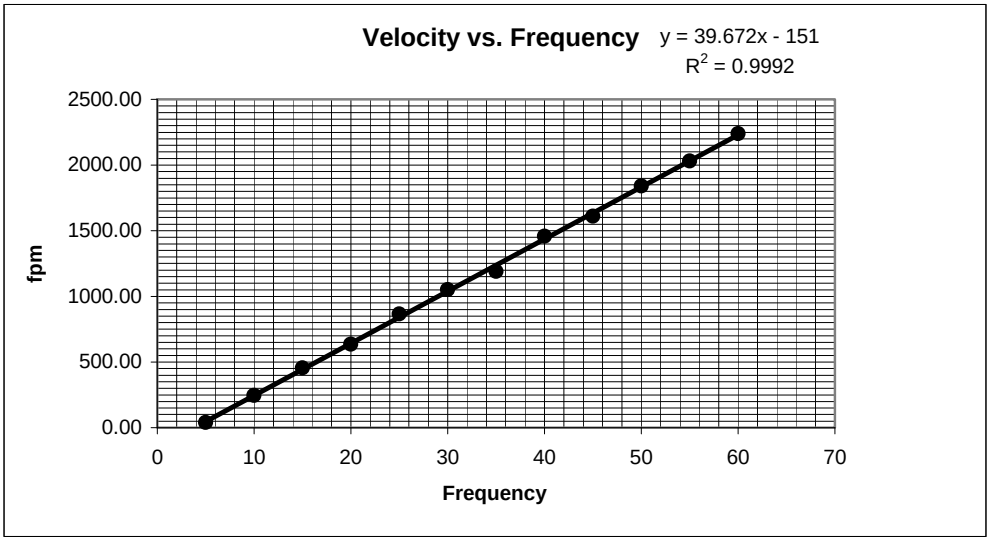
VELOCITY vs. FREQUENCY DATA FORM

VELFR_Rev0 8/11/2006

Site	**LV-S1 (C3) model**	Run No.	**VF-1**
Date	8/6/2009	Stack Temp	92.3
Tester	DMT, JEF	Stack RH%	20%
Stack Dia.	11.844 in.	Baro Press	29.15 in Hg
Stack X-Area	110.2 in2	Fan Configuration	A only, Damper B Closed
Test Port	2	Start/End Time	13:35 / 14:02
Dist. from disturbance	149.25 inches	Reference point from velocity test VC :	Side, 7
Velocity Readings, units =	fpm		

					Target cfm	Target fpm	Estmtd Hz
	fpm						
Hz	1	2	3	Mean	StDev	2 StDev	cfm
5	33	54	33	40.00	12.12	24.25	30.60
10	249	236	251	245.33	8.14	16.29	187.71
15	458	455	450	454.33	4.04	8.08	347.62
20	666	620	620	635.33	26.56	53.12	486.10
25	903	873	824	866.67	39.88	79.76	663.10
30	1080	1047	1027	1051.33	26.76	53.53	804.39
35	1251	1133	1188	1190.67	59.05	118.09	910.99
40	1493	1374	1508	1458.33	73.42	146.84	1115.79
45	1739	1518	1571	1609.33	115.38	230.76	1231.32
50	1972	1726	1822	1840.00	123.98	247.97	1407.80
55	2053	1969	2069	2030.33	53.72	107.43	1553.43
60	2297	2228	2190	2238.33	54.24	108.49	1712.57

Instuments Used:	**Cal Exp. Date:**
Solomat Zephyr SN 12951472	3/17/2010
Fisher Scientific SN 61876141	4/9/2010



Entries made by: Julia Flaherty	Technical Data Review performed by: Ernest Antonio
Signature/date *On File With Original* 8/6/2009	Signature/date Signature on file 7/09/2010 TI-RPP-WTP_687

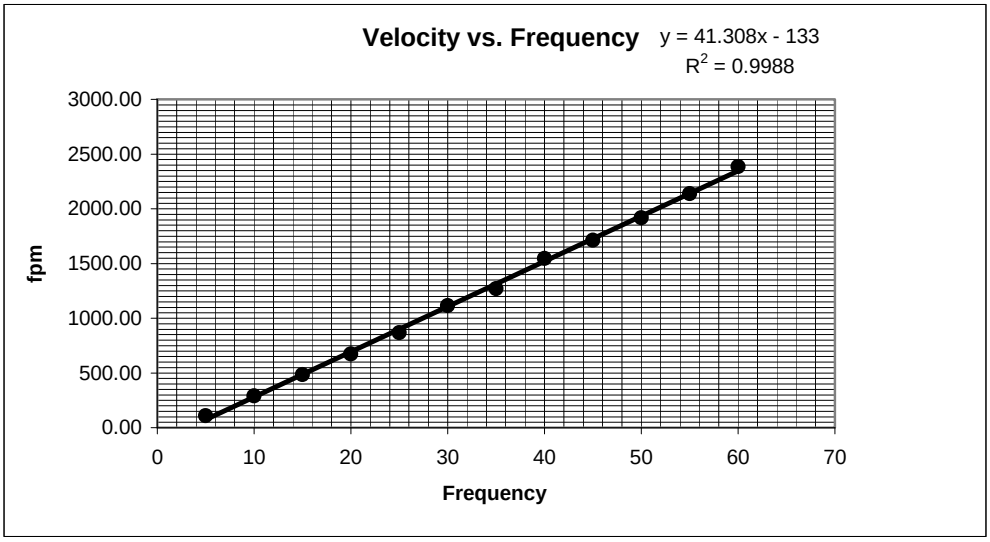
VELOCITY vs. FREQUENCY DATA FORM

VELFR_Rev0 8/11/2006

Site	**LV-S1 (C3) model**	Run No.	**VF-2**
Date	8/6/2009	Stack Temp	82
Tester	DMT, JEF	Stack RH%	24%
Stack Dia.	11.844 in.	Baro Press	29.12 in Hg
Stack X-Area	110.2 in2	Fan Configuration	B only, Damper A closed
Test Port	2	Start/End Time	
Dist. from disturbance	149.25 inches	Reference point from velocity test VC :	Side, Center
Velocity Readings, units =	fpm		

					Target cfm	Target fpm	Estmtd Hz
	fpm						
Hz	1	2	3	Mean	StDev	2 StDev	cfm
5	80	104	149	111.00	35.03	70.06	84.93
10	254	291	323	289.33	34.53	69.06	221.37
15	430	503	523	485.33	48.95	97.90	371.33
20	568	721	731	673.33	91.36	182.72	515.17
25	727	925	953	868.33	123.20	246.39	664.37
30	990	1158	1197	1115.00	110.00	219.99	853.10
35	1021	1408	1385	1271.33	217.10	434.20	972.71
40	1418	1605	1618	1547.00	111.91	223.81	1183.63
45	1493	1792	1854	1713.00	193.03	386.06	1310.63
50	1638	2039	2074	1917.00	242.25	484.51	1466.72
55	1837	2254	2320	2137.00	261.90	523.79	1635.04
60	2036	2583	2540	2386.33	304.16	608.32	1825.81

Instuments Used:	**Cal Exp. Date:**
Solomat Zephyr SN 12951472	3/17/2010
Fisher Scientific SN 61876141	4/9/2010



Entries made by: Julia Flaherty	Technical Data Review performed by: Ernest Antonio
Signature/date *On File With Original* 8/6/2009	Signature/date Signature on file 7/09/2010 TI-RPP-WTP_687

VELOCITY vs. FREQUENCY DATA FORM

VELFR_Rev0 8/11/2006

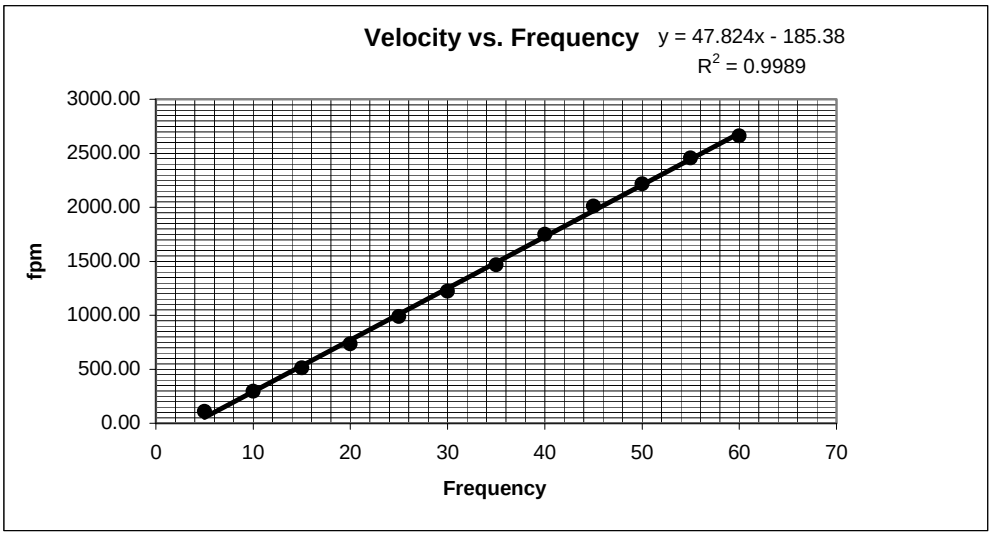
Site	**LV-S1 (C3) model**	Run No.	**VF-3**
Date	8/24/2009	Stack Temp	73.2 / 75.0 deg F
Tester	DMT, JEF	Stack RH%	37%
Stack Dia.	11.844 in.	Baro Press	29.23
Stack X-Area	110.2 in2	Fan Configuration	A only, Damper B Closed
Test Port	2	Start/End Time	0930 / 1010
Dist. from disturbance	149.25 inches	Reference point from velocity test VC :	Side 6
Velocity Readings, units =	s fpm		

					Target cfm	Target fpm	Estmtd Hz
					1917	2440	55
	fpm				1167	1485	35
Hz	1	2	3	Mean	StDev	2 StDev	cfm
5	106	115	106	109.00	5.20	10.39	83.40
10	304	295	285	294.67	9.50	19.01	225.45
15	520	505	510	511.67	7.64	15.28	391.48
20	750	740	715	735.00	18.03	36.06	562.36
25	1000	985	985	990.00	8.66	17.32	757.46
30	1210	1230	1230	1223.33	11.55	23.09	935.99
35	1490	1460	1450	1466.67	20.82	41.63	1122.16
40	1740	1720	1790	1750.00	36.06	72.11	1338.94
45	2020	1980	2030	2010.00	26.46	52.92	1537.87
50	2220	2210	2220	2216.67	5.77	11.55	1696.00
55	2470	2420	2480	2456.67	32.15	64.29	1879.62
60	2630	2690	2670	2663.33	30.55	61.10	2037.74

Instuments Used: **Cal Exp. Date:**

TSI VelociCalc SN305039	6/23/2010
Fisher Scientific SN61876141	4/9/2010

DMT 8/24/09



Entries made by:	Julia Flaherty	Technical Data Review performed by: Ernest Antonio	
Signature/date	On file with original 8/24/2009	Signature/date	Signature on file 7/09/2010 TI-RPP-WTP_687

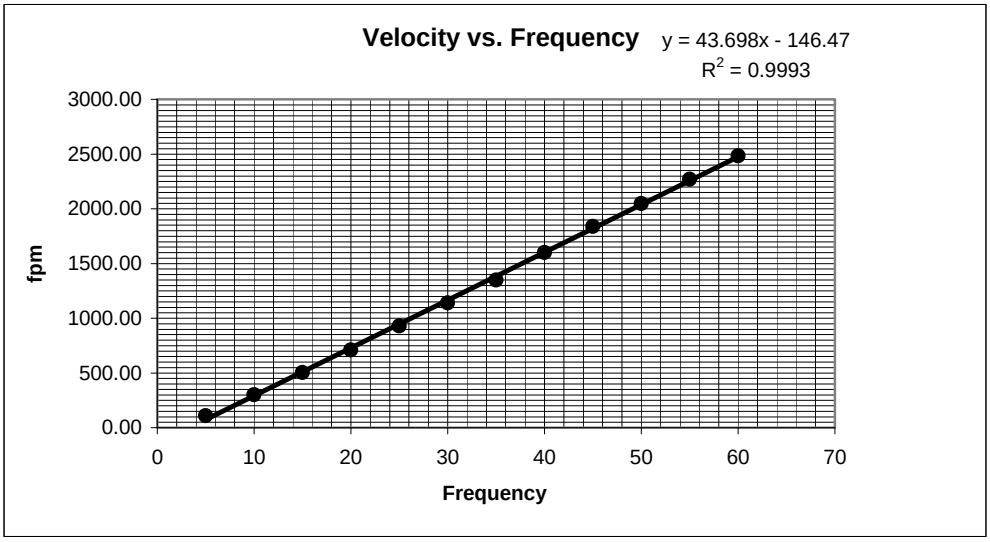
VELOCITY vs. FREQUENCY DATA FORM

VELFR_Rev0 8/11/2006

Site	**LV-S1 (C3) model**		Run No.	**VF-4**	
Date	8/24/2009		Stack Temp	77.1 / 79.0 deg F	
Tester	DMT, JEF		Stack RH%	34, 28%	
Stack Dia.	11.844	in.	Baro Press	29.23	
Stack X-Area	110.2	in2	Fan Configuration	B open, Damper A closed	
Test Port	2		Start/End Time	1019 / 1055	
Dist. from disturbance	149.25	inches	Reference point from velocity test VC	:	Top 6
Velocity Readings, units =	s fpm				

					Target	Target	Estmtd
					cfm	fpm	Hz
					1917	2440	60
	fpm				1167	1485	37
Hz	1	2	3	Mean	StDev	2 StDev	cfm
5	118	108	105	110.33	6.81	13.61	84.42
10	304	296	306	302.00	5.29	10.58	231.06
15	492	510	510	504.00	10.39	20.78	385.62
20	700	720	710	710.00	10.00	20.00	543.23
25	925	940	920	928.33	10.41	20.82	710.28
30	1150	1140	1130	1140.00	10.00	20.00	872.23
35	1330	1360	1360	1350.00	17.32	34.64	1032.90
40	1620	1590	1590	1600.00	17.32	34.64	1224.18
45	1860	1830	1830	1840.00	17.32	34.64	1407.80
50	2040	2030	2070	2046.67	20.82	41.63	1565.93
55	2260	2270	2280	2270.00	10.00	20.00	1736.80
60	2500	2490	2460	2483.33	20.82	41.63	1900.02

Instuments Used:	**Cal Exp. Date:**
TSI VelociCalc SN305039	6/23/2010
Fisher Scientific SN61876141	4/9/2010



Entries made by:	Donna Trott	Technical Data Review performed by:	Ernest Antonio
Signature/date	On file with original 8/24/2009	Signature/date	Signature on file 7/09/2010 TI-RPP-WTP_687

VELOCITY vs. FREQUENCY DATA FORM

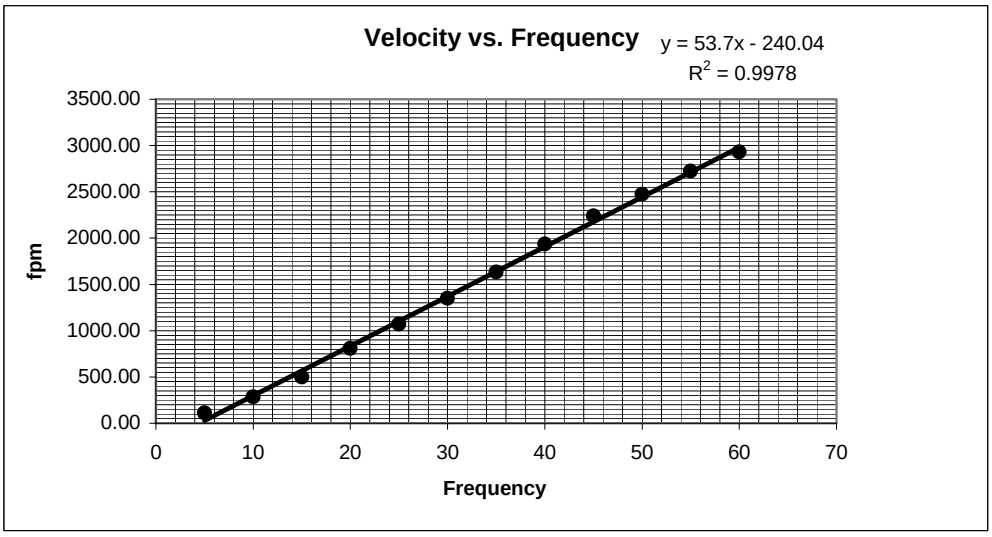
VELFR_Rev0 8/11/2006

Site	**LV-S1 (C3) model**	Run No.	**VF-5**
Date	8/24/2009	Stack Temp	82.2, 81.4
Tester	DMT, JEF	Stack RH%	23%
Stack Dia.	11.844 in.	Baro Press	29.26
Stack X-Area	110.2 in2	Fan Configuration	A only, Damper B Closed, Pre-Filters REMOVED
Test Port	2	Start/End Time	1125/1205
Dist. from disturbance	149.25 inches	Reference point from velocity test VC :	Side 6
Velocity Readings, units =	s fpm		

					Target cfm	Target fpm	Estmtd Hz
					1917	2440	50
	fpm				1167	1485	32
Hz	1	2	3	Mean	StDev	2 StDev	cfm
5	110	125	103	112.67	11.24	22.48	86.20
10	290	280	289	286.33	5.51	11.02	219.08
15	535	450	510	498.33	43.68	87.37	381.28
20	825	815	785	808.33	20.82	41.63	618.46
25	1100	1070	1040	1070.00	30.00	60.00	818.67
30	1340	1370	1340	1350.00	17.32	34.64	1032.90
35	1660	1630	1610	1633.33	25.17	50.33	1249.68
40	1990	1980	1840	1936.67	83.86	167.73	1481.76
45	2320	2240	2160	2240.00	80.00	160.00	1713.85
50	2500	2500	2420	2473.33	46.19	92.38	1892.37
55	2760	2720	2690	2723.33	35.12	70.24	2083.65
60	2970	2920	2900	2930.00	36.06	72.11	2241.77

Instuments Used:	**Cal Exp. Date:**
TSI VelociCalc SN305039	6/23/2010
Fisher Scientific SN61876141	4/9/2010

DMT 8/24/09



Entries made by:	Julia Flaherty	Technical Data Review performed by: Ernest Antonio	
Signature/date	On file with original 8/24/2009	Signature/date	Signature on file 7/09/2010 TI-RPP-WTP_687

VELOCITY vs. FREQUENCY DATA FORM

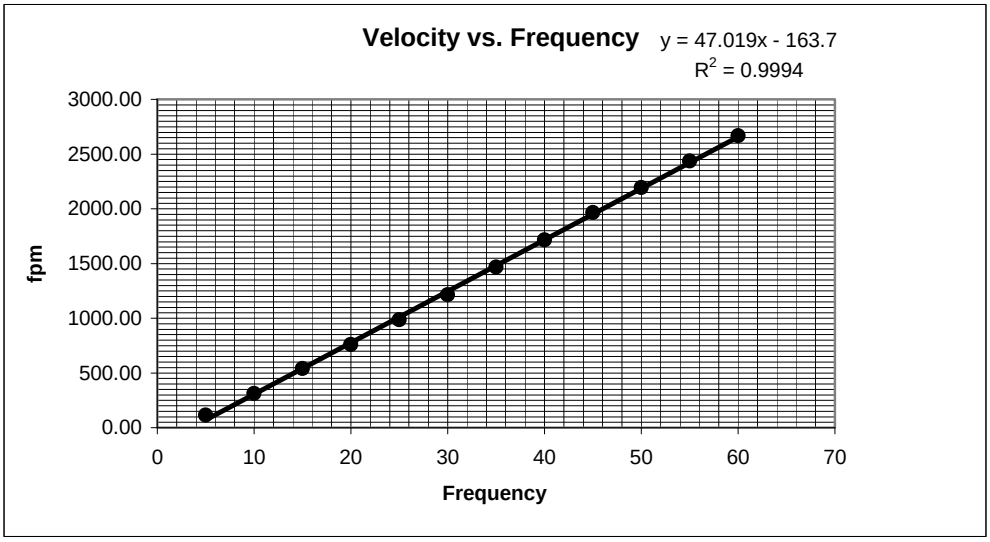
VELFR_Rev0 8/11/2006

Site	**LV-S1 (C3) model**	Run No.	**VF-6**
Date	8/24/2009	Stack Temp	90.5 / 90 deg F
Tester	DMT, JEF	Stack RH%	29% / 23%
Stack Dia.	11.844 in.	Baro Press	29.26 / 29.26 in Hg
Stack X-Area	110.2 in2	Fan Configuration	B open, Damper A closed, Prefilters REMOVED
Test Port	2	Start/End Time	13:40 / 14:20
Dist. from disturbance	149.25 inches	Reference point from velocity test VC :	Top 6
Velocity Readings, units =	s fpm		

					Target cfm	Target fpm	Estmtd Hz
					1917	2440	55
	fpm				1167	1485	35
Hz	1	2	3	Mean	StDev	2 StDev	cfm
5	117	124	103	114.67	10.69	21.39	87.73
10	314	304	322	313.33	9.02	18.04	239.73
15	550	540	530	540.00	10.00	20.00	413.16
20	750	770	760	760.00	10.00	20.00	581.48
25	1000	965	990	985.00	18.03	36.06	753.63
30	1230	1210	1200	1213.33	15.28	30.55	928.33
35	1470	1470	1460	1466.67	5.77	11.55	1122.16
40	1710	1730	1710	1716.67	11.55	23.09	1313.44
45	1950	1990	1960	1966.67	20.82	41.63	1504.72
50	2180	2220	2180	2193.33	23.09	46.19	1678.14
55	2440	2450	2420	2436.67	15.28	30.55	1864.32
60	2630	2720	2650	2666.67	47.26	94.52	2040.29

Note: Duct tape applie
around damper, leak s
in evidence as someth
is flapping. DMT 8/24/

Instuments Used:	**Cal Exp. Date:**
TSI VelociCalc SN305039	6/23/2010
Fisher Scientific SN61876141	4/9/2010



Entries made by:	Donna Trott	Technical Data Review performed by: Ernest Antonio	
Signature/date	On file with original 8/24/2009	Signature/date	Signature on file 7/09/2010 TI-RPP-WTP_687

Appendix B.2: LV-S1 Velocity Uniformity Data Sheets

VELOCITY TRAVERSE DATA FORM

Site	**LV-S1 (C3) Model**	Run No.	**VT-1**		
Date	**8/7/09**	Fan Configuration	**B only, Damper A closed**		
Testers	JEF, DMT	Fan Setting	**60**	**Hz**	
Stack Dia.	11.844 in.	Stack Temp	73.0	deg F	
Stack X-Area	110.2 in.2	Start/End Time	0840/0920		
Test Port	1	Center 2/3 from	1.09	to:	10.76
Distance to disturbance	209.5 inches	Points in Center 2/3	2	to:	7
Velocity units	ft/min	Data Files:	NA		

Order -->		1st				2nd			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	2387	2433	2331	2383.7	2328	2128	2099	2185.0
2	1.24	2511	2470	2517	2499.3	2494	2393	2326	2404.3
3	2.29	2471	2537	2511	2506.3	2532	2388	2468	2462.7
4	3.82	2511	2530	2522	2521.0	2471	2373	2456	2433.3
Center	5.91	2506	2515	2508	2509.7	2525	2328	2363	2405.3
5	8.00	2510	2543	2525	2526.0	2310	2301	2409	2340.0
6	9.52	2505	2426	2434	2455.0	2341	2330	2383	2351.3
7	10.57	2383	2334	2278	2331.7	2210	2289	2360	2286.3
8	11.31	2117	1848	1978	1981.0	2074	1873	2142	2029.7
Averages ---------->		2433.4	2404.0	2400.4	2412.6	2365.0	2267.0	2334.0	2322.0

All	ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	2367.3		Mean	2478.4	2383.3	2430.9
Min Point	1981.0	-16.3%	Std. Dev.	68.7	60.6	79.4
Max Point	2526.0	6.7%	COV as %	2.8	2.5	**3.3**

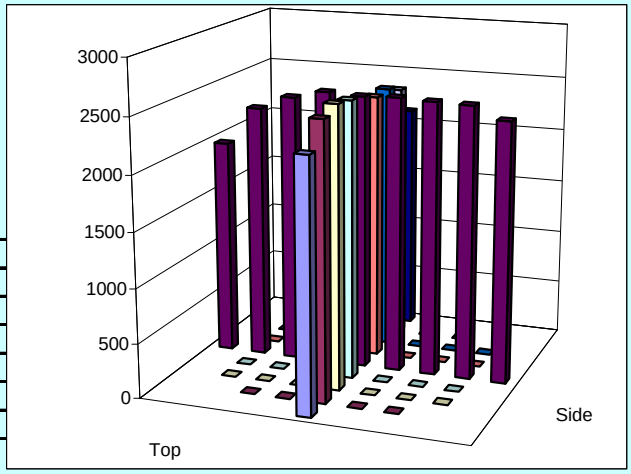
Flow w/o C-Pt 1803 acfm

Vel Avg w/o C-Pt 2356 fpm

Instuments Used:

	Cal Due
Solomat Zephyr SN 12951472	03/17/10
Fisher Scientific SN 61876141	04/09/10

	Start	Finish	
Stack temp	72.8	73	F
Equipment temp	69.2	75	F
Ambient temp	72.5	75.2	F
Stack static	1.27	1.20	mbars
Ambient pressure	29.09	29.09	in Hg
Total Stack pressure	986.40	986.40	mbars
Ambient humidity	54%	44%	RH



Notes: May need more time to let the fan warm up.
Use side #4 instead of side run #1.

JEF 8/7/09

Entries made by:	Julia Flaherty	
Signature/date	On file with original	8/7/2009

Technical Data Review performed by: Ernest Antonio
Signature/date Signature on file 7/12/2010
TI-RPP-WTP_688

VELOCITY TRAVERSE DATA FORM

Site	**LV-S1 (C3) Model**	Run No.	**VT-2**
Date	**8/7/09**	Fan Configuration	**B only, Damper A closed**
Testers	JEF, DMT	Fan Setting	**60 Hz**
Stack Dia.	11.844 in.	Stack Temp	73.0 deg F
Stack X-Area	110.2 in.2	Start/End Time	0925/1000
Test Port	2	Center 2/3 from	1.09 to: 10.76
Distance to disturbance	149.25 inches	Points in Center 2/3	2 to: 7
Velocity units	ft/min	Data Files:	NA

Order -->		1st				2nd			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	2126	2154	2222	2167.3	1997	2160	1917	2024.7
2	1.24	2400	2325	2358	2361.0	2163	2207	2267	2212.3
3	2.29	2494	2398	2415	2435.7	2301	2210	2362	2291.0
4	3.82	2528	2423	2444	2465.0	2377	2324	2369	2356.7
Center	5.91	2538	2396	2427	2453.7	2305	2294	2267	2288.7
5	8.00	2473	2433	2445	2450.3	2320	2329	2310	2319.7
6	9.52	2434	2384	2369	2395.7	2319	2318	2320	2319.0
7	10.57	2288	2292	2198	2259.3	2173	2103	2196	2157.3
8	11.31	1766	2276	1847	1963.0	2052	2036	1985	2024.3
Averages ---------->		2338.6	2342.3	2302.8	2327.9	2223.0	2220.1	2221.4	2221.5

All	ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	2274.7		Mean	2403.0	2277.8	2340.4
Min Point	1963.0	-13.7%	Std. Dev.	73.2	69.2	94.4
Max Point	2465.0	8.4%	COV as %	3.0	3.0	**4.0**

Flow w/o C-Pt 1731 acfm

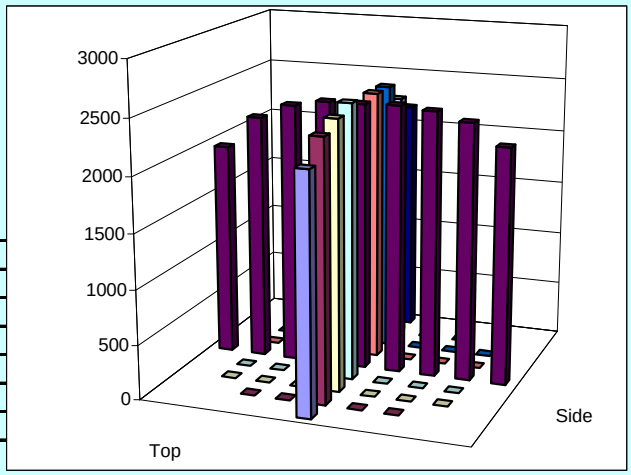
Vel Avg w/o C-Pt 2263 fpm

Instuments Used: Cal Due

Solomat Zephyr SN 12951472 03/17/10

Fisher Scientific SN 61876141 04/09/10

	Start	Finish	
Stack temp	73	74.6	F
Equipment temp	75.5	76.2	F
Ambient temp	76.1	77	F
Stack static	1.27	1.34	mbars
Ambient pressure	29.09	29.12	in Hg
Total Stack pressure	986.40	987.50	mbars
Ambient humidity	44%	42%	RH



Notes:

JEF 8/7/09

Entries made by:	Julia Flaherty	Technical Data Review performed by:	Ernest Antonio
Signature/date	On file with original 8/7/2009	Signature/date	Signature on file 7/12/2010
			TI-RPP-WTP_688

VELOCITY TRAVERSE DATA FORM

Site	**LV-S1 (C3) Model**	Run No.	**VT-3**
Date	**8/7/09**	Fan Configuration	**B only, Damper A closed**
Testers	JEF, DMT	Fan Setting	**60 Hz**
Stack Dia.	11.844 in.	Stack Temp	75.1 deg F
Stack X-Area	110.2 in.2	Start/End Time	1006/1115
Test Port	2	Center 2/3 from	1.09 to: 10.76
Distance to disturbance	149.25 inches	Points in Center 2/3	2 to: 7
Velocity units	ft/min	Data Files:	NA

Order -->		2nd				1st				
Traverse-->		Side				Top				
Trial ---->		1	2	3	Mean	1	2	3	Mean	
Point	Depth, in.	Velocity				Velocity				
1	0.50	2332	2467	2387	2395.3	2276	2407	2280	2321.0	
2	1.24	2385	2516	2417	2439.3	2290	2043	2362	2231.7	
3	2.29	2532	2518	2484	2511.3	2398	2469	2507	2458.0	
4	3.82	2460	2519	2319	2432.7	2459	2518	2528	2501.7	
Center	5.91	2480	2474	2429	2461.0	2416	2375	2509	2433.3	
5	8.00	2563	2428	2457	2482.7	2499	2492	2494	2495.0	
6	9.52	2442	2404	2186	2344.0	2553	2495	2449	2499.0	
7	10.57	2298	2379	2098	2258.3	2551	2200	2373	2374.7	
8	11.31	1747	1600	1620	1655.7	2274	2002	2169	2148.3	
Averages ---------->		2359.9	2367.2	2266.3	2331.1	2412.9	2333.4	2407.9	2384.7	

All	ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	2357.9		Mean	2418.5	2427.6	2423.0
Min Point	1655.7	-29.8%	Std. Dev.	87.9	97.7	89.4
Max Point	2511.3	6.5%	COV as %	3.6	4.0	**3.7**

Flow w/o C-Pt 1796 acfm

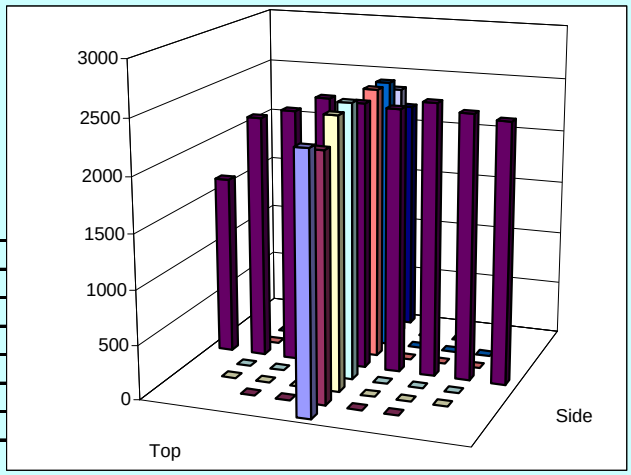
Vel Avg w/o C-Pt 2347 fpm

Instuments Used: Cal Due

Solomat Zephyr SN 12951472 03/17/10

Fisher Scientific SN 61876141 04/09/10

	Start	Finish	
Stack temp	74.8	75.5	F
Equipment temp	76.1	76.8	F
Ambient temp	79.7	77.9	F
Stack static	0.32	0.23	mbars
Ambient pressure	29.12	29.15	in Hg
Total Stack pressure	986.44	987.40	mbars
Ambient humidity	32%	39%	RH



Notes:

DMT 8/7/09

Entries made by:	Donna Trott	Technical Data Review performed by:	Ernest Antonio
Signature/date	On file with original 8/7/2009	Signature/date	Signature on file 7/12/2010
			TI-RPP-WTP_688

VELOCITY TRAVERSE DATA FORM

Site	**LV-S1 (C3) Model**	Run No.	**VT-4**
Date	**8/14/09**	Fan Configuration	**B only, damper A closed**
Testers	DMT	Fan Setting	**60 Hz**
Stack Dia.	11.844 in.	Stack Temp	76.0 deg F
Stack X-Area	110.2 in.2	Start/End Time	0921/1029
Test Port	2	Center 2/3 from	1.09 to: 10.76
Distance to disturbance	149.25 inches	Points in Center 2/3	2 to: 7
Velocity units	ft/min	Data Files:	NA

Order -->		1st				2nd			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	2290	2260	2290	2280.0	2230	2210	2270	2236.7
2	1.24	2290	2320	2320	2310.0	2280	2330	2250	2286.7
3	2.29	2270	2310	2310	2296.7	2300	2270	2290	2286.7
4	3.82	2170	2200	2150	2173.3	2260	2240	2170	2223.3
Center	5.91	2130	2170	2100	2133.3	2240	2150	2130	2173.3
5	8.00	2100	2060	2100	2086.7	2050	2050	2060	2053.3
6	9.52	2000	1950	1920	1956.7	1900	1920	1920	1913.3
7	10.57	1900	1880	1860	1880.0	1840	1860	1850	1850.0
8	11.31	1660	1600	1640	1633.3	1370	1360	1530	1420.0
Averages ---------->		2090.0	2083.3	2076.7	2083.3	2052.2	2043.3	2052.2	2049.3

All	ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	2066.3		Mean	2119.5	2112.4	2116.0
Min Point	1420.0	-31.3%	Std. Dev.	161.1	177.4	162.8
Max Point	2310.0	11.8%	COV as %	7.6	8.4	**7.7**

Flow w/o C-Pt 1573 acfm

Vel Avg w/o C-Pt 2055 fpm

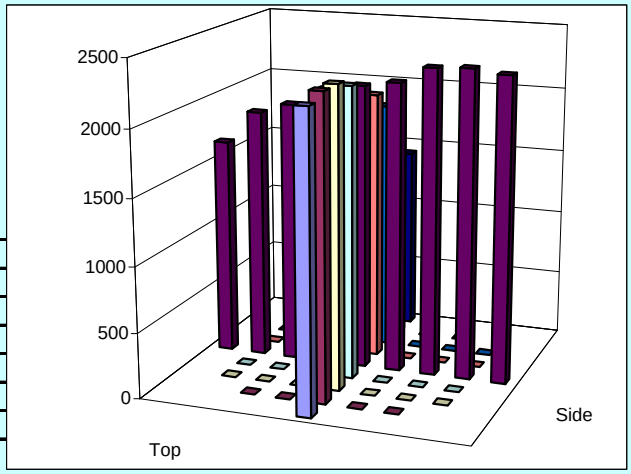
Instuments Used: Cal Due

Velocicalc TSI SN305039 06/23/09

Fisher Scientific SN 61876141 04/09/10

DMT 8/14/09

	Start	Finish	
Stack temp	74.9	77.1	F
Equipment temp	n/a	n/a	F
Ambient temp	77.9	82.4	F
Stack static	n/a	n/a	mbars
Ambient pressure	29.29	29.35	in Hg
Total Stack pressure	n/a	n/a	mbars
Ambient humidity	32%	29%	RH



Notes: Turned fan B on at 8:35 am at 60 Hz, therefore 30+ minutes to "warm up". Replaced Solomat with Velocicalc.

DMT 8/14/09

Entries made by:	Donna Trott	8/14/2009
Signature/date	On file with original	

Technical Data Review performed by: Ernest Antonio

Signature/date Signature on file 7/12/2010

TI-RPP-WTP_688

VELOCITY TRAVERSE DATA FORM

Site	**LV-S1 (C3) Model**	Run No.	**VT-5**
Date	**8/27/09**	Fan Configuration	**B only, Damper A Closed**
Testers	DMT, JEF	Fan Setting	**55** **Hz**
Stack Dia.	11.844 in.	Stack Temp	71.3/75.8 deg F
Stack X-Area	110.2 in.2	Start/End Time	0850/0940
Test Port	2	Center 2/3 from	1.09 to: 10.76
Distance to disturbance	149.25 inches	Points in Center 2/3	2 to: 7
Velocity units	s ft/min	Data Files:	NA

Order -->		1st				2nd			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	2650	2800	2840	2763.3	2630	2630	2590	2616.7
2	1.24	2860	2730	2720	2770.0	2650	2710	2650	2670.0
3	2.29	2880	2720	2770	2790.0	2690	2700	2690	2693.3
4	3.82	2800	2600	2720	2706.7	2690	2680	2750	2706.7
Center	5.91	2640	2620	2590	2616.7	2630	2680	2650	2653.3
5	8.00	2540	2510	2510	2520.0	2570	2600	2590	2586.7
6	9.52	2330	2330	2360	2340.0	2460	2520	2420	2466.7
7	10.57	2250	2240	2300	2263.3	2430	2450	2390	2423.3
8	11.31	2230	2230	2140	2200.0	2430	2360	2340	2376.7
Averages ---------->		2575.6	2531.1	2550.0	2552.2	2575.6	2592.2	2563.3	2577.0

All	s ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	2564.6		Mean	2572.4	2600.0	2586.2
Min Point	2200.0	-14.2%	Std. Dev.	207.6	113.3	161.3
Max Point	2790.0	8.8%	COV as %	8.1	4.4	**6.2**

Flow w/o C-Pt 1955 scfm

Vel Avg w/o C-Pt 2556 sfpm

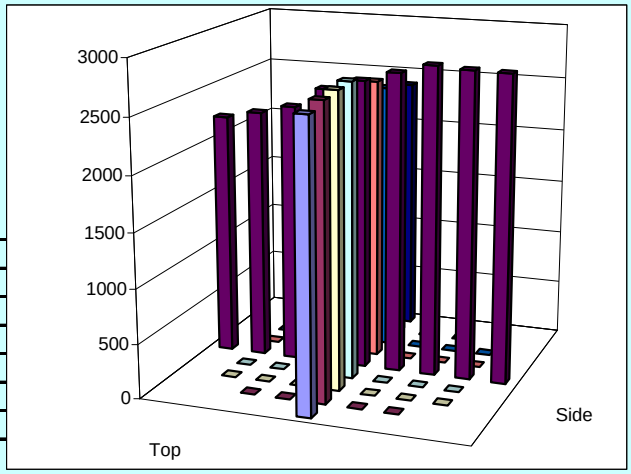
Instuments Used: Cal Due

TSI Velocicalc SN 305039 06/23/10

Fisher Scientific SN 61876141 04/09/10

JEF 8/27/09

	Start	Finish	
Stack temp	71.3	75.8	F
Equipment temp	N/A	N/A	F
Ambient temp	72.5	69.8	F
Stack static	N/A	N/A	mbars
Ambient pressure	29.35	29.35	in Hg
Total Stack pressure	N/A	N/A	mbars
Ambient humidity	34%	34%	RH



Notes: Blue Pre-filters removed. Butterfly valves upstream of A & B are both open.

JEF 8/27/09

Entries made by:	Julia Flaherty	8/27/2009
Signature/date	*On file with original*	

Technical Data Review performed by: Ernest Antonio

Signature/date Signature on file 7/12/2010

TI-RPP-WTP_688

VELOCITY TRAVERSE DATA FORM

Site	**LV-S1 (C3) Model**	Run No.	**VT-6**
Date	**8/27/09**	Fan Configuration	**B only, Damper A Closed**
Testers	DMT, JEF	Fan Setting	**55** **Hz**
Stack Dia.	11.844 in.	Stack Temp	76.8/80.9 deg F
Stack X-Area	110.2 in.2	Start/End Time	0941/1022
Test Port	2	Center 2/3 from	1.09 to: 10.76
Distance to disturbance	149.25 inches	Points in Center 2/3	2 to: 7
Velocity units	s ft/min	Data Files:	NA

Order -->		2nd				1st			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	2570	2610	2600	2593.3	2750	2590	2730	2690.0
2	1.24	2630	2670	2600	2633.3	2710	2820	2790	2773.3
3	2.29	2640	2650	2630	2640.0	2830	2820	2690	2780.0
4	3.82	2650	2690	2630	2656.7	2680	2690	2640	2670.0
Center	5.91	2600	2640	2620	2620.0	2690	2610	2610	2636.7
5	8.00	2510	2510	2520	2513.3	2650	2630	2530	2603.3
6	9.52	2360	2360	2360	2360.0	2450	2430	2410	2430.0
7	10.57	2280	2300	2290	2290.0	2330	2340	2370	2346.7
8	11.31	2180	2210	2150	2180.0	2270	2320	2250	2280.0
Averages ---------->		2491.1	2515.6	2488.9	2498.5	2595.6	2583.3	2557.8	2578.9

All	s ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	2538.7		Mean	2530.5	2605.7	2568.1
Min Point	2180.0	-14.1%	Std. Dev.	149.3	164.1	155.7
Max Point	2780.0	9.5%	COV as %	5.9	6.3	**6.1**

Flow w/o C-Pt 1934 scfm

Vel Avg w/o C-Pt 2528 sfpm

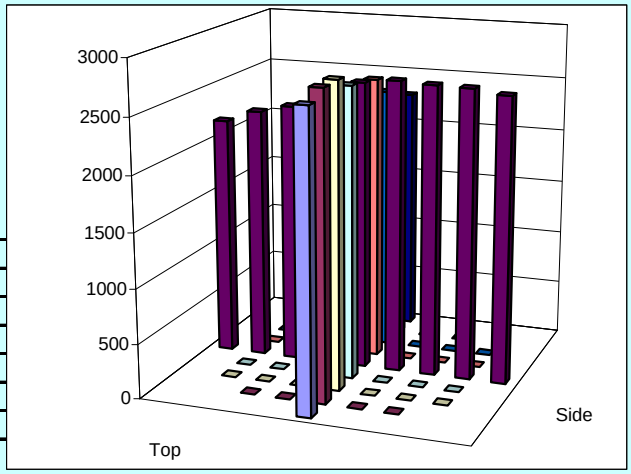
Instuments Used: Cal Due

TSI Velocicalc SN 305039 06/23/10

Fisher Scientific SN 61876141 04/09/10

DMT 8/27/09

	Start	Finish	
Stack temp	76.8	80.9	F
Equipment temp	N/A	N/A	F
Ambient temp	70.7	74.3	F
Stack static	N/A	N/A	mbars
Ambient pressure	29.35	29.35	in Hg
Total Stack pressure	N/A	N/A	mbars
Ambient humidity	34%	31%	RH



Notes: Blue Pre-filters removed. Butterfly valves upstream of A & B are both open.

DMT 8/27/09

Entries made by:	Donna Trott	8/27/2009
Signature/date	*On file with original*	

Technical Data Review performed by: Ernest Antonio

Signature/date Signature on file 7/12/2010

TI-RPP-WTP_688

VELOCITY TRAVERSE DATA FORM

Site	**LV-S1 (C3) Model**	Run No.	**VT-7**
Date	**8/27/09**	Fan Configuration	**B only, Damper A Closed**
Testers	DMT, JEF	Fan Setting	**55** **Hz**
Stack Dia.	11.844 in.	Stack Temp	81.6/83.9 deg F
Stack X-Area	110.2 in.2	Start/End Time	1027/1105
Test Port	2	Center 2/3 from	1.09 to: 10.76
Distance to disturbance	149.25 inches	Points in Center 2/3	2 to: 7
Velocity units	s ft/min	Data Files:	NA

Order -->		1st				2nf			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	2670	2580	2590	2613.3	2550	2530	2760	2613.3
2	1.24	2750	2640	2700	2696.7	2700	2650	2580	2643.3
3	2.29	2710	2660	2710	2693.3	2660	2700	2640	2666.7
4	3.82	2630	2560	2610	2600.0	2730	2710	2620	2686.7
Center	5.91	2720	2590	2650	2653.3	2640	2660	2620	2640.0
5	8.00	2520	2490	2500	2503.3	2570	2620	2570	2586.7
6	9.52	2340	2360	2340	2346.7	2510	2480	2420	2470.0
7	10.57	2360	2270	2330	2320.0	2480	2440	2340	2420.0
8	11.31	2270	2110	2190	2190.0	2340	2340	2250	2310.0
Averages ---------->		2552.2	2473.3	2513.3	2513.0	2575.6	2570.0	2533.3	2559.6

All	s ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	2536.3		Mean	2544.8	2587.6	2566.2
Min Point	2190.0	-13.7%	Std. Dev.	158.9	103.1	130.6
Max Point	2696.7	6.3%	COV as %	6.2	4.0	**5.1**

Flow w/o C-Pt 1930 scfm

Vel Avg w/o C-Pt 2523 sfpm

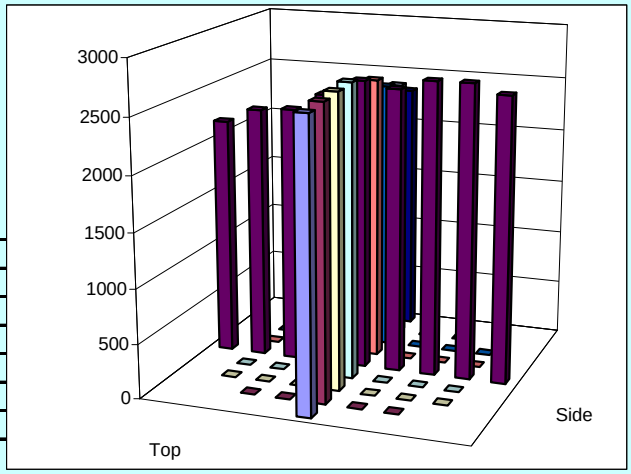
Instuments Used: Cal Due

TSI Velocicalc SN 305039 06/23/10

Fisher Scientific SN 61876141 04/09/10

DMT 8/27/09

	Start	Finish	
Stack temp	81.6	83.9	F
Equipment temp	N/A	N/A	F
Ambient temp	75.2	77	F
Stack static	N/A	N/A	mbars
Ambient pressure	29.35	29.35	in Hg
Total Stack pressure	N/A	N/A	mbars
Ambient humidity	30%	29%	RH



Notes: Blue Pre-filters removed. Butterfly valves upstream of A & B are both open.

DMT 8/27/09

Entries made by:	Julia Flaherty	8/27/2009
Signature/date	*On file with original*	

Technical Data Review performed by: Ernest Antonio

Signature/date Signature on file 7/12/2010

TI-RPP-WTP_688

VELOCITY TRAVERSE DATA FORM

Site	**LV-S1 (C3) Model**	Run No.	**VT-8**
Date	**8/31/09**	Fan Configuration	**B, A dampers closed**
Testers	JAG, MP	Fan Setting	**60** **Hz**
Stack Dia.	11.844 in.	Stack Temp	87.0 deg F
Stack X-Area	110.2 in.2	Start/End Time	1125 / 1212
Test Port	2	Center 2/3 from	1.09 to: 10.76
Distance to disturbance	149.25 inches	Points in Center 2/3	2 to: 7
Velocity units	s ft/min	Data Files:	NA

Order -->		1st				2nd			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	2420	2400	2380	2400.0	2640	2460	2450	2516.7
2	1.24	2520	2450	2510	2493.3	2540	2480	2490	2503.3
3	2.29	2600	2550	2590	2580.0	2570	2620	2560	2583.3
4	3.82	2750	2780	2770	2766.7	2750	2780	2780	2770.0
Center	5.91	2920	2900	2840	2886.7	2850	2870	2860	2860.0
5	8.00	2900	2890	2900	2896.7	2900	2840	2870	2870.0
6	9.52	2920	2910	2940	2923.3	2920	2860	2860	2880.0
7	10.57	2870	2910	2930	2903.3	2920	2810	2870	2866.7
8	11.31	2800	2780	2840	2806.7	2760	2770	2750	2760.0
Averages ---------->		2744.4	2730.0	2744.4	2739.6	2761.1	2721.1	2721.1	2734.4

All	s ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	2737.0		Mean	2778.6	2761.9	2770.2
Min Point	2400.0	-12.3%	Std. Dev.	174.7	155.5	159.1
Max Point	2923.3	6.8%	COV as %	6.3	5.6	**5.7**

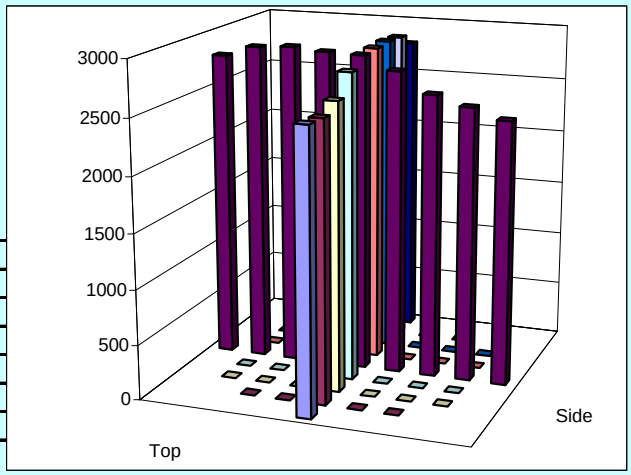
Flow w/o C-Pt 2081 scfm

Vel Avg w/o C-Pt 2720 sfpm

Instuments Used:

	Cal Due
TSI Velocicalc SN 305039	06/23/10
Fisher Scientific SN 61876141	04/09/10

	Start	Finish	
Stack temp	87	90	F
Equipment temp	N/A	N/A	F
Ambient temp	82	86	F
Stack static	N/A	N/A	mbars
Ambient pressure	29.15	29.15	in Hg
Total Stack pressure	N/A	N/A	mbars
Ambient humidity	38%	31%	RH



Notes: Stack temp taken at end of each trial,
89, 88, 88, 90, 90, 90 Degrees F

DMT 8/31/09

Entries made by:	John Glissmeyer		Technical Data Review performed by: Ernest Antonio
Signature/date	*On file with original*	8/31/2009	Signature/date Signature on file 7/12/2010
			TI-RPP-WTP_688

VELOCITY TRAVERSE DATA FORM

Site	**LV-S1 (C3) Model**	Run No.	**VT-9**
Date	**8/31/09**	Fan Configuration	**B, A dampers closed**
Testers	JAG, MP	Fan Setting	**60 Hz**
Stack Dia.	11.844 in.	Stack Temp	92-94 deg F
Stack X-Area	110.2 in.2	Start/End Time	1225 / 1308
Test Port	2	Center 2/3 from	1.09 to: 10.76
Distance to disturbance	149.25 inches	Points in Center 2/3	2 to: 7
Velocity units	s ft/min	Data Files:	NA

Order -->		2nd				1st			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	2470	2490	2500	2486.7	2480	2370	2380	2410.0
2	1.24	2590	2560	2550	2566.7	2580	2470	2440	2496.7
3	2.29	2690	2720	2650	2686.7	2670	2620	2580	2623.3
4	3.82	2860	2770	2780	2803.3	2860	2800	2770	2810.0
Center	5.91	2920	2950	2910	2926.7	2830	2870	2830	2843.3
5	8.00	2900	3010	2970	2960.0	2860	2900	2830	2863.3
6	9.52	2950	2910	2930	2930.0	2880	2850	2830	2853.3
7	10.57	2940	2920	2890	2916.7	2820	2880	2820	2840.0
8	11.31	2850	2850	2820	2840.0	2960	2730	2770	2820.0
Averages ---------->		2796.7	2797.8	2777.8	2790.7	2771.1	2721.1	2694.4	2728.9

All	s ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	2759.8		Mean	2827.1	2761.4	2794.3
Min Point	2410.0	-12.7%	Std. Dev.	149.6	143.3	144.8
Max Point	2960.0	7.3%	COV as %	5.3	5.2	**5.2**

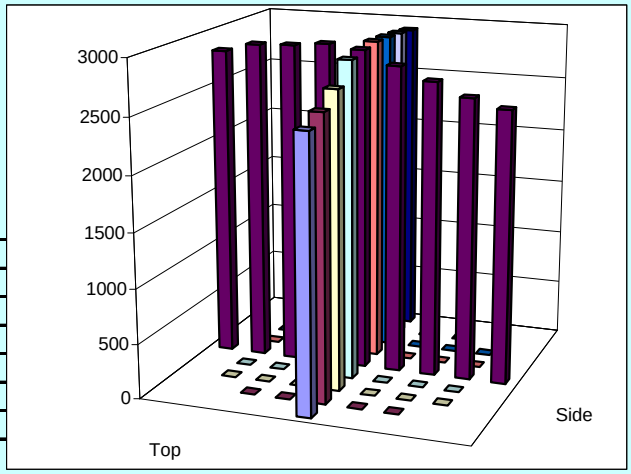
Flow w/o C-Pt 2100 scfm

Vel Avg w/o C-Pt 2744 sfpm

Instuments Used:

	Cal Due
TSI Velocicalc SN 305039	06/23/10
Fisher Scientific SN 61876141	04/09/10

	Start	Finish	
Stack temp	92	94	F
Equipment temp	N/A	N/A	F
Ambient temp	87.8	88.7	F
Stack static	N/A	N/A	mbars
Ambient pressure	29.15	29.15	in Hg
Total Stack pressure	N/A	N/A	mbars
Ambient humidity	31%	29%	RH



Notes: Stack temp taken at end of each trial,
94, 94, 94, 91, 92, 93 degrees F.
Port Plug Installed.

DMT 8/31/09

Entries made by:	John Glissmeyer		Technical Data Review performed by: Ernest Antonio
Signature/date	*On file with original*	8/31/2009	Signature/date Signature on file 7/12/2010
			TI-RPP-WTP_688

VELOCITY TRAVERSE DATA FORM

Site	**LV-S1 (C3) Model**	Run No.	**VT-10**
Date	**8/31/09**	Fan Configuration	**B ON, A dampers closed**
Testers	JAG, MP	Fan Setting	**60 Hz**
Stack Dia.	11.844 in.	Stack Temp	94-95 deg F
Stack X-Area	110.2 in.2	Start/End Time	1312 / 1420
Test Port	2	Center 2/3 from	1.09 to: 10.76
Distance to disturbance	149.25 inches	Points in Center 2/3	2 to: 7
Velocity units	s ft/min	Data Files:	NA

Order -->		1st				2nd			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	2410	2450	2530	2463.3	2470	2350	2370	2396.7
2	1.24	2480	2530	2530	2513.3	2550	2490	2480	2506.7
3	2.29	2630	2650	2640	2640.0	2630	2610	2590	2610.0
4	3.82	2860	2820	2870	2850.0	2760	2750	2770	2760.0
Center	5.91	2950	2880	2960	2930.0	2850	2810	2800	2820.0
5	8.00	2920	2980	2920	2940.0	2810	2830	2820	2820.0
6	9.52	3000	2950	2990	2980.0	2870	2790	2850	2836.7
7	10.57	2930	2950	2950	2943.3	2820	2830	2810	2820.0
8	11.31	2920	2790	2800	2836.7	2720	2860	2760	2780.0
Averages ---------->		2788.9	2777.8	2798.9	2788.5	2720.0	2702.2	2694.4	2705.6

All	s ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	2747.0		Mean	2828.1	2739.0	2783.6
Min Point	2396.7	-12.8%	Std. Dev.	179.9	129.3	157.4
Max Point	2980.0	8.5%	COV as %	6.4	4.7	**5.7**

Flow w/o C-Pt 2090 scfm

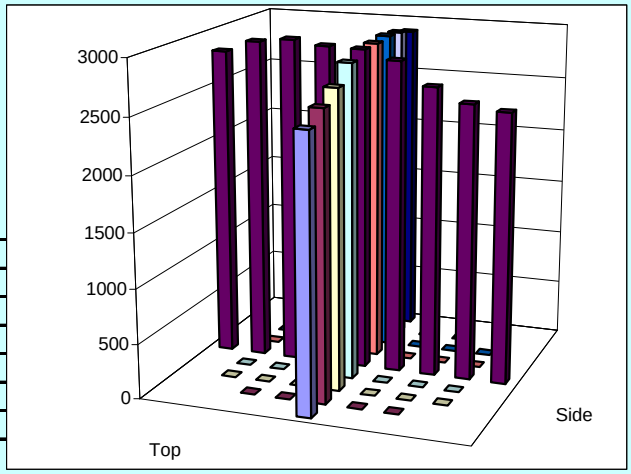
Vel Avg w/o C-Pt 2731 sfpm

Instuments Used: Cal Due

TSI Velocicalc SN 305039 06/23/10

Fisher Scientific SN 61876141 04/09/10

	Start	Finish	
Stack temp	94	95	F
Equipment temp	N/A	N/A	F
Ambient temp	89.6	89.6	F
Stack static	N/A	N/A	mbars
Ambient pressure	29.15	29.15	in Hg
Total Stack pressure	N/A	N/A	mbars
Ambient humidity	29%	28%	RH



Notes: Stack temp taken at end of each trial,
94, 94, 95, 95, 95 Degrees F.
Port plug used.

DMT 8/31/09

Entries made by:	John Glissmeyer		Technical Data Review performed by: Ernest Antonio
Signature/date	*On file with original*	8/31/2009	Signature/date Signature on file 7/12/2010
			TI-RPP-WTP_688

VELOCITY TRAVERSE DATA FORM

Site	**LV-S1 (C3) Model**	Run No.	**VT-11**
Date	**9/1/09**	Fan Configuration	**B only, Damper A and butterfly valve shut**
Testers	DMT, JEF	Fan Setting	**60 Hz**
Stack Dia.	11.813 in.	Stack Temp	76.8 / 83.2 deg F
Stack X-Area	109.6 in.2	Start/End Time	0900 / 0950
Test Port	3	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	88.875 inches	Points in Center 2/3	2 to: 7
Velocity units	s ft/min	Data Files:	NA

Order -->		1st				2nd			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	2530	2470	2480	2493.3	2480	2600	2600	2560.0
2	1.24	2530	2530	2520	2526.7	2710	2710	2670	2696.7
3	2.29	2620	2650	2620	2630.0	2700	2680	2710	2696.7
4	3.82	2830	2810	2810	2816.7	2820	2910	2970	2900.0
Center	5.91	2910	2900	2940	2916.7	2890	3000	2990	2960.0
5	8.00	2950	2900	2900	2916.7	2930	3030	3040	3000.0
6	9.52	3040	3010	3100	3050.0	2980	3010	3020	3003.3
7	10.57	3160	3180	3190	3176.7	2980	2960	3050	2996.7
8	11.31	3090	2980	3160	3076.7	2910	2880	2920	2903.3
Averages ---------->		2851.1	2825.6	2857.8	2844.8	2822.2	2864.4	2885.6	2857.4

All	s ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	2851.1		Mean	2861.9	2893.3	2877.6
Min Point	2493.3	-12.5%	Std. Dev.	226.8	139.0	181.5
Max Point	3176.7	11.4%	COV as %	7.9	4.8	**6.3**

Flow w/o C-Pt 2162 scfm

Vel Avg w/o C-Pt 2840 sfpm

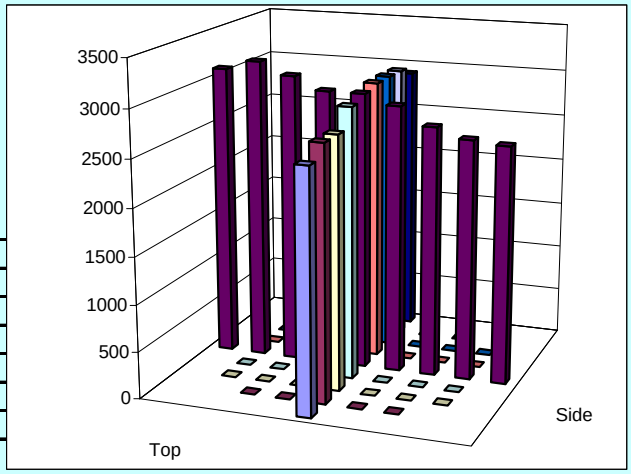
Instuments Used: Cal Due

TSI Velocicalc SN 305039 06/23/10

Fisher Scientific SN 61876141 04/09/10

JEF 9/1/09

	Start	Finish	
Stack temp	76.8	83.2	F
Equipment temp	N/A	N/A	F
Ambient temp	84.2	79.7	F
Stack static	N/A	N/A	mbars
Ambient pressure	29.09	29.09	in Hg
Total Stack pressure	N/A	N/A	mbars
Ambient humidity	33%	38%	RH



Notes: Blue Pre-filters were not installed on the HEPA filters. Port plug installed.

Stack temp taken at end of each trial,

78.2 (after point 5 of trial 2), 78.6, 79.4, 79.6, 82.1, 83.2

JEF 9/1/09

Entries made by:	Julia Flaherty		Technical Data Review performed by: Ernest Antonio
Signature/date	*On file with original*	9/1/2009	Signature/date Signature on file 7/12/2010
			TI-RPP-WTP_688

VELOCITY TRAVERSE DATA FORM

Site	**LV-S1 (C3) Model**	Run No.	**VT-12**
Date	**9/1/09**	Fan Configuration	**B only, Damper A and butterfly valve shut**
Testers	DMT, JEF	Fan Setting	**60** **Hz**
Stack Dia.	11.813 in.	Stack Temp	83.2 / 85.8 deg F
Stack X-Area	109.6 in.2	Start/End Time	0953 / 1030
Test Port	1	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	209.625 inches	Points in Center 2/3	2 to: 7
Velocity units	s ft/min	Data Files:	NA

Order -->		1st				2nd			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	2430	2460	2380	2423.3	2620	2380	2390	2463.3
2	1.24	2490	2580	2550	2540.0	2520	2530	2540	2530.0
3	2.29	2650	2610	2590	2616.7	2630	2610	2710	2650.0
4	3.82	2820	2800	2840	2820.0	2890	2840	2880	2870.0
Center	5.91	2970	3010	2880	2953.3	2930	2930	3000	2953.3
5	8.00	2900	2870	2910	2893.3	2930	2890	3140	2986.7
6	9.52	2890	2920	2940	2916.7	2930	3120	3150	3066.7
7	10.57	2880	2970	2850	2900.0	3090	3100	3100	3096.7
8	11.31	2820	2840	2740	2800.0	2990	2990	2910	2963.3
Averages ---------->		2761.1	2784.4	2742.2	2762.6	2836.7	2821.1	2868.9	2842.2

All	s ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	2802.4		Mean	2805.7	2879.0	2842.4
Min Point	2423.3	-13.5%	Std. Dev.	161.9	213.7	186.1
Max Point	3096.7	10.5%	COV as %	5.8	7.4	**6.5**

Flow w/o C-Pt 2119 scfm

Vel Avg w/o C-Pt 2784 sfpm

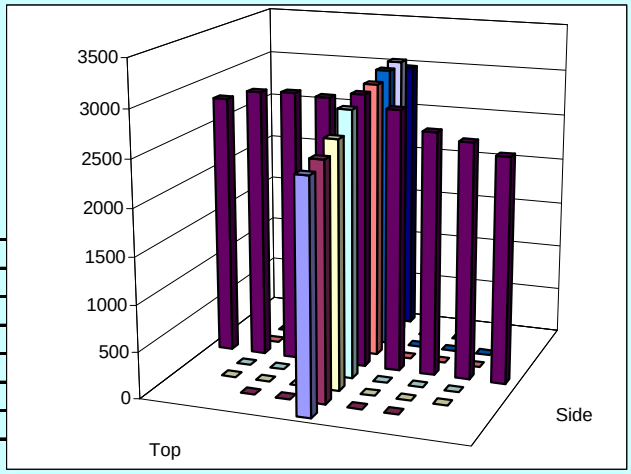
Instuments Used: Cal Due

TSI Velocicalc SN 305039 06/23/10

Fisher Scientific SN 61876141 04/09/10

	Start	Finish	
Stack temp	83.2	85.8	F
Equipment temp	N/A	N/A	F
Ambient temp	81.5	86.9	F
Stack static	N/A	N/A	mbars
Ambient pressure	29.09	29.06	in Hg
Total Stack pressure	N/A	N/A	mbars
Ambient humidity	36%	32%	RH

DMT 9/1/09



Notes: Blue Pre-filters were not installed on the HEPA filters. Port plug used.

Stack temp taken at end of each trial, 84.1, 84.3, 85.2, 86.1, 85.5, 85.8.

DMT 9/1/09

Entries made by:	Donna Trott		Technical Data Review performed by: Ernest Antonio
Signature/date	*On file with original*	9/1/2009	Signature/date Signature on file 7/12/2010
			TI-RPP-WTP_688

VELOCITY TRAVERSE DATA FORM

Site	**LV-S1 (C3) Model**	Run No.	**VT-13**
Date	**9/1/09**	Fan Configuration	**B only, Damper A and butterfly valve shut**
Testers	DMT/JEF	Fan Setting	**37** **Hz**
Stack Dia.	11.813 in.	Stack Temp	85.6 / 89.0 deg F
Stack X-Area	109.6 in.2	Start/End Time	1035 / 1115
Test Port	1	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	209.625 inches	Points in Center 2/3	2 to: 7
Velocity units	s ft/min	Data Files:	NA

Order -->		2nd				1st			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	1370	1440	1410	1406.7	1320	1460	1400	1393.3
2	1.24	1490	1470	1510	1490.0	1530	1490	1530	1516.7
3	2.29	1560	1600	1600	1586.7	1570	1620	1560	1583.3
4	3.82	1620	1690	1630	1646.7	1630	1690	1680	1666.7
Center	5.91	1670	1670	1690	1676.7	1690	1700	1720	1703.3
5	8.00	1680	1690	1690	1686.7	1720	1690	1730	1713.3
6	9.52	1670	1710	1630	1670.0	1710	1720	1690	1706.7
7	10.57	1630	1630	1600	1620.0	1630	1590	1640	1620.0
8	11.31	1420	1520	1510	1483.3	1530	1480	1530	1513.3
Averages ---------->		1567.8	1602.2	1585.6	1585.2	1592.2	1604.4	1608.9	1601.9

All	s ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1593.5		Mean	1625.2	1644.3	1634.8
Min Point	1393.3	-12.6%	Std. Dev.	69.1	74.4	69.7
Max Point	1713.3	7.5%	COV as %	4.3	4.5	**4.3**

Flow w/o C-Pt 1204 scfm

Vel Avg w/o C-Pt 1581 sfpm

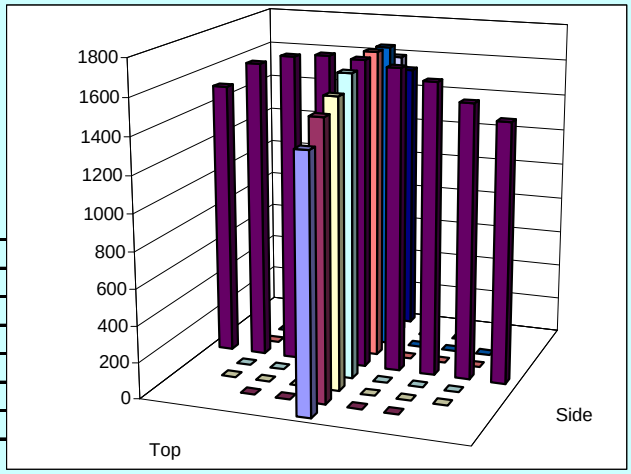
Instuments Used: Cal Due

TSI Velocicalc SN 305039 06/23/10

Fisher Scientific SN 61876141 04/09/10

	Start	Finish	
Stack temp	85.6	89	F
Equipment temp	N/A	N/A	F
Ambient temp	89.6	91.4	F
Stack static	N/A	N/A	mbars
Ambient pressure	29.06	29.09	in Hg
Total Stack pressure	N/A	N/A	mbars
Ambient humidity	30%	30%	RH

DMT 9/1/09



Notes: Blue Pre-filters were not installed on the HEPA filters. Port plug installed.

Stack temp taken at end of each trial,

87.5, 88.5, 89.0, 86.2, 86.7, 87.3

JEF 9/1/09

Entries made by:	Julia Flaherty		Technical Data Review performed by: Ernest Antonio
Signature/date	*On file with original*	9/1/2009	Signature/date Signature on file 7/12/2010
			TI-RPP-WTP_688

VELOCITY TRAVERSE DATA FORM

Site	**LV-S1 (C3) Model**	Run No.	**VT-14**
Date	**9/1/09**	Fan Configuration	**B only, Damper A and butterfly valve shut**
Testers	DMT, JEF	Fan Setting	**37** **Hz**
Stack Dia.	11.844 in.	Stack Temp	88.4 / 90.5 deg F
Stack X-Area	110.2 in.2	Start/End Time	1120 / 1150
Test Port	2	Center 2/3 from	1.09 to: 10.76
Distance to disturbance	149.25 inches	Points in Center 2/3	2 to: 7
Velocity units	s ft/min	Data Files:	NA

Order -->		1st				2nd			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	1370	1360	1360	1363.3	1410	1440	1480	1443.3
2	1.24	1500	1470	1470	1480.0	1520	1510	1560	1530.0
3	2.29	1530	1500	1510	1513.3	1580	1580	1640	1600.0
4	3.82	1580	1600	1610	1596.7	1650	1670	1660	1660.0
Center	5.91	1680	1680	1640	1666.7	1680	1670	1720	1690.0
5	8.00	1710	1700	1690	1700.0	1720	1690	1750	1720.0
6	9.52	1690	1710	1680	1693.3	1730	1670	1750	1716.7
7	10.57	1660	1660	1680	1666.7	1700	1650	1690	1680.0
8	11.31	1570	1570	1560	1566.7	1550	1560	1650	1586.7
Averages ---------->		1587.8	1583.3	1577.8	1583.0	1615.6	1604.4	1655.6	1625.2

All	s ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1604.1		Mean	1616.7	1656.7	1636.7
Min Point	1363.3	-15.0%	Std. Dev.	89.0	69.0	79.3
Max Point	1720.0	7.2%	COV as %	5.5	4.2	**4.8**

Flow w/o C-Pt 1220 scfm

Vel Avg w/o C-Pt 1595 sfpm

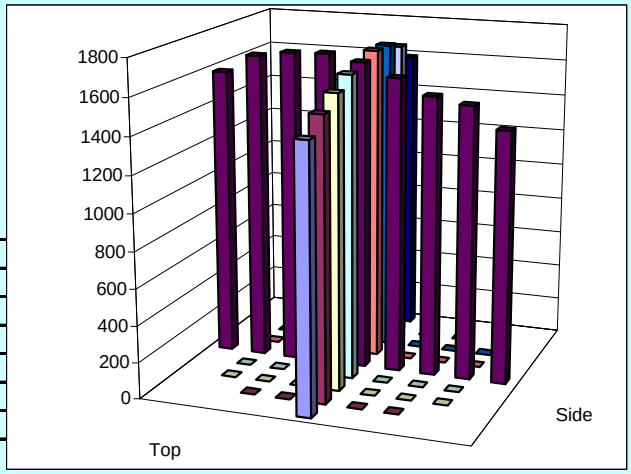
Instuments Used: Cal Due

TSI Velocicalc SN 305039 06/23/10

Fisher Scientific SN 61876141 04/09/10

DMT 9/1/09

	Start	Finish	
Stack temp	88.4	90.5	F
Equipment temp	N/A	N/A	F
Ambient temp	93.2	87.8	F
Stack static	N/A	N/A	mbars
Ambient pressure	29.09	29.09	in Hg
Total Stack pressure	N/A	N/A	mbars
Ambient humidity	28%	32%	RH



Notes: Blue Pre-filters were not installed on the HEPA filters. Port plug installed.

Stack temp taken at end of each trial, 89.1, 89.2, 90.3, 90.0, 90.3, 90.5.

DMT 9/1/09

Entries made by:	Donna Trott		Technical Data Review performed by: Ernest Antonio
Signature/date	*On file with original*	9/1/2009	Signature/date Signature on file 7/12/2010
			TI-RPP-WTP_688

VELOCITY TRAVERSE DATA FORM

Site	**LV-S1 (C3) Model**	Run No.	**VT-15**
Date	**9/2/09**	Fan Configuration	**B only, Damper A and butterfly closed**
Testers	DMT, JEF	Fan Setting	**37** **Hz**
Stack Dia.	11.813 in.	Stack Temp	77.3 / 80.0 deg F
Stack X-Area	109.6 in.2	Start/End Time	0845 / 0930
Test Port	3	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	88.875 inches	Points in Center 2/3	2 to: 7
Velocity units	s ft/min	Data Files:	NA

Order -->		1st				2nd			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	1520	1510	1490	1506.7	1410	1450	1390	1416.7
2	1.24	1530	1580	1530	1546.7	1530	1600	1520	1550.0
3	2.29	1620	1620	1630	1623.3	1590	1610	1550	1583.3
4	3.82	1670	1680	1670	1673.3	1670	1700	1620	1663.3
Center	5.91	1700	1670	1700	1690.0	1770	1830	1710	1770.0
5	8.00	1730	1710	1730	1723.3	1870	1870	1820	1853.3
6	9.52	1760	1740	1720	1740.0	1880	1890	1830	1866.7
7	10.57	1780	1740	1720	1746.7	1840	1880	1870	1863.3
8	11.31	1690	1710	1680	1693.3	1770	1770	1750	1763.3
Averages ---------->		1666.7	1662.2	1652.2	1660.4	1703.3	1733.3	1673.3	1703.3

All	s ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1681.9		Mean	1677.6	1735.7	1706.7
Min Point	1416.7	-15.8%	Std. Dev.	71.9	136.3	108.9
Max Point	1866.7	11.0%	COV as %	4.3	7.9	**6.4**

Flow w/o C-Pt 1275 scfm

Vel Avg w/o C-Pt 1676 sfpm

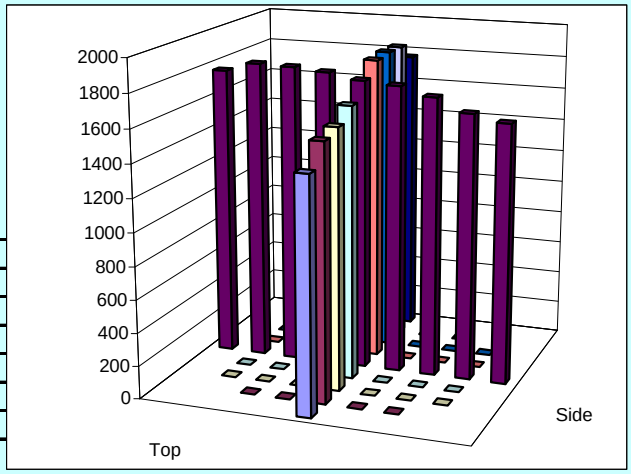
Instuments Used: Cal Due

TSI Velocicalc SN 305039 06/23/10

Fisher Scientific SN 61876141 04/09/10

JEF 9/2/09

	Start	Finish	
Stack temp	77.3	80	F
Equipment temp	N/A	N/A	F
Ambient temp	78.8	78.8	F
Stack static	N/A	N/A	mbars
Ambient pressure	29.15	29.15	in Hg
Total Stack pressure	N/A	N/A	mbars
Ambient humidity	45%	42%	RH



Notes: Blue Pre-filters were not installed on the HEPA filters. Port plug installed.

Stack temp taken at end of each trial, 78.0, 79.1, 78.2, 79.9, 79.5, 80.0.

JEF 9/2/2009

Entries made by:	Julia Flaherty		Technical Data Review performed by: Ernest Antonio
Signature/date	*On file with original*	9/2/2009	Signature/date Signature on file 7/12/2010
			TI-RPP-WTP_688

VELOCITY TRAVERSE DATA FORM

Site	**LV-S1 (C3) Model**	Run No.	**VT-16**
Date	**9/2/09**	Fan Configuration	**B only, Damper A and butterfly closed**
Testers	DMT, JEF	Fan Setting	**37** **Hz**
Stack Dia.	11.813 in.	Stack Temp	80.0 / 83.0 deg F
Stack X-Area	109.6 in.2	Start/End Time	0935 / 1009
Test Port	3	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	88.875 inches	Points in Center 2/3	2 to: 7
Velocity units	s ft/min	Data Files:	NA

Order -->		2nd				1st			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	1470	1480	1460	1470.0	1460	1500	1510	1490.0
2	1.24	1550	1530	1540	1540.0	1640	1580	1610	1610.0
3	2.29	1620	1600	1580	1600.0	1630	1650	1610	1630.0
4	3.82	1740	1700	1720	1720.0	1680	1680	1670	1676.7
Center	5.91	1670	1710	1740	1706.7	1710	1740	1720	1723.3
5	8.00	1800	1730	1730	1753.3	1750	1730	1760	1746.7
6	9.52	1800	1860	1800	1820.0	1730	1800	1750	1760.0
7	10.57	1790	1810	1790	1796.7	1760	1770	1720	1750.0
8	11.31	1790	1760	1740	1763.3	1660	1660	1640	1653.3
Averages ---------->		1692.2	1686.7	1677.8	1685.6	1668.9	1678.9	1665.6	1671.1

All	s ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1678.3		Mean	1705.2	1699.5	1702.4
Min Point	1470.0	-12.4%	Std. Dev.	102.0	61.1	80.8
Max Point	1820.0	8.4%	COV as %	6.0	3.6	**4.7**

Flow w/o C-Pt 1274 scfm

Vel Avg w/o C-Pt 1674 sfpm

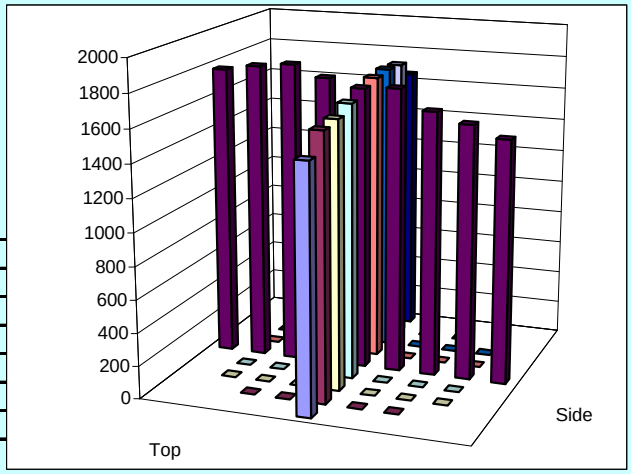
Instuments Used: Cal Due

TSI Velocicalc SN 305039 06/23/10

Fisher Scientific SN 61876141 04/09/10

DMT 9/2/09

	Start	Finish	
Stack temp	80	83	F
Equipment temp	N/A	N/A	F
Ambient temp	77.9	80.6	F
Stack static	N/A	N/A	mbars
Ambient pressure	29.15	29.15	in Hg
Total Stack pressure	N/A	N/A	mbars
Ambient humidity	43%	37%	RH



Notes: Blue Pre-filters were not installed on the HEPA filters. Port plug installed.

Stack temp taken at end of each trial,

82.2, 83.1, 83.0, 80.5, 80.6, 81.4.

DMT 9/2/2009

Entries made by:	Donna Trott		Technical Data Review performed by: Ernest Antonio
Signature/date	*On file with original*	9/2/2009	Signature/date Signature on file 7/12/2010
			TI-RPP-WTP_688

VELOCITY TRAVERSE DATA FORM

Site	**LV-S1 (C3) Model**	Run No.	**VT-17**
Date	**9/2/09**	Fan Configuration	**B only, Damper A and butterfly valve closed**
Testers	DMT, JEF	Fan Setting	**37** **Hz**
Stack Dia.	11.813 in.	Stack Temp	83.0 / 86.1 deg F
Stack X-Area	109.6 in.2	Start/End Time	1012 / 1051
Test Port	3	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	88.875 inches	Points in Center 2/3	2 to: 7
Velocity units	s ft/min	Data Files:	NA

Order -->		1st				2nd			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	1440	1470	1430	1446.7	1410	1390	1450	1416.7
2	1.24	1540	1520	1500	1520.0	1530	1490	1500	1506.7
3	2.29	1580	1560	1550	1563.3	1590	1570	1550	1570.0
4	3.82	1660	1650	1670	1660.0	1630	1640	1620	1630.0
Center	5.91	1690	1670	1680	1680.0	1720	1750	1700	1723.3
5	8.00	1690	1740	1740	1723.3	1840	1770	1710	1773.3
6	9.52	1790	1780	1790	1786.7	1820	1860	1770	1816.7
7	10.57	1850	1820	1840	1836.7	1790	1780	1830	1800.0
8	11.31	1760	1770	1690	1740.0	1700	1760	1760	1740.0
Averages ---------->		1666.7	1664.4	1654.4	1661.9	1670.0	1667.8	1654.4	1664.1

All	s ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1663.0		Mean	1681.4	1688.6	1685.0
Min Point	1416.7	-14.8%	Std. Dev.	113.6	121.0	112.8
Max Point	1836.7	10.4%	COV as %	6.8	7.2	**6.7**

Flow w/o C-Pt 1262 scfm

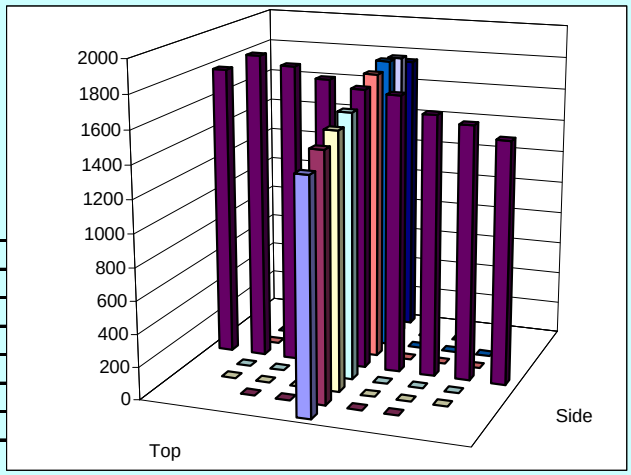
Vel Avg w/o C-Pt 1658 sfpm

Instuments Used:

	Cal Due
TSI Velocicalc SN 305039	06/23/10
Fisher Scientific SN 61876141	04/09/10

JEF 9/2/09

	Start	Finish	
Stack temp	83	86.1	F
Equipment temp	N/A	N/A	F
Ambient temp	80.6	83.3	F
Stack static	N/A	N/A	mbars
Ambient pressure	29.15	29.15	in Hg
Total Stack pressure	N/A	N/A	mbars
Ambient humidity	37%	33%	RH



Notes: Blue Pre-filters were not installed on the HEPA filters. Port plug installed.

Stack temp taken at end of each trial,

83.2, 84.1, 84.1, 84.6, 85.2, 86.1.

JEF 9/2/2009

Entries made by:	Julia Flaherty		Technical Data Review performed by: Ernest Antonio
Signature/date	*On file with original*	9/2/2009	Signature/date Signature on file 7/12/2010
			TI-RPP-WTP_688

VELOCITY TRAVERSE DATA FORM

Site	**LV-S1 (C3) Model**	Run No.	**VT-18**
Date	**9/2/09**	Fan Configuration	**A only, Damper B and butterfly closed**
Testers	DMT, JEF	Fan Setting	**37 Hz**
Stack Dia.	11.844 in.	Stack Temp	86.8 / 87.2 deg F
Stack X-Area	110.2 in.2	Start/End Time	1055 / 1132
Test Port	2	Center 2/3 from	1.09 to: 10.76
Distance to disturbance	149.25 inches	Points in Center 2/3	2 to: 7
Velocity units	s ft/min	Data Files:	NA

Order -->		1st				2nd			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	1550	1580	1660	1596.7	1560	1590	1550	1566.7
2	1.24	1760	1720	1710	1730.0	1700	1650	1650	1666.7
3	2.29	1790	1780	1730	1766.7	1760	1700	1750	1736.7
4	3.82	1910	1790	1790	1830.0	1830	1840	1790	1820.0
Center	5.91	1830	1800	1820	1816.7	1850	1870	1870	1863.3
5	8.00	1850	1870	1870	1863.3	1850	1830	1860	1846.7
6	9.52	1920	1870	1900	1896.7	1860	1860	1860	1860.0
7	10.57	1850	1820	1850	1840.0	1830	1820	1820	1823.3
8	11.31	1690	1710	1720	1706.7	1710	1760	1720	1730.0
Averages ---------->		1794.4	1771.1	1783.3	1783.0	1772.2	1768.9	1763.3	1768.1

All	s ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1775.6		Mean	1820.5	1802.4	1811.4
Min Point	1566.7	-11.8%	Std. Dev.	56.6	73.6	63.8
Max Point	1896.7	6.8%	COV as %	3.1	4.1	**3.5**

Flow w/o C-Pt 1352 scfm

Vel Avg w/o C-Pt 1768 sfpm

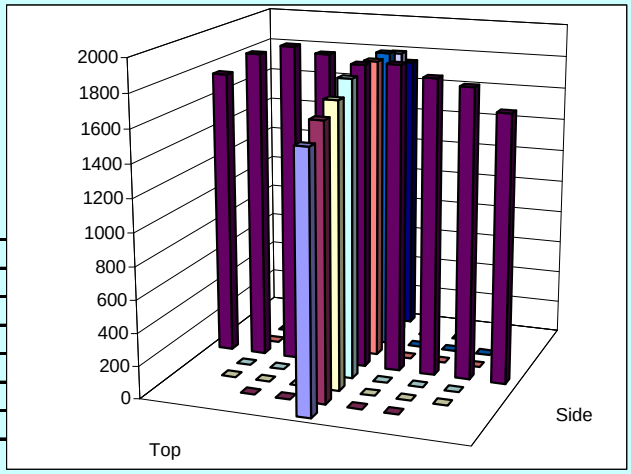
Instuments Used: Cal Due

TSI Velocicalc SN 305039 06/23/10

Fisher Scientific SN 61876141 04/09/10

DMT 9/2/09

	Start	Finish	
Stack temp	86.8	87.2	F
Equipment temp	N/A	N/A	F
Ambient temp	84.2	85.1	F
Stack static	N/A	N/A	mbars
Ambient pressure	29.15	29.18	in Hg
Total Stack pressure	N/A	N/A	mbars
Ambient humidity	31%	32%	RH



Notes: Blue Pre-filters were not installed on the HEPA filters. Port plug installed.

Stack temp taken at end of each trial,

86.7, 86.5, 86.9, 87.1, 87.1, 87.2.

DMT 9/2/2009

Entries made by:	Donna Trott		Technical Data Review performed by: Ernest Antonio
Signature/date	*On file with original*	9/2/2009	Signature/date Signature on file 7/12/2010
			TI-RPP-WTP_688

VELOCITY TRAVERSE DATA FORM

Site	**LV-S1 (C3) Model**	Run No.	**VT-19**
Date	**9/4/09**	Fan Configuration	**A only, B Damper and Butterfly valve closed**
Testers	MSP, DMT	Fan Setting	**60 Hz**
Stack Dia.	11.813 in.	Stack Temp	71 / 73 deg F
Stack X-Area	109.6 in.2	Start/End Time	0933 /1010
Test Port	1	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	209.625 inches	Points in Center 2/3	2 to: 7
Velocity units	s ft/min	Data Files:	NA

Order -->		1st				2nd			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	2690	2770	2630	2696.7	2510	2560	2530	2533.3
2	1.24	2780	2810	2730	2773.3	2730	2690	2620	2680.0
3	2.29	2930	2940	2930	2933.3	2900	2830	2760	2830.0
4	3.82	3220	3140	3190	3183.3	3120	3080	3060	3086.7
Center	5.91	3210	3220	3200	3210.0	3100	3090	3110	3100.0
5	8.00	3180	3190	3210	3193.3	3150	3140	3160	3150.0
6	9.52	3200	3160	3180	3180.0	3310	3130	3220	3220.0
7	10.57	3160	3150	3190	3166.7	3220	3100	3240	3186.7
8	11.31	3060	3020	3160	3080.0	3060	2960	3080	3033.3
Averages ---------->		3047.8	3044.4	3046.7	3046.3	3011.1	2953.3	2975.6	2980.0

All	s ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	3013.1		Mean	3091.4	3036.2	3063.8
Min Point	2533.3	-15.9%	Std. Dev.	169.6	202.2	181.6
Max Point	3220.0	6.9%	COV as %	5.5	6.7	**5.9**

Flow w/o C-Pt 2280 scfm

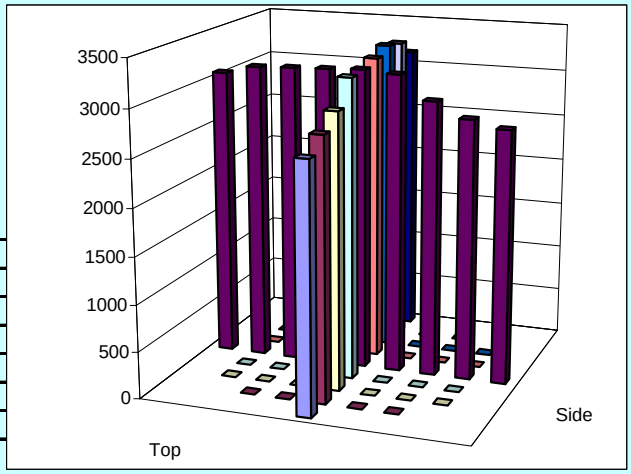
Vel Avg w/o C-Pt 2995 sfpm

Instuments Used:

	Cal Due
TSI Velocicalc SN 305039	06/23/10
Fisher Scientific SN 61876141	04/09/10

	Start	Finish	
Stack temp	71	73	F
Equipment temp	N/A	N/A	F
Ambient temp	72.5	73.4	F
Stack static	N/A	N/A	mbars
Ambient pressure	29.41	29.38	in Hg
Total Stack pressure	N/A	N/A	mbars
Ambient humidity	37%	36%	RH

DMT 9/4/09



Notes: Blue Prefilters not installed on HEPA filters.

Port plug installed. Stack temp taken at end of each trial:

71, 72, 73, 73, 72, 73.

DMT 9/4/09

Entries made by:	Donna Trott		Technical Data Review performed by: Ernest Antonio
Signature/date	*On file with original*	9/4/2009	Signature/date Signature on file 7/12/2010
			TI-RPP-WTP_688

VELOCITY TRAVERSE DATA FORM

Site	**LV-S1 (C3) Model**	Run No.	**VT-20**
Date	**9/4/09**	Fan Configuration	**A only, B Damper and Butterfly valve closed**
Testers	MSP, DMT	Fan Setting	**60** **Hz**
Stack Dia.	11.813 in.	Stack Temp	73 / 76 deg F
Stack X-Area	109.6 in.2	Start/End Time	1013 / 1050
Test Port	1	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	209.625 inches	Points in Center 2/3	2 to: 7
Velocity units	s ft/min	Data Files:	NA

Order -->		2nd				1st			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	2590	2670	2610	2623.3	2580	2580	2530	2563.3
2	1.24	2730	2710	2790	2743.3	2720	2680	2680	2693.3
3	2.29	2870	2860	2850	2860.0	2840	2830	2850	2840.0
4	3.82	3050	3020	3160	3076.7	3000	3090	3040	3043.3
Center	5.91	3150	3140	3170	3153.3	3100	3120	3160	3126.7
5	8.00	3160	3120	3150	3143.3	3110	3160	3090	3120.0
6	9.52	3180	3150	3140	3156.7	3110	3080	3110	3100.0
7	10.57	3240	3180	3130	3183.3	3150	3210	3050	3136.7
8	11.31	3120	3120	3030	3090.0	2990	3010	3020	3006.7
Averages ---------->		3010.0	2996.7	3003.3	3003.3	2955.6	2973.3	2947.8	2958.9

All	s ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	2981.1		Mean	3045.2	3008.6	3026.9
Min Point	2563.3	-14.0%	Std. Dev.	172.8	173.3	167.3
Max Point	3183.3	6.8%	COV as %	5.7	5.8	**5.5**

Flow w/o C-Pt 2254 scfm

Vel Avg w/o C-Pt 2961 sfpm

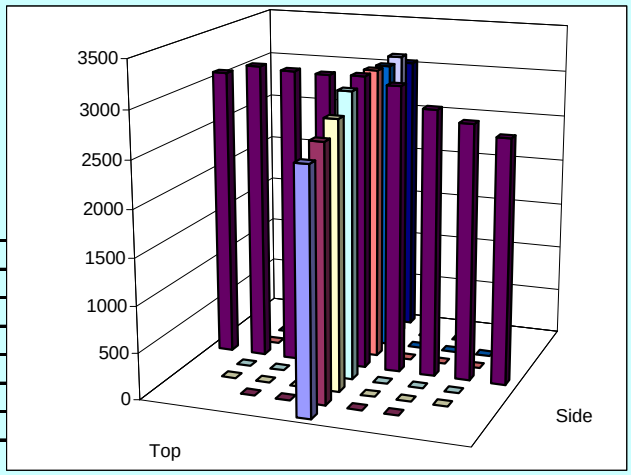
Instuments Used: Cal Due

TSI Velocicalc SN 305039 06/23/10

Fisher Scientific SN 61876141 04/09/10

	Start	Finish	
Stack temp	73	76	F
Equipment temp	N/A	N/A	F
Ambient temp	74.3	76.1	F
Stack static	N/A	N/A	mbars
Ambient pressure	29.38	29.38	in Hg
Total Stack pressure	N/A	N/A	mbars
Ambient humidity	35%	32%	RH

DMT 9/4/09



Notes: Blue Prefilters not installed on HEPA filters.

Port plug installed. Stack temp taken at end of each trial:

73, 73, 76, 73, 73, 73.

DMT 9/4/09

Entries made by:	Donna Trott	Technical Data Review performed by:	Ernest Antonio
Signature/date	*On file with original* 9/4/2009	Signature/date	Signature on file 7/12/2010
			TI-RPP-WTP_688

VELOCITY TRAVERSE DATA FORM

Site	**LV-S1 (C3) Model**	Run No.	**VT-21**
Date	**9/4/09**	Fan Configuration	**A only, B Damper and Butterfly valve closed**
Testers	MSP, DMT	Fan Setting	**60 Hz**
Stack Dia.	11.813 in.	Stack Temp	77 / 80 deg F
Stack X-Area	109.6 in.2	Start/End Time	1056 / 1133
Test Port	1	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	209.625 inches	Points in Center 2/3	2 to: 7
Velocity units	s ft/min	Data Files:	NA

Order -->		1st				2nd			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	2490	2570	2540	2533.3	2550	2550	2630	2576.7
2	1.24	2700	2660	2730	2696.7	2730	2690	2820	2746.7
3	2.29	2890	2810	2820	2840.0	2840	2790	2820	2816.7
4	3.82	3120	3070	3060	3083.3	3060	3020	3040	3040.0
Center	5.91	3190	3200	3070	3153.3	3100	3120	3130	3116.7
5	8.00	3190	3140	3100	3143.3	3110	3170	3120	3133.3
6	9.52	3190	3100	3110	3133.3	3110	3120	3110	3113.3
7	10.57	3180	3130	3130	3146.7	3090	2980	2990	3020.0
8	11.31	3030	3050	3130	3070.0	2920	2920	2980	2940.0
Averages ---------->		2997.8	2970.0	2965.6	2977.8	2945.6	2928.9	2960.0	2944.8

All	s ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	2961.3		Mean	3028.1	2998.1	3013.1
Min Point	2533.3	-14.5%	Std. Dev.	183.7	154.9	164.0
Max Point	3153.3	6.5%	COV as %	6.1	5.2	**5.4**

Flow w/o C-Pt 2237 scfm

Vel Avg w/o C-Pt 2940 sfpm

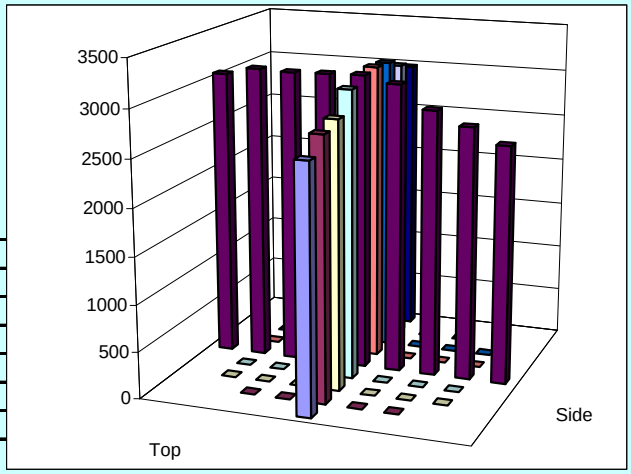
Instuments Used: Cal Due

TSI Velocicalc SN 305039 06/23/10

Fisher Scientific SN 61876141 04/09/10

	Start	Finish	
Stack temp	77	80	F
Equipment temp	N/A	N/A	F
Ambient temp	77.9	84.2	F
Stack static	N/A	N/A	mbars
Ambient pressure	29.38	29.38	in Hg
Total Stack pressure	N/A	N/A	mbars
Ambient humidity	31%	27%	RH

DMT 9/4/09



Notes: Blue Prefilters not installed on HEPA filters.

Port plug installed. Stack temp taken at end of each trial:

76, 75, 77, 78, 78, 80.

DMT 9/4/09

Entries made by:	Donna Trott		Technical Data Review performed by: Ernest Antonio
Signature/date	*On file with original*	9/4/2009	Signature/date Signature on file 7/12/2010
			TI-RPP-WTP_688

VELOCITY TRAVERSE DATA FORM

Site	**LV-S1 (C3) Model**	Run No.	**VT-22**
Date	**9/4/09**	Fan Configuration	**A only, B Damper and Butterfly valve closed**
Testers	MSP, DMT	Fan Setting	**60 Hz**
Stack Dia.	11.844 in.	Stack Temp	80 / 79 deg F
Stack X-Area	110.2 in.2	Start/End Time	1136 / 1218
Test Port	2	Center 2/3 from	1.09 to: 10.76
Distance to disturbance	149.25 inches	Points in Center 2/3	2 to: 7
Velocity units	s ft/min	Data Files:	NA

Order -->		2nd				1st			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	2630	2710	2690	2676.7	2630	2620	2620	2623.3
2	1.24	2800	2800	2880	2826.7	2730	2740	2890	2786.7
3	2.29	2970	2880	2910	2920.0	2810	3000	3030	2946.7
4	3.82	3130	3070	3050	3083.3	3040	2940	3140	3040.0
Center	5.91	3120	3150	3100	3123.3	3090	3040	3230	3120.0
5	8.00	3180	3210	3140	3176.7	3180	3120	3400	3233.3
6	9.52	3210	3140	3210	3186.7	3170	3150	3210	3176.7
7	10.57	3180	3080	3160	3140.0	3140	3110	3080	3110.0
8	11.31	2980	3010	3040	3010.0	3050	2950	3040	3013.3
Averages ---------->		3022.2	3005.6	3020.0	3015.9	2982.2	2963.3	3071.1	3005.6

All	s ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	3010.7		Mean	3065.2	3059.0	3062.1
Min Point	2623.3	-12.9%	Std. Dev.	138.1	151.5	139.3
Max Point	3233.3	7.4%	COV as %	4.5	5.0	**4.5**

Flow w/o C-Pt 2293 scfm

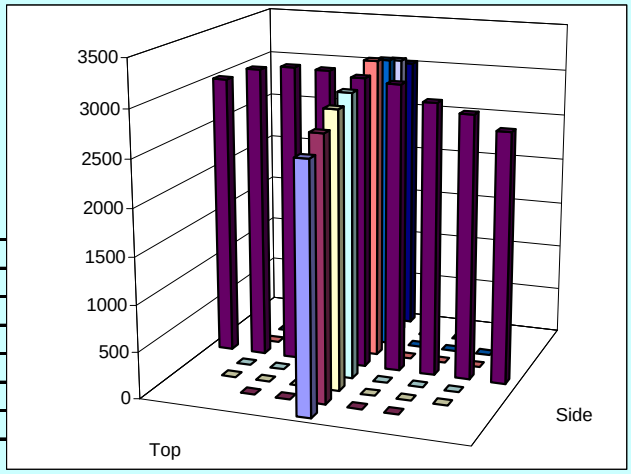
Vel Avg w/o C-Pt 2997 sfpm

Instuments Used:

	Cal Due
TSI Velocicalc SN 305039	06/23/10
Fisher Scientific SN 61876141	04/09/10

	Start	Finish	
Stack temp	80	79	F
Equipment temp	N/A	N/A	F
Ambient temp	86	79.7	F
Stack static	N/A	N/A	mbars
Ambient pressure	29.38	29.38	in Hg
Total Stack pressure	N/A	N/A	mbars
Ambient humidity	25%	30%	RH

DMT 9/4/09



Notes: Blue Prefilters not installed on HEPA filters.
Port plug installed. Stack temp taken at end of each trial:
78, 80, 79, 80, 81, 82. Changed batteries in TSI
after Trial 2 of Top transverse, point 3.

DMT 9/4/09

Entries made by:	Donna Trott	
Signature/date	*On file with original*	9/4/2009

Technical Data Review performed by: Ernest Antonio
Signature/date Signature on file 7/12/2010
TI-RPP-WTP_688

VELOCITY TRAVERSE DATA FORM

Site	**LV-S1 (C3) Model**	Run No.	**VT-23**
Date	**9/8/09**	Fan Configuration	**A only, Damper B and butterfly closed**
Testers	JEF, DMT	Fan Setting	**60 Hz**
Stack Dia.	11.813 in.	Stack Temp	63.5 / 67.4 deg F
Stack X-Area	109.6 in.2	Start/End Time	0940 / 1021
Test Port	3	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	88.875 inches	Points in Center 2/3	2 to: 7
Velocity units	s ft/min	Data Files:	NA

Order -->		1st				2nd			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	2560	2500	2510	2523.3	2570	2600	2570	2580.0
2	1.24	2560	2630	2570	2586.7	2720	2700	2680	2700.0
3	2.29	2730	2660	2670	2686.7	2790	2820	2770	2793.3
4	3.82	2900	2870	2830	2866.7	3030	3040	3070	3046.7
Center	5.91	2960	3020	2930	2970.0	3080	3050	3070	3066.7
5	8.00	3060	3050	3050	3053.3	2960	3020	2990	2990.0
6	9.52	3100	3120	3080	3100.0	3020	2980	3020	3006.7
7	10.57	3110	3150	3260	3173.3	3030	3020	3030	3026.7
8	11.31	3080	3240	3120	3146.7	2990	3050	2980	3006.7
Averages ---------->		2895.6	2915.6	2891.1	2900.7	2910.0	2920.0	2908.9	2913.0

All	s ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	2906.9		Mean	2919.5	2947.1	2933.3
Min Point	2523.3	-13.2%	Std. Dev.	218.0	141.8	177.3
Max Point	3173.3	9.2%	COV as %	7.5	4.8	**6.0**

Flow w/o C-Pt 2202 scfm

Vel Avg w/o C-Pt 2893 sfpm

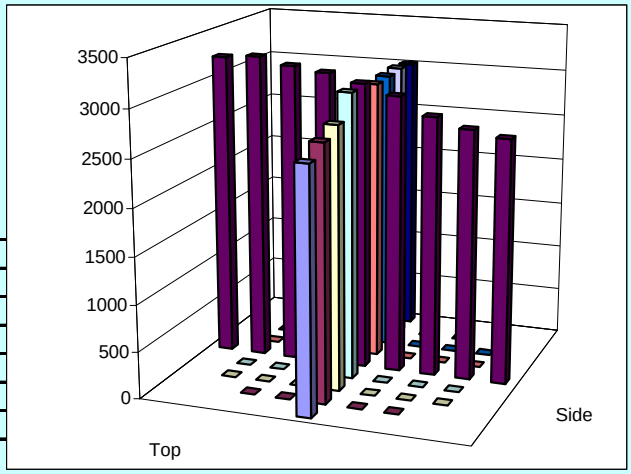
Instuments Used: Cal Due

TSI Velocicalc SN 305039 06/23/10

Fisher Scientific SN 61876141 04/09/10

DMT 9/8/09

	Start	Finish	
Stack temp	63.5	67.4	F
Equipment temp	N/A	N/A	F
Ambient temp	60.8	64.4	F
Stack static	N/A	N/A	mbars
Ambient pressure	29.38	29.38	in Hg
Total Stack pressure	N/A	N/A	mbars
Ambient humidity	53%	46%	RH



Notes: Blue pre-filters not installed on HEPA filters.

Port plug used. Stack temp taken at end of each trial:

64.3, 63.8, 64.3, 66.1, 66.1, 67.4.

DMT 9/8/09

Entries made by:	Julia Flaherty		Technical Data Review performed by: Ernest Antonio
Signature/date	*On file with original*	9/8/2009	Signature/date Signature on file 7/12/2010
			TI-RPP-WTP_688

VELOCITY TRAVERSE DATA FORM

Site	**LV-S1 (C3) Model**	Run No.	**VT-24**
Date	**9/8/09**	Fan Configuration	**A only, Damper B and butterfly closed**
Testers	JEF, DMT	Fan Setting	**37 Hz**
Stack Dia.	11.844 in.	Stack Temp	67.6 / 70.6 deg F
Stack X-Area	110.2 in.2	Start/End Time	1024 / 1104
Test Port	2	Center 2/3 from	1.09 to: 10.76
Distance to disturbance	149.25 inches	Points in Center 2/3	2 to: 7
Velocity units	s ft/min	Data Files:	NA

Order -->		1st				2nd			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	1460	1520	1510	1496.7	1550	1420	1470	1480.0
2	1.24	1710	1630	1600	1646.7	1610	1660	1570	1613.3
3	2.29	1680	1690	1680	1683.3	1680	1680	1650	1670.0
4	3.82	1720	1740	1710	1723.3	1720	1690	1740	1716.7
Center	5.91	1760	1780	1730	1756.7	1760	1730	1720	1736.7
5	8.00	1800	1820	1820	1813.3	1800	1770	1780	1783.3
6	9.52	1820	1830	1780	1810.0	1830	1850	1760	1813.3
7	10.57	1800	1750	1680	1743.3	1810	1750	1760	1773.3
8	11.31	1600	1600	1680	1626.7	1690	1670	1680	1680.0
Averages ---------->		1705.6	1706.7	1687.8	1700.0	1716.7	1691.1	1681.1	1696.3

All	s ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1698.1		Mean	1739.5	1729.5	1734.5
Min Point	1480.0	-12.8%	Std. Dev.	61.6	69.6	63.4
Max Point	1813.3	6.8%	COV as %	3.5	4.0	**3.7**

Flow w/o C-Pt 1295 scfm

Vel Avg w/o C-Pt 1692 sfpm

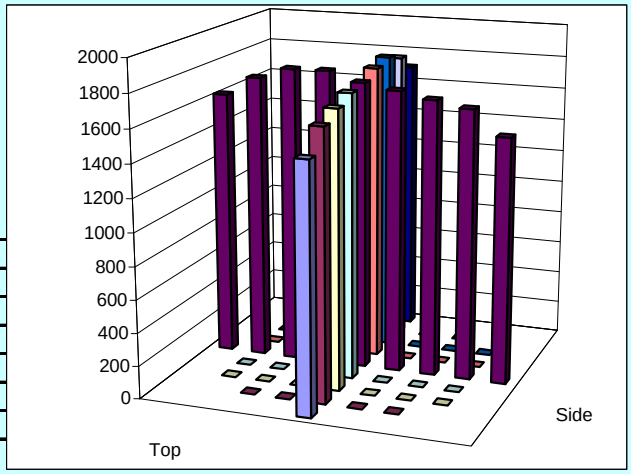
Instuments Used: Cal Due

TSI Velocicalc SN 305039 06/23/10

Fisher Scientific SN 61876141 04/09/10

DMT 9/8/09

	Start	Finish	
Stack temp	67.6	70.6	F
Equipment temp	N/A	N/A	F
Ambient temp	65.3	68.9	F
Stack static	N/A	N/A	mbars
Ambient pressure	29.38	29.38	in Hg
Total Stack pressure	N/A	N/A	mbars
Ambient humidity	45%	38%	RH



Notes: Blue pre-filters not installed on HEPA filters.

Port plug used. Stack temp taken at end of each trial:

68.4, 68.8, 69.3, 69.9, 71.1, 70.6.

Batteries changed in TSI after point 3, trial 2, top.

DMT 9/8/09

Entries made by:	Donna Trott		Technical Data Review performed by: Ernest Antonio
Signature/date	*On file with original*	9/8/2009	Signature/date Signature on file 7/12/2010
			TI-RPP-WTP_688

Appendix B.3: LV-S1 Flow Angle Data Sheets

TI-RPP-WTP-689
Page

FLOW ANGLE DATA FORM

LVS1_FlowAngleRev0.xls

CCP-WTPSP-####

Site	**LVS1 (C3) scale model**	Run No.	**FA-1**
Date	9/10/2009	Fan Setting	**37** Hz
Tester	MSP, DMT	Fan configuration	**B only, Damper A and butterfly closed**
Stack Dia.	11.844 in	Approx. air vel.	1816 fpm at point >>1 side center
Stack X-Area	110.2 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	2
Distance to disturbance	149.25 in	Stack Temp	75
Start/End Time	1005/1042		

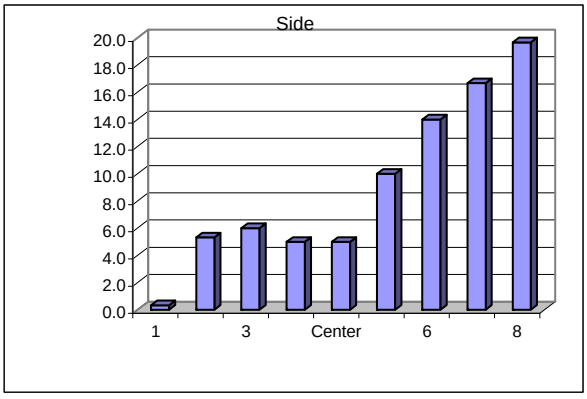
Order -->		2				1				
Traverse-->		**Side**				**Top**				
Trial ---->		1	2	3		1	2	3		
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.	
1	0.50	5	0	-4	0.3	-3	-1	1	-1.0	
2	1.24	7	4	5	5.3	5	2	9	5.3	
3	2.29	6	5	7	6.0	3	5	7	5.0	
4	3.81	5	6	4	5.0	2	1	3	2.0	
Center	5.89	5	5	5	5.0	0	0	3	1.0	
5	7.98	10	10	10	10.0	7	8	11	8.7	
6	9.50	14	13	15	14.0	12	12	12	12.0	
7	10.54	16	17	17	16.7	15	16	16	15.7	
8	11.28	21	19	19	19.7	21	20	19	20.0	
Mean of absolute values:					9.1				7.9	
" " w/o points by wall:					8.9				7.1	
								Grand mean ABS	8.5	
								" " w/o wall pts	8.0	

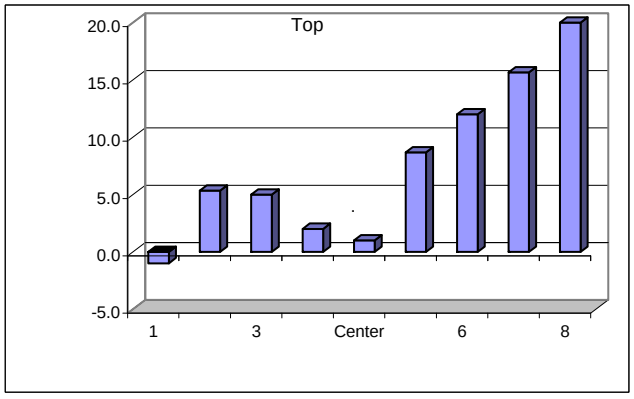
Instuments Used:		**Cal. Due**
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI Velocicalc SN#305039	23-Jun-10
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).

Notes: Blue pre-filters not installed on HEPA filters, port plug used.
Start time estimated.

DMT 9/10/09





Entries made by:	Donna Trott	Technical Data Review performed by:	Ernest Antonio
Signature/date	On file with original 9/10/2009	Signature/date	Signature on File 13 July 2010 TI-RPP-WTP_689

FLOW ANGLE DATA FORM

LVS1_FlowAngleRev0.xls

CCP-WTPSP-####

Site	**LVS1 (C3) scale model**	Run No.	**FA-2**
Date	9/10/2009	Fan Setting	**60** Hz
Tester	MSP, DMT	Fan configuration	**B only, Damper A and butterfly closed**
Stack Dia.	11.844 in	Approx. air vel.	2440 fpm at point >>1 side center
Stack X-Area	110.2 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	2
Distance to disturbance	149.25 in	Stack Temp	78
Start/End Time	1045/1124		

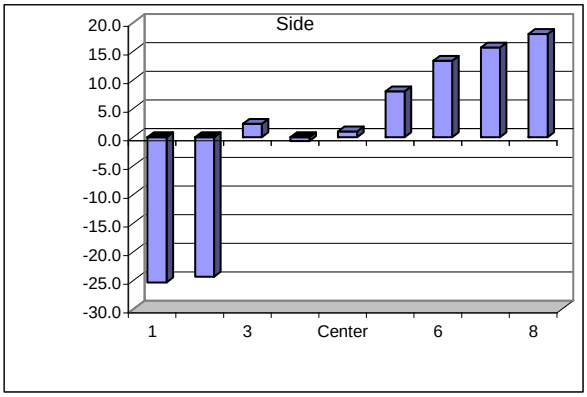
Order -->		1				2				
Traverse-->		**Side**				**Top**				
Trial ---->		1	2	3		1	2	3		
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.	
1	0.50	-28	-24	-24	-25.3	-1	-18	-11	-10.0	
2	1.24	-23	-25	-25	-24.3	2	8	4	4.7	
3	2.29	3	2	2	2.3	-18	6	6	-2.0	
4	3.81	0	0	-2	-0.7	-3	-2	-1	-2.0	
Center	5.89	1	1	1	1.0	4	6	1	3.7	
5	7.98	9	7	8	8.0	11	9	11	10.3	
6	9.50	15	12	13	13.3	15	14	16	15.0	
7	10.54	18	14	15	15.7	17	18	18	17.7	
8	11.28	19	18	17	18.0	20	21	22	21.0	
Mean of absolute values:					12.1				9.6	
" " w/o points by wall:					9.3				7.9	
								Grand mean ABS	10.8	
								" " w/o wall pts	8.6	

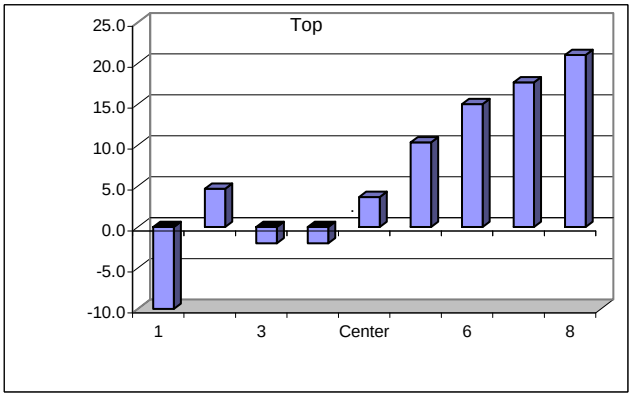
Instuments Used:		**Cal. Due**
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI Velocicalc SN#305039	23-Jun-10
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Notes: Blue pre-filters not installed on HEPA filters, port plug used.

DMT 9/10/09

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).





Entries made by:	Donna Trott		Technical Data Review performed by:	Ernest Antonio
Signature/date	On file with original	9/10/2009	Signature/date	Signature on File 13 July 2010
				TI-RPP-WTP_689

FLOW ANGLE DATA FORM

LVS1_FlowAngleRev0.xls

CCP-WTPSP-####

Site	**LVS1 (C3) scale model**	Run No.	**FA-3**
Date	9/10/2009	Fan Setting	**60** Hz
Tester	MSP, DMT	Fan configuration	**B only, Damper A and butterfly closed**
Stack Dia.	11.844 in	Approx. air vel.	3290 fpm at point >>1 side center
Stack X-Area	110.2 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	2
Distance to disturbance	149.25 in	Stack Temp	79
Start/End Time	1125/1156		

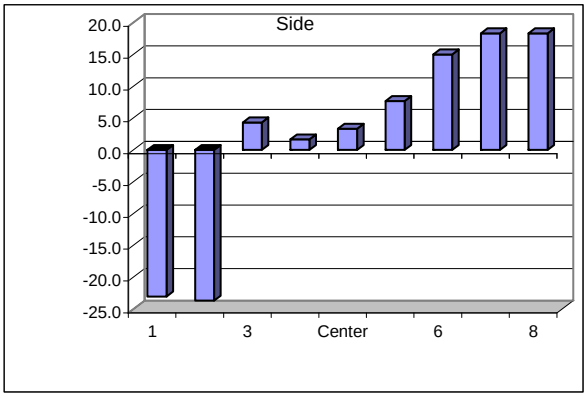
Order -->		2				1				
Traverse-->		Side				Top				
Trial ---->		1	2	3		1	2	3		
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.	
1	0.50	-23	-23	-23	-23.0	-14	3	4	-2.3	
2	1.24	-24	-22	-25	-23.7	5	6	6	5.7	
3	2.29	4	4	5	4.3	4	6	5	5.0	
4	3.81	4	0	1	1.7	-1	0	1	0.0	
Center	5.89	5	2	3	3.3	3	2	5	3.3	
5	7.98	9	7	7	7.7	11	10	9	10.0	
6	9.50	16	14	15	15.0	16	14	16	15.3	
7	10.54	21	18	16	18.3	19	18	19	18.7	
8	11.28	18	17	20	18.3	21	21	22	21.3	
Mean of absolute values:					12.8				9.1	
" " w/o points by wall:					10.6				8.3	
								Grand mean ABS	10.9	
								" " w/o wall pts	9.4	

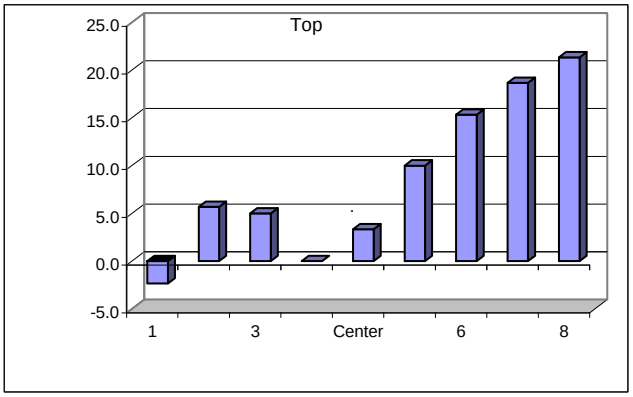
Instuments Used:		**Cal. Due**
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI Velocicalc SN#305039	23-Jun-10
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Notes: Blue pre-filters not installed on HEPA filters, port plug used.

DMT 9/10/09

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).





Entries made by:	Donna Trott		Technical Data Review performed by:	Ernest Antonio
Signature/date	On file with original	9/10/2009	Signature/date	Signature on File 13 July 2010
				TI-RPP-WTP_689

FLOW ANGLE DATA FORM

LVS1_FlowAngleRev0.xls

CCP-WTPSP-####

Site	**LVS1 (C3) scale model**	Run No.	**FA-4**
Date	9/11/2009	Fan Setting	**60** Hz
Tester	MSP, DMT	Fan configuration	**B only, Damper A and butterfly shut**
Stack Dia.	11.844 in	Approx. air vel.	2980 fpm at point >>1 side center
Stack X-Area	110.2 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	2
Distance to disturbance	149.25 in	Stack Temp	76
Start/End Time	0935/1028		

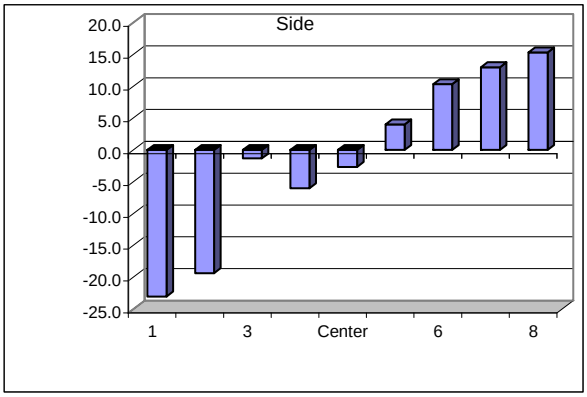
Order -->		2				1				
Traverse-->		Side				Top				
Trial ---->		1	2	3		1	2	3		
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.	
1	0.50	-29	-26	-14	-23.0	-8	-15	-4	-9.0	
2	1.24	-27	-27	-4	-19.3	1	1	1	1.0	
3	2.29	-2	-3	1	-1.3	0	3	2	1.7	
4	3.81	-7	-5	-6	-6.0	-6	-6	-5	-5.7	
Center	5.89	-2	-3	-3	-2.7	1	-1	1	0.3	
5	7.98	4	4	4	4.0	4	7	6	5.7	
6	9.50	10	11	10	10.3	12	13	11	12.0	
7	10.54	12	15	12	13.0	14	15	14	14.3	
8	11.28	15	17	14	15.3	16	18	16	16.7	
Mean of absolute values:					10.6				7.4	
" " w/o points by wall:					8.1				5.8	
								Grand mean ABS	9.0	
								" " w/o wall pts	7.0	

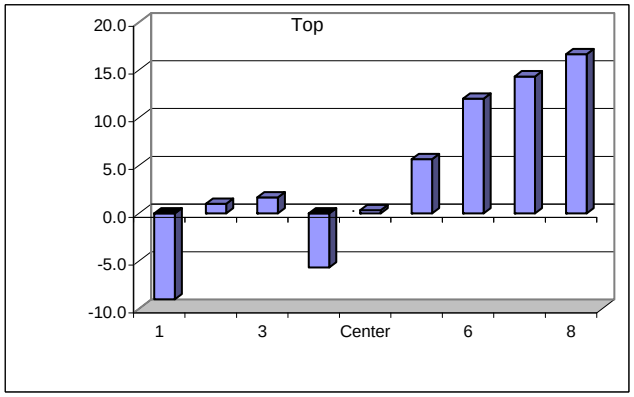
Instuments Used:		**Cal. Due**
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI Velocicalc SN#305039	23-Jun-10
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Notes: Blue pre-filters not installed on HEPA filters, port plug used.
Winds 12 gusting to 15 mph.

DMT 9/11/09

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).





Entries made by:	Donna Trott		Technical Data Review performed by: Ernest Antonio
Signature/date	On file with original	9/11/2009	Signature/date Signature on File 13 July 2010
			TI-RPP-WTP_689

FLOW ANGLE DATA FORM

LVS1_FlowAngleRev0.xls

CCP-WTPSP-####

Site	**LVS1 (C3) scale model**	Run No.	**FA-5**
Date	9/11/2009	Fan Setting	**37** Hz
Tester	MSP, DMT	Fan configuration	**B only, Damper A and butterfly shut**
Stack Dia.	11.813 in	Approx. air vel.	1740 fpm at point >>1 side center
Stack X-Area	109.6 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	3
Distance to disturbance	88.875 in	Stack Temp	77.7
Start/End Time	1038/1104		

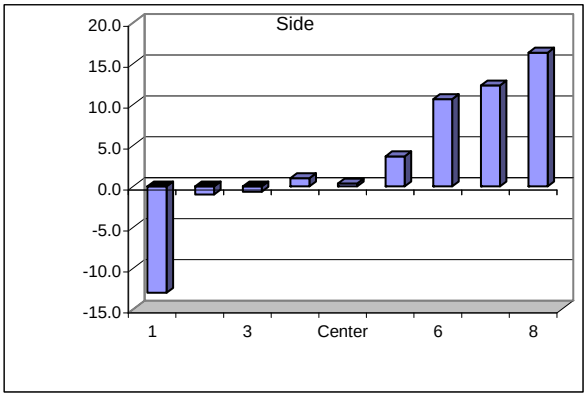
Order -->		1				2				
Traverse-->		Side				Top				
Trial ---->		1	2	3		1	2	3		
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.	
1	0.50	-12	-14	-13	-13.0	-25	-19	-16	-20.0	
2	1.24	-1	-1	-1	-1.0	-6	-6	-2	-4.7	
3	2.29	-2	-1	1	-0.7	-5	-3	-4	-4.0	
4	3.81	1	1	1	1.0	-7	-2	-4	-4.3	
Center	5.89	0	1	0	0.3	-3	1	-5	-2.3	
5	7.98	4	4	3	3.7	4	6	3	4.3	
6	9.50	11	12	9	10.7	9	8	7	8.0	
7	10.54	13	11	13	12.3	12	10	11	11.0	
8	11.28	17	17	15	16.3	14	14	13	13.7	
Mean of absolute values:					6.6				8.0	
" " w/o points by wall:					4.2				5.5	
								Grand mean ABS	7.3	
								" " w/o wall pts	4.9	

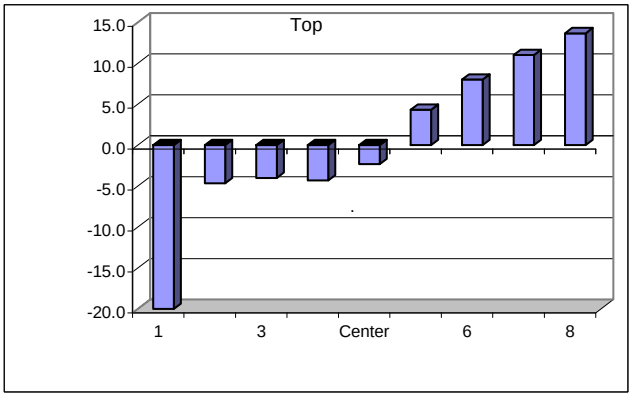
Instuments Used:		**Cal. Due**
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI Velocicalc SN#305039	23-Jun-10
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Notes: Blue pre-filters not installed on HEPA filters, port plug used.

DMT 9/11/09

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).





Entries made by:	Donna Trott		Technical Data Review performed by:	Ernest Antonio
Signature/date	On file with original	9/11/2009	Signature/date	Signature on File 13 July 2010
				TI-RPP-WTP_689

FLOW ANGLE DATA FORM

LVS1_FlowAngleRev0.xls

CCP-WTPSP-####

Site	**LVS1 (C3) scale model**	Run No.	**FA-6**
Date	9/11/2009	Fan Setting	**37** Hz
Tester	MSP, DMT	Fan configuration	**B only, Damper A and butterfly shut**
Stack Dia.	11.813 in	Approx. air vel.	1740 fpm at point >>1 side center
Stack X-Area	109.6 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	3
Distance to disturbance	88.875 in	Stack Temp	79.8
Start/End Time	1111/1140		

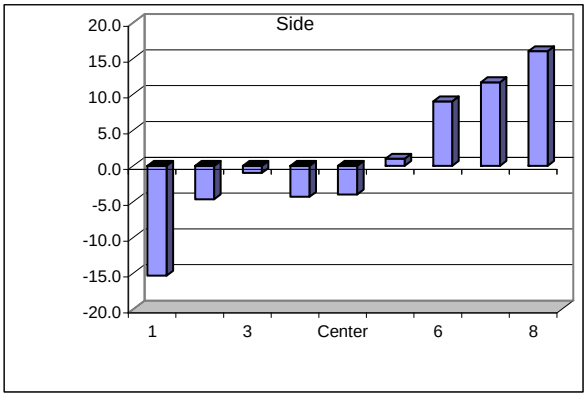
Order -->		2				1				
Traverse-->		Side				Top				
Trial ---->		1	2	3		1	2	3		
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.	
1	0.50	-14	-17	-15	-15.3	-17	-19	-22	-19.3	
2	1.24	-6	-3	-5	-4.7	-5	-10	-7	-7.3	
3	2.29	1	-1	-3	-1.0	-7	-8	-3	-6.0	
4	3.81	-2	-6	-5	-4.3	-7	-6	-5	-6.0	
Center	5.89	-3	-5	-4	-4.0	-2	-4	-5	-3.7	
5	7.98	1	0	2	1.0	4	2	4	3.3	
6	9.50	10	8	9	9.0	7	8	10	8.3	
7	10.54	12	12	11	11.7	13	12	11	12.0	
8	11.28	14	17	17	16.0	14	14	13	13.7	
Mean of absolute values:					7.4				8.9	
" " w/o points by wall:					5.1				6.7	
								Grand mean ABS	8.1	
								" " w/o wall pts	5.9	

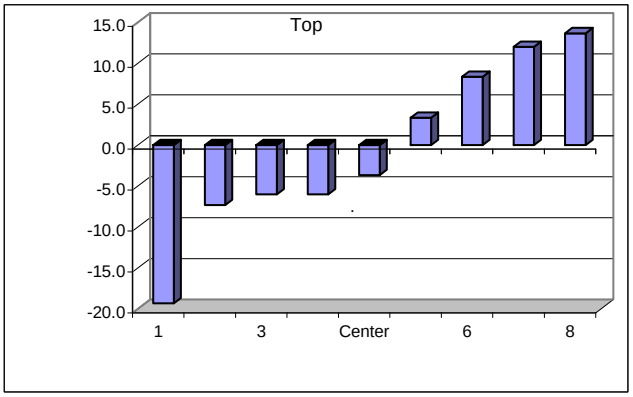
Instuments Used:		**Cal. Due**
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI Velocicalc SN#305039	23-Jun-10
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Notes: Blue pre-filters not installed on HEPA filters, port plug used.

DMT 9/11/09

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).





Entries made by:	Donna Trott		Technical Data Review performed by: Ernest Antonio
Signature/date	On file with original	9/11/2009	Signature/date Signature on File 13 July 2010
			TI-RPP-WTP_689

FLOW ANGLE DATA FORM

LVS1_FlowAngleRev0.xls

CCP-WTPSP-####

Site	**LVS1 (C3) scale model**	Run No.	**FA-7**
Date	9/11/2009	Fan Setting	**37** Hz
Tester	MSP, DMT	Fan configuration	**B only, Damper A and butterfly shut**
Stack Dia.	11.813 in	Approx. air vel.	1720 fpm at point >>1 side center
Stack X-Area	109.6 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	3
Distance to disturbance	88.875 in	Stack Temp	82
Start/End Time	1142/1216		

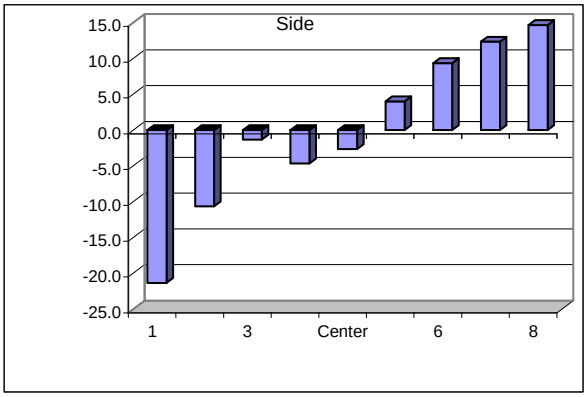
Order -->		1				2				
Traverse-->		**Side**				**Top**				
Trial ---->		1	2	3		1	2	3		
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.	
1	0.50	-26	-23	-15	-21.3	-19	-18	-23	-20.0	
2	1.24	-13	-4	-15	-10.7	-6	-11	-9	-8.7	
3	2.29	-1	-1	-2	-1.3	-7	-6	-4	-5.7	
4	3.81	-6	-5	-3	-4.7	-7	-8	-7	-7.3	
Center	5.89	-3	-2	-3	-2.7	-1	-2	-2	-1.7	
5	7.98	4	5	3	4.0	4	4	4	4.0	
6	9.50	11	8	9	9.3	9	10	8	9.0	
7	10.54	15	10	12	12.3	12	11	11	11.3	
8	11.28	16	14	14	14.7	12	14	12	12.7	
Mean of absolute values:					9.0				8.9	
" " w/o points by wall:					6.4				6.8	
								Grand mean ABS	9.0	
								" " w/o wall pts	6.6	

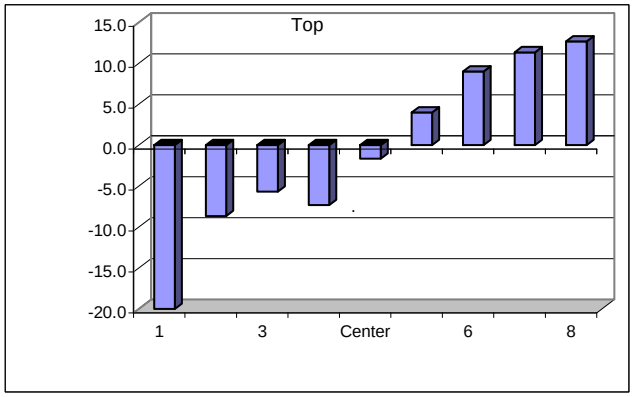
Instuments Used:		**Cal. Due**
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI Velocicalc SN#305039	23-Jun-10
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).

Notes: Blue pre-filters not installed on HEPA filters, port plug used.
Winds 10 gusting to 15 mph.

DMT 9/11/09





Entries made by:	Donna Trott		Technical Data Review performed by: Ernest Antonio
Signature/date	On file with original	9/11/2009	Signature/date Signature on File 13 July 2010
			TI-RPP-WTP_689

FLOW ANGLE DATA FORM

LVS1_FlowAngleRev0.xls

CCP-WTPSP-####

Site **LVS1 (C3) scale model**
Date 9/11/2009
Tester MSP, DMT
Stack Dia. 11.813 in
Stack X-Area 109.6 in2
Elevation N.A. ft
Distance to disturbance 88.875 in
Start/End Time 1220/1251

Run No. **FA-8**
Fan Setting **60** Hz
Fan configuration **B only, Damper A and butterfly shut**
Approx. air vel. 2970 fpm at point >>1 side center
Units degrees (clockwise > pos. nos.)
Port 3
Stack Temp 85

		Side				Top			
Order -->		2				1			
Traverse-->		Side				Top			
Trial ---->		1	2	3		1	2	3	
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.
1	0.50	-23	-28	-25	-25.3	-16	-12	-23	-17.0
2	1.24	-10	-15	-15	-13.3	-6	-8	-5	-6.3
3	2.29	-11	-14	-9	-11.3	-3	-5	-6	-4.7
4	3.81	-8	-10	-8	-8.7	-8	-6	-6	-6.7
Center	5.89	-3	-4	-2	-3.0	-1	-2	-3	-2.0
5	7.98	6	6	5	5.7	7	5	4	5.3
6	9.50	11	12	11	11.3	12	10	11	11.0
7	10.54	15	15	13	14.3	13	12	13	12.7
8	11.28	17	16	15	16.0	16	13	16	15.0
Mean of absolute values:					12.1				9.0
" " w/o points by wall:					9.7				7.0
								Grand mean ABS	10.5
								" " w/o wall pts	8.3

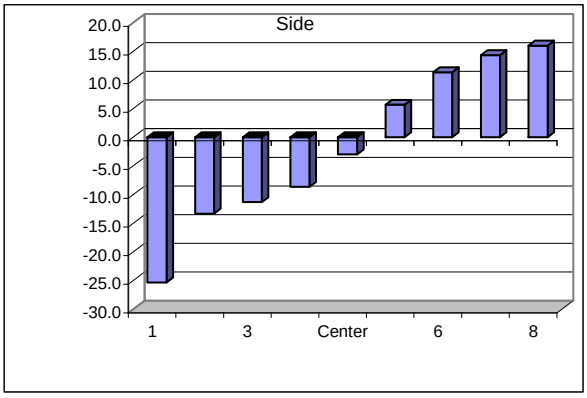
Instuments Used:

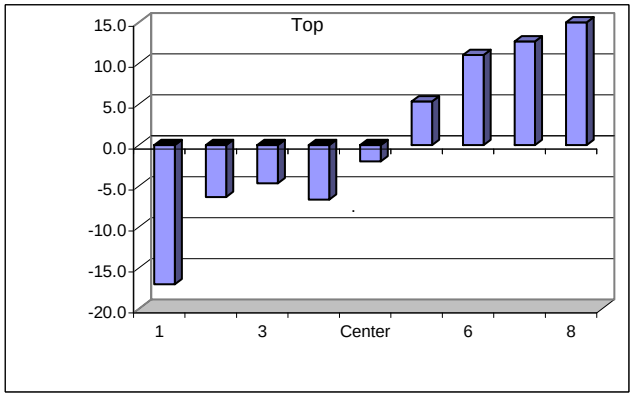
		Cal. Due
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI Velocicalc SN#305039	23-Jun-10
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).

Notes: Blue pre-filters not installed on HEPA filters, port plug used.
Wind 10 gusting 16 mph

DMT 9/11/09





Entries made by:	Donna Trott		Technical Data Review performed by: Ernest Antonio
Signature/date	On file with original	9/11/2009	Signature/date Signature on File 13 July 2010
			TI-RPP-WTP_689

FLOW ANGLE DATA FORM

LVS1_FlowAngleRev0.xls

CCP-WTPSP-####

Site	**LVS1 (C3) scale model**	Run No.	**FA-9**
Date	9/15/2009	Fan Setting	**60** Hz
Tester	DMT, JEF	Fan configuration	**B only, Damper A & Butterfly shut**
Stack Dia.	11.813 in	Approx. air vel.	2980 fpm at point >>1 side center
Stack X-Area	109.6 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	1 TOP Center J
Distance to disturbance	209.625 in	Stack Temp	75.8
Start/End Time	0920 / 1016		

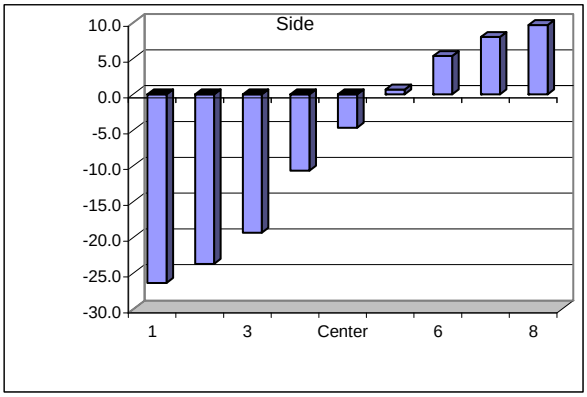
		Side				Top			
Order -->		1				2			
Traverse-->									
Trial ---->		1	2	3		1	2	3	
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.
1	0.50	-27	-26	-26	-26.3	-1	-1	-1	-1.0
2	1.24	-25	-23	-23	-23.7	-3	-1	-2	-2.0
3	2.29	-21	-17	-20	-19.3	-2	-1	0	-1.0
4	3.81	-10	-11	-11	-10.7	-1	-4	-2	-2.3
Center	5.89	-4	-6	-4	-4.7	-1	-3	-3	-2.3
5	7.98	0	0	2	0.7	2	2	4	2.7
6	9.50	5	5	6	5.3	7	8	8	7.7
7	10.54	9	7	8	8.0	11	10	11	10.7
8	11.28	10	10	9	9.7	13	12	12	12.3
Mean of absolute values:					12.0				4.7
" " w/o points by wall:					10.3				4.1
								Grand mean ABS	8.4
								" " w/o wall pts	7.2

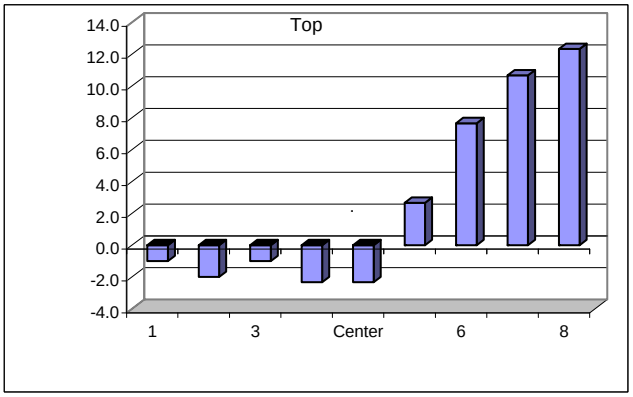
Instuments Used:		**Cal. Due**
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI Velocicalc SN#305039	23-Jun-10
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Notes: Blue pre-filters were not installed. Port Plug used.

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).

DMT 9/15/09





Entries made by:	Donna Trott	Technical Data Review performed by:	Ernest Antonio
Signature/date	*On File w/ Original* 9/15/2009	Signature/date	Signature on File 13 July 2010
			TI-RPP-WTP_689

FLOW ANGLE DATA FORM

LVS1_FlowAngleRev0.xls

CCP-WTPSP-####

Site	**LVS1 (C3) scale model**	Run No.	**FA-10**
Date	9/15/2009	Fan Setting	**37** Hz
Tester	DMT, JEF	Fan configuration	**B only, Damper A & Butterfly shut**
Stack Dia.	11.813 in	Approx. air vel.	1700 fpm at point >>1 side center
Stack X-Area	109.6 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	1 TOP Center J
Distance to disturbance	209.625 in	Stack Temp	78.2
Start/End Time	1020 / 1045		

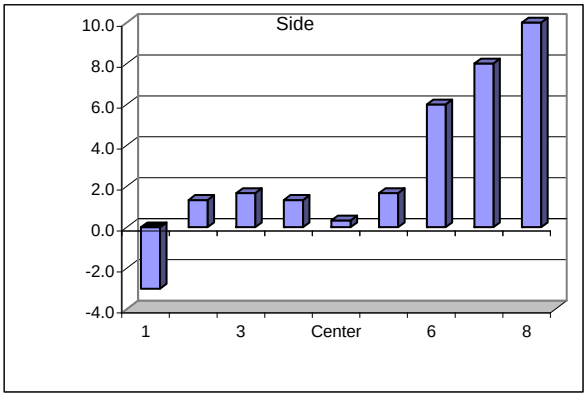
		Side				Top			
Order -->		2				1			
Traverse-->									
Trial ---->		1	2	3		1	2	3	
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.
1	0.50	-3	-3	-3	-3.0	-5	0	1	-1.3
2	1.24	1	2	1	1.3	5	4	5	4.7
3	2.29	0	3	2	1.7	6	6	5	5.7
4	3.81	2	0	2	1.3	6	5	4	5.0
Center	5.89	0	0	1	0.3	5	3	6	4.7
5	7.98	1	2	2	1.7	5	5	6	5.3
6	9.50	8	5	5	6.0	7	10	9	8.7
7	10.54	8	8	8	8.0	13	12	10	11.7
8	11.28	11	9	10	10.0	18	12	12	14.0
Mean of absolute values:					3.7				6.8
" " w/o points by wall:					2.9				6.5
								Grand mean ABS	5.2
								" " w/o wall pts	4.7

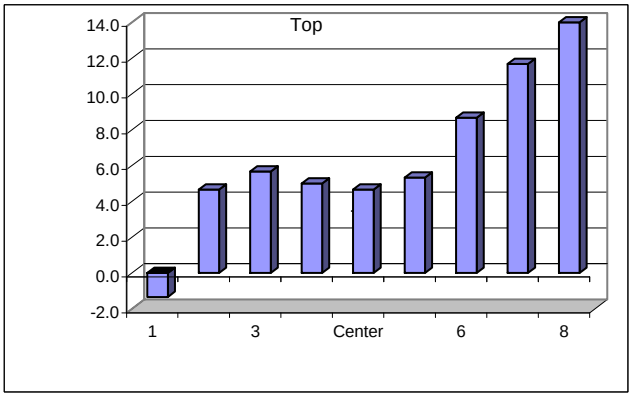
Instuments Used:		**Cal. Due**
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI Velocicalc SN#305039	23-Jun-10
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Notes: Blue pre-filters were not installed. Port Plug used.

JEF 9/15/09

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).





Entries made by:	Julia Flaherty	Technical Data Review performed by:	Ernest Antonio
Signature/date	*On File w/ Original* 9/15/2009	Signature/date	Signature on File 13 July 2010
			TI-RPP-WTP_689

FLOW ANGLE DATA FORM

LVS1_FlowAngleRev0.xls

CCP-WTPSP-####

Site	**LVS1 (C3) scale model**	Run No.	**FA-11**
Date	9/15/2009	Fan Setting	**60** Hz
Tester	DMT, JEF	Fan configuration	**A only, Damper B & Butterfly shut**
Stack Dia.	11.813 in	Approx. air vel.	3140 fpm at point >> 1 top center
Stack X-Area	109.6 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	1 TOP Center J
Distance to disturbance	209.625 in	Stack Temp	80
Start/End Time	1100 / 1139		

Order -->		1				2			
Traverse-->		Side				Top			
Trial ---->		1	2	3		1	2	3	
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.
1	0.50	4	4	8	5.3	19	22	6	15.7
2	1.24	6	-7	-5	-2.0	20	21	23	21.3
3	2.29	-4	-5	2	-2.3	17	18	16	17.0
4	3.81	7	6	12	8.3	10	10	3	7.7
Center	5.89	2	1	1	1.3	0	1	2	1.0
5	7.98	-3	-4	-3	-3.3	-4	-4	-3	-3.7
6	9.50	-8	-7	-7	-7.3	-5	-6	-7	-6.0
7	10.54	-10	-9	-10	-9.7	-9	-10	-8	-9.0
8	11.28	-10	-10	-11	-10.3	-11	-11	-11	-11.0
Mean of absolute values:					5.6				10.3
" " w/o points by wall:					4.9				9.4
								Grand mean ABS	7.9
								" " w/o wall pts	7.1

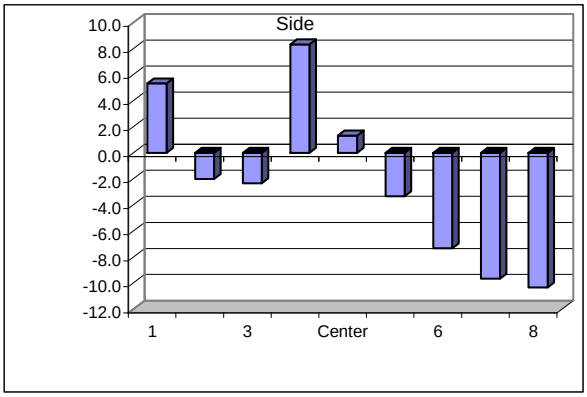
Instuments Used:

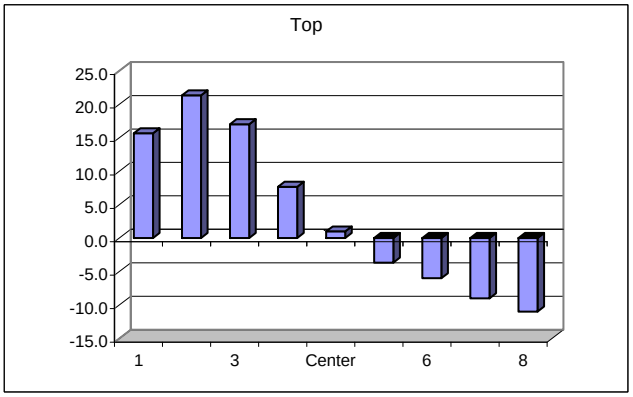
		Cal. Due
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI Velocicalc SN#305039	23-Jun-10
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).

Notes: Blue pre-filters were not installed. Port Plug used.

JEF 9/15/09





Entries made by:	Julia Flaherty	Technical Data Review performed by:	Ernest Antonio
Signature/date	*On File w/ Original* 9/15/2009	Signature/date	Signature on File 13 July 2010
			TI-RPP-WTP_689

FLOW ANGLE DATA FORM

LVS1_FlowAngleRev0.xls

CCP-WTPSP-####

Site **LVS1 (C3) scale model**
Date 9/16/2009
Tester XYY, JEF
Stack Dia. 11.813 in
Stack X-Area 109.6 in2
Elevation N.A. ft
Distance to disturbance 209.625 in
Start/End Time 0945 / 1020

Run No. **FA-12**
Fan Setting **60** Hz
Fan configuration **A only, Damper B & Butterfly closed**
Approx. air vel. 3200 fpm at point >>1 side center
Units degrees (clockwise > pos. nos.)
Port 1
Stack Temp 74.4

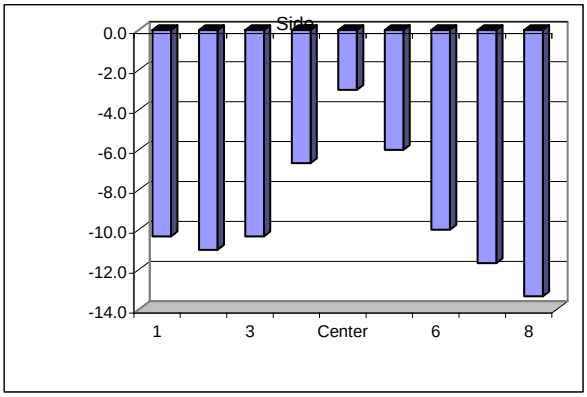
Order -->		1				2			
Traverse-->		Side				Top			
Trial ---->		1	2	3		1	2	3	
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.
1	0.50	-12	-10	-9	-10.3	-7	-9	-5	-7.0
2	1.24	-11	-11	-11	-11.0	-8	-10	-7	-8.3
3	2.29	-11	-10	-10	-10.3	-4	-8	-3	-5.0
4	3.81	-9	-6	-5	-6.7	2	1	0	1.0
Center	5.89	-5	-2	-2	-3.0	0	0	-1	-0.3
5	7.98	-8	-4	-6	-6.0	-6	-5	-6	-5.7
6	9.50	-12	-9	-9	-10.0	-9	-9	-9	-9.0
7	10.54	-13	-13	-9	-11.7	-9	-10	-11	-10.0
8	11.28	-14	-16	-10	-13.3	-10	-12	-13	-11.7
Mean of absolute values:					9.1				6.4
" " w/o points by wall:					8.4				5.6
								Grand mean ABS	7.8
								" " w/o wall pts	7.0

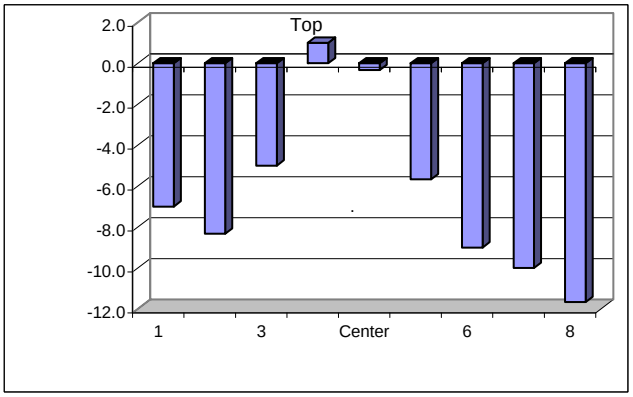
Instuments Used:		**Cal. Due**
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI Velocicalc SN#305039	23-Jun-10
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).

Notes: Blue prefilteres not installed upstream of HEPA filters.
Port plug used.

JEF 9/16/09





Entries made by:	Julia Flaherty		Technical Data Review performed by:	Ernest Antonio
Signature/date	*On File w/ Original*	9/16/2009	Signature/date	Signature on File 13 July 2010
				TI-RPP-WTP_689

FLOW ANGLE DATA FORM

LVS1_FlowAngleRev0.xls

CCP-WTPSP-####

Site	**LVS1 (C3) scale model**	Run No.	**FA-13**
Date	9/16/2009	Fan Setting	**60** Hz
Tester	XYY, JEF	Fan configuration	**A only, Damper B & Butterfly closed**
Stack Dia.	11.813 in	Approx. air vel.	3000 fpm at point >>1 side center
Stack X-Area	109.6 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	1
Distance to disturbance	209.625 in	Stack Temp	77.1
Start/End Time	1025 / 1105		

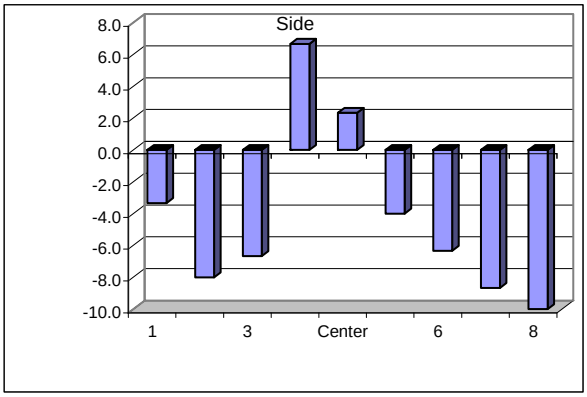
Order -->		2				1				
Traverse-->		Side				Top				
Trial ---->		1	2	3		1	2	3		
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.	
1	0.50	-3	-4	-3	-3.3	-8	-6	-5	-6.3	
2	1.24	-9	-9	-6	-8.0	-5	-8	-6	-6.3	
3	2.29	-7	-7	-6	-6.7	-1	-4	-6	-3.7	
4	3.81	-1	10	11	6.7	10	11	9	10.0	
Center	5.89	2	0	5	2.3	4	4	2	3.3	
5	7.98	-4	-4	-4	-4.0	-2	-4	-4	-3.3	
6	9.50	-6	-7	-6	-6.3	-6	-5	-7	-6.0	
7	10.54	-8	-9	-9	-8.7	-8	-9	-8	-8.3	
8	11.28	-10	-10	-10	-10.0	-10	-10	-13	-11.0	
Mean of absolute values:					6.2				6.5	
" " w/o points by wall:					6.1				5.9	
								Grand mean ABS	6.4	
								" " w/o wall pts	6.0	

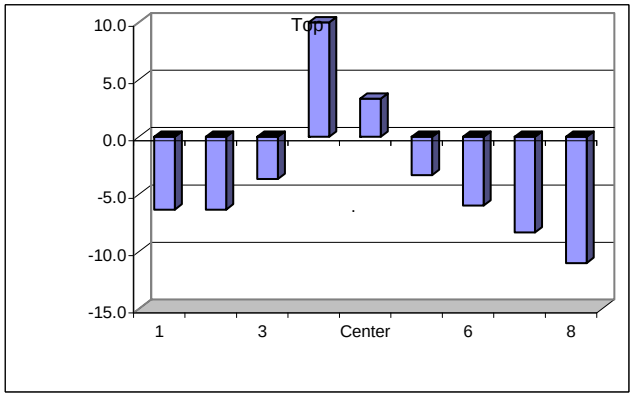
Instuments Used:		**Cal. Due**
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI Velocicalc SN#305039	23-Jun-10
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).

Notes: Blue prefilteres not installed upstream of HEPA filters.
Port plug used.

JEF 9/16/09





Entries made by:	Xiao-Ying Yu	Technical Data Review performed by:	Ernest Antonio
Signature/date	*On File w/ Original* 9/16/2009	Signature/date	Signature on File 13 July 2010
			TI-RPP-WTP_689

FLOW ANGLE DATA FORM

LVS1_FlowAngleRev0.xls

CCP-WTPSP-####

Site	**LVS1 (C3) scale model**	Run No.	**FA-14**
Date	9/16/2009	Fan Setting	**60** Hz
Tester	XYY, JEF	Fan configuration	**A only, Damper B & Butterfly closed**
Stack Dia.	11.844 in	Approx. air vel.	3090 fpm at point >>1 side center
Stack X-Area	110.2 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	2
Distance to disturbance	149.25 in	Stack Temp	80.3
Start/End Time	1106 / 1138		

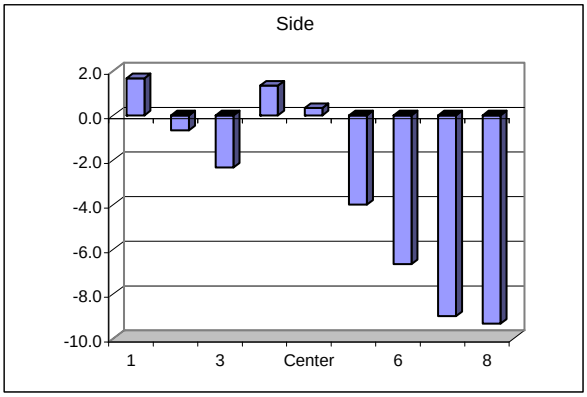
Order -->	1				2			
Traverse-->	**Side**				**Top**			
Trial ---->	1	2	3		1	2	3	
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.
1	0.50	2	3	0	1.7	11	2	-4	3.0
2	1.24	1	0	-3	-0.7	-3	-3	-4	-3.3
3	2.29	-3	-2	-2	-2.3	-4	-3	-2	-3.0
4	3.81	1	2	1	1.3	-2	1	-2	-1.0
Center	5.89	1	0	0	0.3	-3	-1	-2	-2.0
5	7.98	-4	-4	-4	-4.0	-6	-7	-6	-6.3
6	9.50	-6	-7	-7	-6.7	-9	-10	-9	-9.3
7	10.54	-9	-8	-10	-9.0	-10	-10	-10	-10.0
8	11.28	-9	-9	-10	-9.3	-12	-12	-13	-12.3
Mean of absolute values:					3.9				5.6
" " w/o points by wall:					3.5				5.0
							Grand mean ABS		4.8
							" " w/o wall pts		4.2

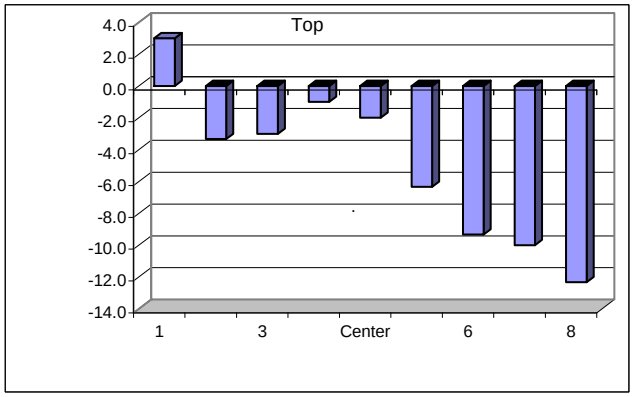
Instuments Used:		**Cal. Due**
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI Velocicalc SN#305039	23-Jun-10
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).

Notes: Blue prefilteres not installed upstream of HEPA filters.
Port plug used.

JEF 9/16/09





Entries made by:	Xiao-Ying Yu	Technical Data Review performed by:	Ernest Antonio
Signature/date	*On File w/ Original* 9/16/2009	Signature/date	Signature on File 13 July 2010 TI-RPP-WTP_689

FLOW ANGLE DATA FORM

LVS1_FlowAngleRev0.xls

CCP-WTPSP-####

Site	**LVS1 (C3) scale model**	Run No.	**FA-15**
Date	9/18/2009	Fan Setting	**60** Hz
Tester	MSP, JEF	Fan configuration	**A only, Fan B & damper shut**
Stack Dia.	11.813 in	Approx. air vel.	3030 fpm at point >>1 side center
Stack X-Area	109.6 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	3
Distance to disturbance	88.875 in	Stack Temp	86
Start/End Time	1315 / 1350		

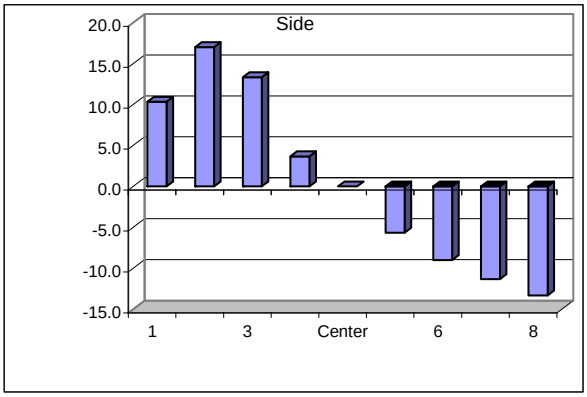
Order -->		1				2				
Traverse-->		**Side**				**Top**				
Trial ---->		1	2	3		1	2	3		
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.	
1	0.50	19	7	5	10.3	-1	19	-3	5.0	
2	1.24	15	20	16	17.0	23	22	21	22.0	
3	2.29	10	16	14	13.3	17	16	13	15.3	
4	3.81	0	6	5	3.7	0	6	7	4.3	
Center	5.89	-4	3	1	0.0	2	2	2	2.0	
5	7.98	-7	-5	-5	-5.7	-1	-3	-3	-2.3	
6	9.50	-8	-10	-9	-9.0	-8	-9	-8	-8.3	
7	10.54	-11	-12	-11	-11.3	-10	-13	-13	-12.0	
8	11.28	-13	-14	-13	-13.3	-12	-14	-17	-14.3	
Mean of absolute values:					9.3				9.5	
" " w/o points by wall:					8.6				9.5	
								Grand mean ABS	9.4	
								" " w/o wall pts	9.0	

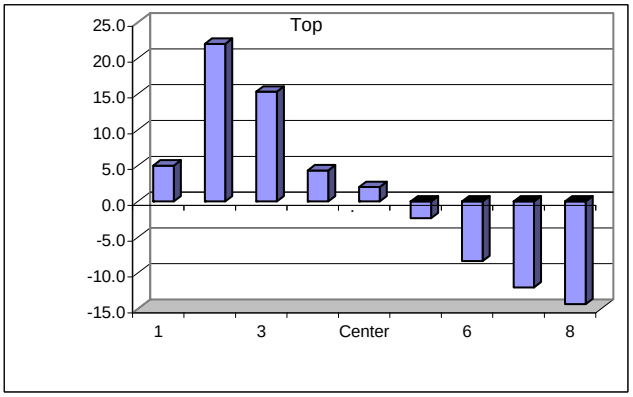
Instuments Used:		**Cal. Due**
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI Velocicalc SN#305039	23-Jun-10
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).

Notes: Blue pre-filteres not installed upstream of HEPA filters.
Port Plug installed.

JEF 9/18/09





Entries made by:	Julia Flaherty	Technical Data Review performed by:	Ernest Antonio
Signature/date	*On File w/ Original* 9/18/2009	Signature/date	Signature on File 13 July 2010
			TI-RPP-WTP_689

FLOW ANGLE DATA FORM

LVS1_FlowAngleRev0.xls

CCP-WTPSP-####

Site	**LVS1 (C3) scale model**	Run No.	**FA-16**
Date	9/18/2009	Fan Setting	**37** Hz
Tester	MSP, JEF	Fan configuration	**A only, Fan B & damper B and butterfly sh**
Stack Dia.	11.844 in	Approx. air vel.	1700 fpm at point >>1 side center
Stack X-Area	110.2 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	2
Distance to disturbance	149.25 in	Stack Temp	86.1
Start/End Time	1355 / 1422		

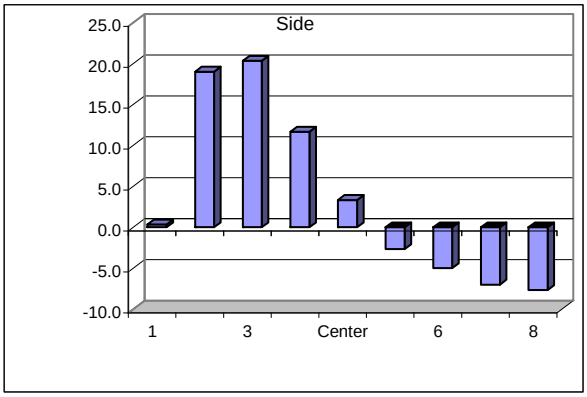
		Side				Top			
Order -->		1				2			
Traverse-->									
Trial ---->		1	2	3		1	2	3	
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.
1	0.50	-1	1	1	0.3	-3	-3	-3	-3.0
2	1.24	17	19	21	19.0	1	18	20	13.0
3	2.29	21	20	20	20.3	6	13	16	11.7
4	3.81	12	11	12	11.7	2	3	1	2.0
Center	5.89	2	5	3	3.3	-1	1	1	0.3
5	7.98	-3	-3	-2	-2.7	-5	-6	-6	-5.7
6	9.50	-5	-5	-5	-5.0	-7	-8	-8	-7.7
7	10.54	-7	-6	-8	-7.0	-9	-9	-10	-9.3
8	11.28	-8	-8	-7	-7.7	-11	-9	-9	-9.7
Mean of absolute values:					8.6				6.9
" " w/o points by wall:					9.9				7.1
								Grand mean ABS	7.7
								" " w/o wall pts	8.5

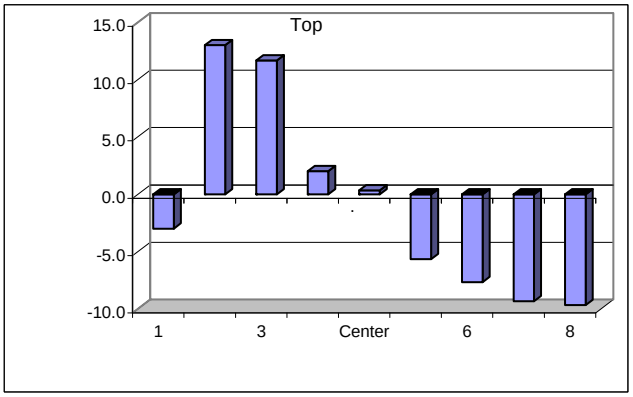
Instuments Used:		**Cal. Due**
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI Velocicalc SN#305039	23-Jun-10
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).

Notes: Blue pre-filteres not installed upstream of HEPA filters.
Port Plug installed.

JEF 9/18/09





Entries made by:	Julia Flaherty		Technical Data Review performed by: Ernest Antonio
Signature/date	*On File w/ Original*	9/18/2009	Signature/date Signature on File 13 July 2010
			TI-RPP-WTP_689

FLOW ANGLE DATA FORM

LVS1_FlowAngleRev0.xls

CCP-WTPSP-####

Site	**LVS1 (C3) scale model**	Run No.	**FA-17**
Date	9/18/2009	Fan Setting	**37** Hz
Tester	MSP, JEF	Fan configuration	**A only, Damper B & butterfly shut**
Stack Dia.	11.844 in	Approx. air vel.	1870 fpm at point >>1 side center
Stack X-Area	110.2 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	2
Distance to disturbance	149.25 in	Stack Temp	87.5
Start/End Time	1423 / 1443		

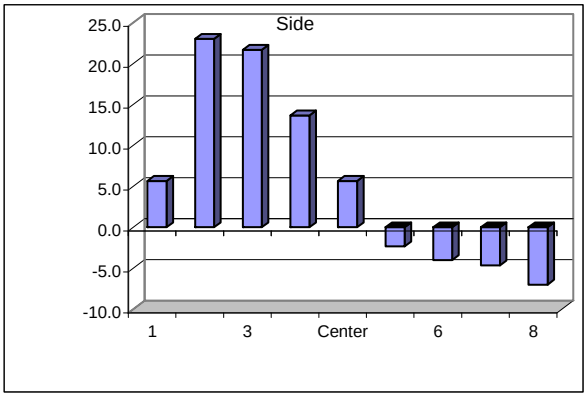
Order -->		2				1				
Traverse-->		**Side**				**Top**				
Trial ---->		1	2	3		1	2	3		
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.	
1	0.50	5	9	3	5.7	0	1	2	1.0	
2	1.24	23	23	23	23.0	17	18	18	17.7	
3	2.29	23	22	20	21.7	12	12	10	11.3	
4	3.81	14	13	14	13.7	1	2	2	1.7	
Center	5.89	6	4	7	5.7	-1	-1	-4	-2.0	
5	7.98	-3	-3	-1	-2.3	-5	-6	-5	-5.3	
6	9.50	-3	-5	-4	-4.0	-8	-8	-9	-8.3	
7	10.54	-5	-4	-5	-4.7	-11	-10	-10	-10.3	
8	11.28	-7	-7	-7	-7.0	-11	-11	-12	-11.3	
Mean of absolute values:					9.7				7.7	
" " w/o points by wall:					10.7				8.1	
								Grand mean ABS	8.7	
								" " w/o wall pts	9.4	

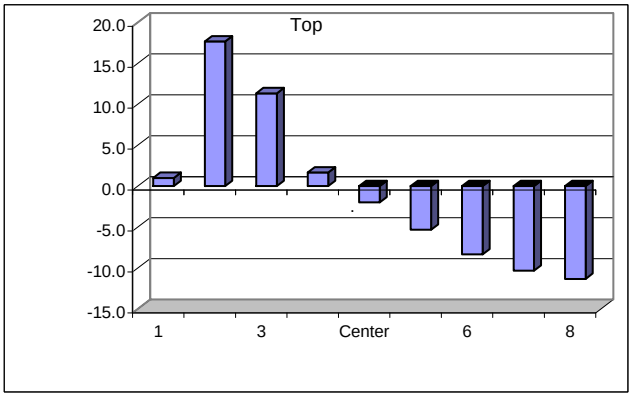
Instuments Used:		**Cal. Due**
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI Velocicalc SN#305039	23-Jun-10
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).

Notes: Blue pre-filteres not installed upstream of HEPA filters.
Port Plug installed.

JEF 9/18/09





Entries made by:	Julia Flaherty		Technical Data Review performed by: Ernest Antonio
Signature/date	*On File w/ Original*	9/18/2009	Signature/date Signature on File 13 July 2010
			TI-RPP-WTP_689

Appendix B.4: LV-S1 Tracer Gas Uniformity Data Sheets

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LV-S1 Model**	Run No.	**GT-1**
Date	10/7/2009	Fan Configuration	**B only, Damper A and Butterfly Shut**
Testers	MSP, DMT	Fan Setting	**60 Hz**
Stack Dia.	11.813 in.	Stack Temp	67.5 deg F
Stack X-Area	109.6 $in.^2$	Start/End Time	1125/1216
Test Port	1	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	209.625 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**B Center**

Order -->		1				2			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	0.898	0.982	0.897	0.926	0.960	0.921	0.944	0.942
2	1.24	0.897	1.040	0.978	0.972	1.03	1.00	0.939	0.990
3	2.29	0.928	0.958	1.04	0.975	0.864	0.899	0.939	0.901
4	3.82	0.961	0.978	0.956	0.965	0.947	1.00	1.02	0.989
Center	5.91	0.935	0.964	1.00	0.966	0.943	0.949	1.00	0.964
5	8.00	0.994	0.947	0.919	0.953	0.946	0.986	0.998	0.977
6	9.52	0.917	0.974	0.982	0.958	0.986	0.975	0.973	0.978
7	10.57	0.922	0.954	0.920	0.932	0.996	0.975	0.936	0.969
8	11.31	0.882	0.932	0.955	0.923	0.934	0.963	0.984	0.960
Averages ---------->		0.926	0.970	0.961	0.952	0.956	0.963	0.970	0.963

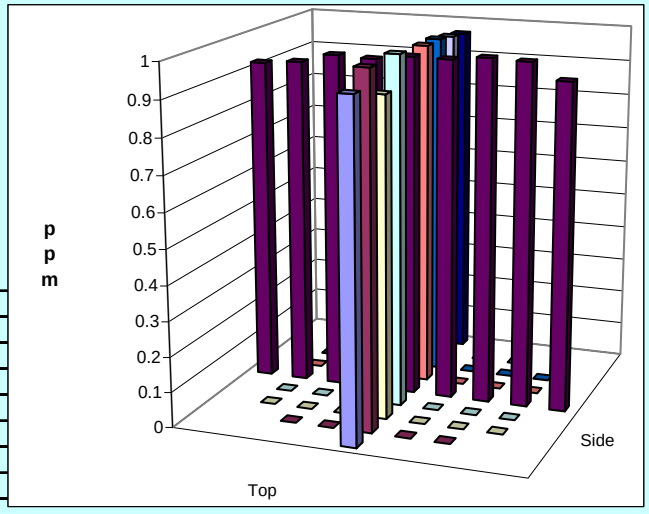
All	ppm	Dev. from mean	***Center 2/3***	Side	Top	All
Mean	0.96		Mean	0.96	0.97	0.96
Min Point	0.90	-6.0%	Std. Dev.	0.01	0.03	0.02
Max Point	0.99	3.3%	COV as %	1.5	3.2	**2.4**

Avg. Conc. 0.957 ppm

Gas analyzer checked:
10/5/09 DMT

DMT 10/7/09

	Start	Finish	
Tracer tank pressure	250-300	300	psig
Stack Temp	64	71	Fº
Center Pt. air vel.	3070	3230.0	fpm
Injection flowmeter	59	59	sccm
	---	---	
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	993.00	993.00	mbar
Ambient humidity	22	23	RH
B&K vapor correction	n	n	Y/N
Back-Gd gas ppb	28.8,31,29,27	36,31,29,33	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	86.9	82.4	Fº



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	7/14/2010
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes: Used Blue SF6 Cylinder, replaced today, 3A2015-9-52

DMT 10/7/09

Entries made by:	Donna Trott	10/7/2009	Technical Data Review performed by:	Ernest Antonio	
Signature/date	On File with Original		Signature/date	Signature on File 30 July 2010	
				TI-RPP-WTP_690	

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	LV-S1 Model		Run No.	GT-2	
Date	10/7/2009		Fan Configuration	B only, Damper A and Butterfly Shut	
Testers	MSP, DMT		Fan Setting	60 Hz	
Stack Dia.	11.844 in.		Stack Temp	73.5 deg F	
Stack X-Area	110.2 $in.^2$		Start/End Time	1218/1300	
Test Port	2		Center 2/3 from	1.09 to:	10.76
Distance to disturbance	149.25 inches		Points in Center 2/3	2 to:	7
Measurement units	ppm SF6		Injection Point	B Center	

Order -->		1				2			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	0.952	0.965	1.03	0.982	0.933	1.00	1.01	0.981
2	1.24	1.06	1.04	1.00	1.033	0.966	1.02	1.01	0.999
3	2.29	1.02	1.02	0.977	1.006	0.981	0.985	1.05	1.005
4	3.82	1.03	1.02	0.981	1.010	1.00	1.02	1.04	1.018
Center	5.91	0.994	0.959	0.967	0.973	1.02	1.02	1.01	1.017
5	8.00	0.932	1.020	0.995	0.982	0.954	0.958	0.973	0.962
6	9.52	0.996	1.030	1.040	1.022	1.01	0.999	1.020	1.010
7	10.57	0.964	1.030	1.040	1.011	0.963	0.970	0.977	0.970
8	11.31	0.944	0.906	0.969	0.940	0.960	1.000	1.000	0.987
Averages ---------->		0.988	0.999	1.000	0.996	0.976	0.997	1.010	0.994

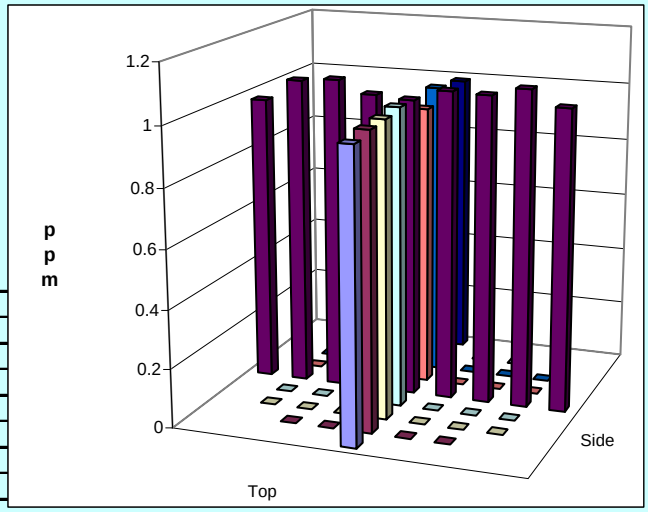
All	ppm	Dev. from mean
Mean	0.99	
Min Point	0.94	-5.6%
Max Point	1.03	3.9%

Center 2/3	Side	Top	All
Mean	1.01	1.00	1.00
Std. Dev.	0.02	0.02	0.02
COV as %	2.1	2.3	**2.1**

Avg. Conc. 0.995 ppm

Gas analyzer checked:
10/5/09 DMT
DMT 10/7/09

	Start	Finish	
Tracer tank pressure	350	350	psig
Stack Temp	72	75	Fº
Center Pt. air vel.	3200	3010.0	fpm
Injection flowmeter	59	59	sccm
	---	---	
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	993.00	992.00	mbar
Ambient humidity	22	25	RH
B&K vapor correction	n	n	Y/N
Back-Gd gas ppb	33,29,28,25	32,33,24,29	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	83.3	71.6	Fº



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	7/14/2010
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes: Used Blue SF6 Cylinder, replaced today, 3A2015-9-52

DMT 10/7/09

Entries made by:	Donna Trott	10/7/2009
Signature/date	On File with Original	

Technical Data Review performed by:	Ernest Antonio
Signature/date	Signature on File 30 July 2010
	TI-RPP-WTP_690

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	LV-S1 Model		Run No.	GT-3	
Date	10/7/2009		Fan Configuration	B only, Damper A and Butterfly Shut	
Testers	XYY, DMT		Fan Setting	60 Hz	
Stack Dia.	11.813 in.		Stack Temp	76.05 deg F	
Stack X-Area	109.6 in.^{2}		Start/End Time	1340/1436	
Test Port	3		Center 2/3 from	1.08 to:	10.73
Distance to disturbance	88.875 inches		Points in Center 2/3	2 to:	7
Measurement units	ppm SF6		Injection Point	B Center	

Order -->		1				2			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	1.02	0.980	0.958	0.986	0.980	0.997	0.947	0.975
2	1.24	0.972	0.991	0.997	0.987	1.03	1.00	1.03	1.020
3	2.29	0.960	0.978	1.02	0.986	0.996	1.01	0.990	0.999
4	3.82	0.957	0.991	0.983	0.977	0.965	0.971	0.998	0.978
Center	5.91	0.959	1.03	1.01	1.000	0.985	1.03	0.971	0.995
5	8.00	0.979	1.01	1.04	1.010	1.01	1.00	1.03	1.013
6	9.52	1.02	0.998	1.03	1.016	0.988	0.989	0.974	0.984
7	10.57	1.00	0.996	1.02	1.005	0.993	1.00	1.02	1.004
8	11.31	1.01	0.973	0.968	0.984	0.975	0.997	0.995	0.989
Averages ---------->		0.986	0.994	1.003	0.994	0.991	0.999	0.995	0.995

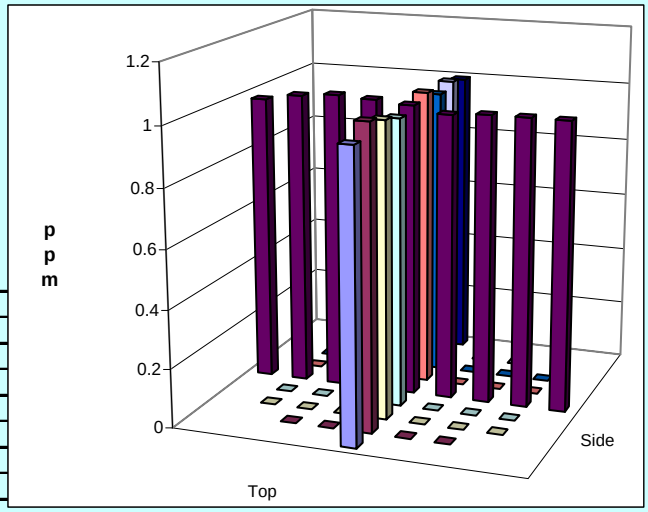
All	ppm	Dev. from mean
Mean	0.99	
Min Point	0.97	-2.0%
Max Point	1.02	2.5%

Center 2/3	Side	Top	All
Mean	1.00	1.00	1.00
Std. Dev.	0.01	0.02	0.01
COV as %	1.4	1.5	**1.4**

Avg. Conc. 0.995 ppm

Gas analyzer checked:
10/5/09 DMT
XYY 10/7/09

	Start	Finish	
Tracer tank pressure	400	400	psig
Stack Temp	76.5	75.6	Fº
Center Pt. air vel.	3070	3100.0	fpm
Injection flowmeter	59	59	sccm
		XYY 10/7/09	
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	992.00	992.00	mbar
Ambient humidity	23	21	RH
B&K vapor correction	n	n	Y/N
Back-Gd gas ppb	21.0,21.0,23.1,20.4	27.7,20.9,21.6,27.8	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	75.2	79.7	Fº



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	7/14/2010
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes: New SF6 cylinder used.
Bottom is actually top, the pipe is turned 180 degrees
The main valve of the SF6 cylinder is very difficult to turn.
XYY 10/7/09

Entries made by:	Xiao-Ying Yu	10/7/2009	Technical Data Review performed by:	Ernest Antonio
Signature/date	On File with Original		Signature/date	Signature on File 30 July 2010
				TI-RPP-WTP_690

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LV-S1 Model**	Run No.	**GT-4**
Date	10/7/2009	Fan Configuration	**B only, Damper A and Butterfly Shut**
Testers	DMT, XYY	Fan Setting	**37.5 Hz**
Stack Dia.	11.813 in.	Stack Temp	74.95 deg F
Stack X-Area	109.6 $in.^2$	Start/End Time	1436/1525
Test Port	3	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	88.875 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**B Center**

Order -->		2				1			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	1.54	1.67	1.53	1.580	1.65	1.58	1.61	1.613
2	1.24	1.65	1.62	1.62	1.630	1.57	1.63	1.57	1.590
3	2.29	1.58	1.60	1.60	1.593	1.66	1.55	1.58	1.597
4	3.82	1.67	1.64	1.65	1.653	1.59	1.61	1.60	1.600
Center	5.91	1.70	1.61	1.67	1.660	1.68	1.59	1.51	1.593
5	8.00	1.55	1.56	1.62	1.577	1.60	1.58	1.66	1.613
6	9.52	1.64	1.54	1.66	1.613	1.55	1.63	1.67	1.617
7	10.57	1.68	1.67	1.64	1.663	1.60	1.59	1.55	1.580
8	11.31	1.64	1.60	1.59	1.610	1.62	1.58	1.51	1.570
Averages ---------->		1.628	1.612	1.620	1.620	1.613	1.593	1.584	1.597

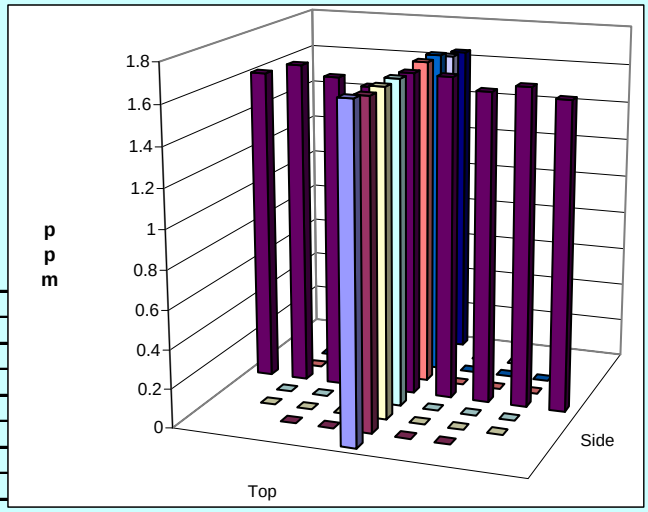
All	ppm	Dev. from mean	***Center 2/3***	Side	Top	All
Mean	1.61		Mean	1.63	1.60	1.61
Min Point	1.57	-2.4%	Std. Dev.	0.03	0.01	0.03
Max Point	1.66	3.4%	COV as %	2.1	0.8	**1.8**

Avg. Conc. 1.606 ppm

Gas analyzer checked:
10/5/09 by DMT/XYY

XYY 10/7/09

	Start	Finish	
Tracer tank pressure	400	400	psig
Stack Temp	75.7	74.2	Fº
Center Pt. air vel.	1830	1820.0	fpm
Injection flowmeter	59	59	sccm
		XYY 10/7/09	
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	992.00	992.00	mbar
Ambient humidity	21	22	RH
B&K vapor correction	n	n	Y/N
Back-Gd gas ppb	23,28,24,27	35,29,28,22	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	80.6	77.9	Fº



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	7/14/2010
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes: New SF6 cylinder used. XYY 10/7/09

XYY10/7/09

Entries made by:	Xiao-Ying Yu	10/7/2009	Technical Data Review performed by:	Ernest Antonio
Signature/date	On File with Original		Signature/date	Signature on File 30 July 2010
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Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LV-S1 Model**	Run No.	**GT-5**
Date	10/7/2009	Fan Configuration	**B only, Damper A and Butterfly Shut**
Testers	XYY, DMT	Fan Setting	**37.6 Hz**
Stack Dia.	11.813 in.	Stack Temp	74.45 deg F
Stack X-Area	109.6 $in.^2$	Start/End Time	1525/1620
Test Port	3	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	88.875 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**B Center**

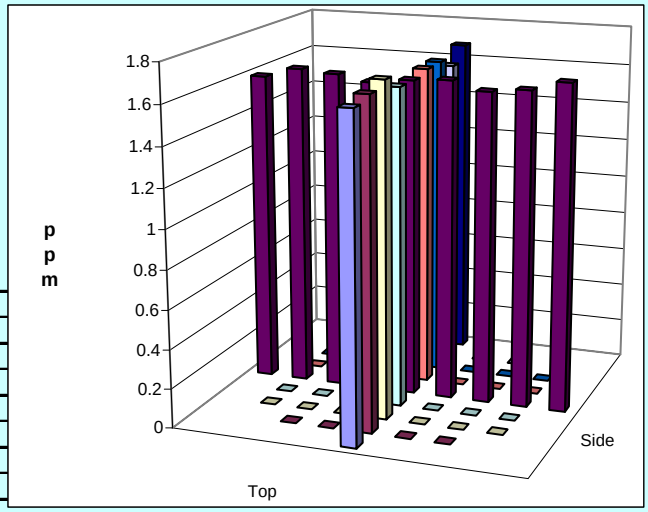
Order -->		1				2			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	1.69	1.57	1.73	1.663	1.63	1.60	1.62	1.617
2	1.24	1.61	1.64	1.59	1.613	1.66	1.62	1.65	1.643
3	2.29	1.58	1.62	1.58	1.593	1.64	1.69	1.70	1.677
4	3.82	1.61	1.67	1.63	1.637	1.58	1.61	1.63	1.607
Center	5.91	1.65	1.60	1.62	1.623	1.65	1.59	1.57	1.603
5	8.00	1.69	1.56	1.55	1.600	1.64	1.62	1.62	1.627
6	9.52	1.62	1.62	1.65	1.630	1.65	1.65	1.59	1.630
7	10.57	1.66	1.65	1.62	1.643	1.56	1.57	1.60	1.577
8	11.31	1.63	1.62	1.53	1.593	1.66	1.63	1.67	1.653
Averages ---------->		1.638	1.617	1.611	1.622	1.630	1.620	1.628	1.626

All	ppm	Dev. from mean	***Center 2/3***	Side	Top	All
Mean	1.62		Mean	1.62	1.62	1.62
Min Point	1.58	-2.9%	Std. Dev.	0.02	0.03	0.03
Max Point	1.68	3.3%	COV as %	1.2	2.0	**1.6**

Avg. Conc. 1.625 ppm

Gas analyzer checked:
10/5/09 DMT
DMT 10/7/09

	Start	Finish	
Tracer tank pressure	400	400	psig
Stack Temp	74.2	74.7	Fº
Center Pt. air vel.	1820	1780.0	fpm
Injection flowmeter	59	59.5	sccm
			XYY10/7/09
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	992.00	992.00	mbar
Ambient humidity	21	21	RH
B&K vapor correction	n	n	Y/N
Back-Gd gas ppb	35,28,29,22	29,28,33,28	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	80.6	79.7	Fº



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	7/14/2010
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes: Fan B frequency is 37.6 Hz, not 37.5 Hz. XYY 10/7/09

DMT 10/7/09

Entries made by:	Donna Trott	10/7/2009	Technical Data Review performed by:	Ernest Antonio	
Signature/date	On File with Original		Signature/date	Signature on File 30 July 2010	
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Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LV-S1 Model**	Run No.	**GT-6**
Date	10/8/2009	Fan Configuration	**B only, Damper A and Butterfly Shut**
Testers	MSP, DMT	Fan Setting	**37.5 Hz**
Stack Dia.	11.813 in.	Stack Temp	66.8 deg F
Stack X-Area	109.6 $in.^2$	Start/End Time	1148/1335
Test Port	3	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	88.875 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**B Center**

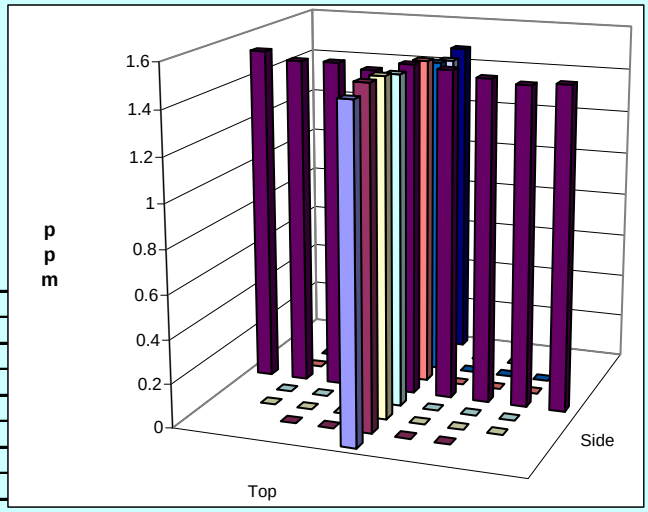
Order -->		1				2			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	1.45	1.52	1.41	1.460	1.44	1.50	1.53	1.490
2	1.24	1.39	1.46	1.49	1.447	1.55	1.47	1.56	1.527
3	2.29	1.49	1.44	1.46	1.463	1.49	1.51	1.57	1.523
4	3.82	1.59	1.44	1.44	1.490	1.49	1.48	1.53	1.500
Center	5.91	1.54	1.47	1.50	1.503	1.55	1.49	1.50	1.513
5	8.00	1.47	1.41	1.52	1.467	1.50	1.45	1.55	1.500
6	9.52	1.55	1.44	1.48	1.490	1.44	1.53	1.42	1.463
7	10.57	1.52	1.43	1.51	1.487	1.45	1.45	1.43	1.443
8	11.31	1.53	1.56	1.47	1.520	1.51	1.39	1.51	1.470
Averages ---------->		1.503	1.463	1.476	1.481	1.491	1.474	1.511	1.492

All	ppm	Dev. from mean	***Center 2/3***	Side	Top	All
Mean	1.49		Mean	1.48	1.50	1.49
Min Point	1.44	-2.9%	Std. Dev.	0.02	0.03	0.03
Max Point	1.53	2.7%	COV as %	1.3	2.1	**1.8**

Avg. Conc. 1.484 ppm

Gas analyzer checked:
10/5/09 DMT
DMT 10/8/09

	Start	Finish	
Tracer tank pressure	300	300	psig
Stack Temp	65.6	68	Fº
Center Pt. air vel.	1810	1790.0	fpm
Injection flowmeter	59	59	sccm
			DMT 10/8/09
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	995.00	995.00	mbar
Ambient humidity	33	31	RH
B&K vapor correction	n	n	Y/N
Back-Gd gas ppb	17,19,23,17	31,28,30,29	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	62.6	64.4	Fº



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	7/14/2010
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes:

DMT 10/8/09

Entries made by:	Donna Trott	10/8/2009	Technical Data Review performed by:	Ernest Antonio	
Signature/date	On File with Original		Signature/date	Signature on File 30 July 2010	
				TI-RPP-WTP_690	

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LV-S1 Model**	Run No.	**GT-7**
Date	10/8/2009	Fan Configuration	**B only, Damper A and Butterfly Shut**
Testers	MSP, DMT	Fan Setting	**37.5 Hz**
Stack Dia.	11.844 in.	Stack Temp	68.5 deg F
Stack X-Area	110.2 $in.^2$	Start/End Time	1338/1420
Test Port	2	Center 2/3 from	1.09 to: 10.76
Distance to disturbance	149.25 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**B Center**

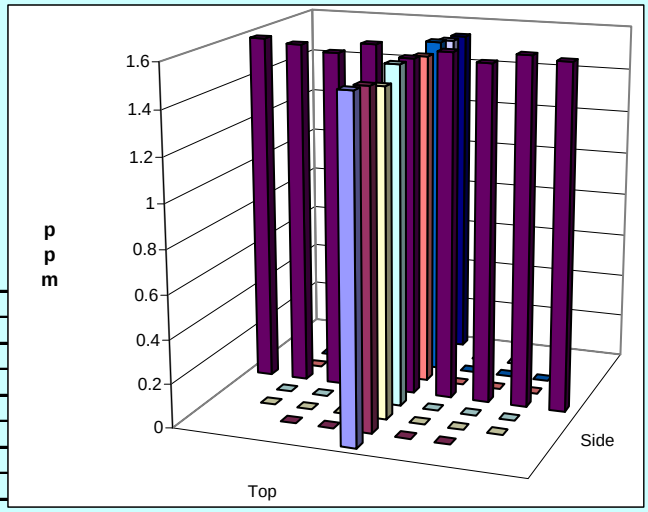
Order -->		1				2			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	1.47	1.51	1.54	1.507	1.58	1.47	1.53	1.527
2	1.24	1.53	1.49	1.55	1.523	1.49	1.53	1.52	1.513
3	2.29	1.46	1.42	1.56	1.480	1.39	1.53	1.52	1.480
4	3.82	1.56	1.54	1.45	1.517	1.52	1.51	1.60	1.543
Center	5.91	1.46	1.46	1.52	1.480	1.56	1.43	1.63	1.540
5	8.00	1.51	1.62	1.46	1.530	1.47	1.47	1.62	1.520
6	9.52	1.46	1.49	1.50	1.483	1.57	1.47	1.63	1.557
7	10.57	1.49	1.51	1.53	1.510	1.50	1.52	1.59	1.537
8	11.31	1.45	1.58	1.55	1.527	1.47	1.56	1.56	1.530
Averages ---------->		1.488	1.513	1.518	1.506	1.506	1.499	1.578	1.527

All	ppm	Dev. from mean	***Center 2/3***	Side	Top	All
Mean	1.52		Mean	1.50	1.53	1.52
Min Point	1.48	-2.4%	Std. Dev.	0.02	0.03	0.03
Max Point	1.56	2.6%	COV as %	1.4	1.7	**1.7**

Avg. Conc. 1.518 ppm

Gas analyzer checked:
10/5/09 DMT
DMT 10/8/09

	Start	Finish	
Tracer tank pressure	300	300	psig
Stack Temp	68	69	Fº
Center Pt. air vel.	1830	1750.0	fpm
Injection flowmeter	59	59	sccm
			DMT 10/8/09
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	995.00	995.00	mbar
Ambient humidity	31	30	RH
B&K vapor correction	n	n	Y/N
Back-Gd gas ppb	22,26,25,26	29,33,32,30	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	65.3	66.2	Fº



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	7/14/2010
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes:

DMT 10/8/09

Entries made by:	Donna Trott	10/8/2009	Technical Data Review performed by:	Ernest Antonio	
Signature/date	On File with Original		Signature/date	Signature on File 30 July 2010	
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Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06	Site	**LV-S1 Model**	Run No.	**GT-8**	
	Date	10/8/2009	Fan Configuration	**B only, Damper A and Butterfly Shut**	
	Testers	MSP, DMT	Fan Setting	**37.5**	**Hz**
	Stack Dia.	11.844 in.	Stack Temp	69.4	deg F
	Stack X-Area	110.2 $in.^2$	Start/End Time	1422/1512	
	Test Port	2	Center 2/3 from	1.09	to: 10.76
	Distance to disturbance	149.25 inches	Points in Center 2/3	2	to: 7
	Measurement units	ppm SF6	Injection Point	**B Center**	

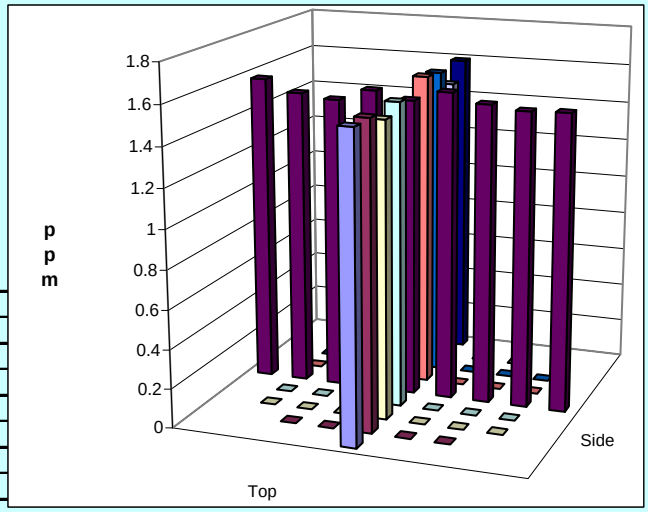
Order -->		2				1			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	1.58	1.46	1.51	1.517	1.54	1.45	1.62	1.537
2	1.24	1.54	1.49	1.50	1.510	1.50	1.61	1.51	1.540
3	2.29	1.57	1.53	1.49	1.530	1.49	1.51	1.48	1.493
4	3.82	1.56	1.57	1.60	1.577	1.53	1.51	1.58	1.540
Center	5.91	1.49	1.51	1.57	1.523	1.55	1.46	1.52	1.510
5	8.00	1.59	1.56	1.53	1.560	1.60	1.59	1.59	1.593
6	9.52	1.44	1.58	1.48	1.500	1.56	1.59	1.59	1.580
7	10.57	1.58	1.52	1.46	1.520	1.45	1.54	1.47	1.487
8	11.31	1.59	1.57	1.58	1.580	1.60	1.55	1.58	1.577
Averages ---------->		1.549	1.532	1.524	1.535	1.536	1.534	1.549	1.540

All	ppm	Dev. from mean	***Center 2/3***	Side	Top	All
Mean	1.54		Mean	1.53	1.53	1.53
Min Point	1.49	-3.3%	Std. Dev.	0.03	0.04	0.03
Max Point	1.59	3.6%	COV as %	1.8	2.7	**2.2**

Avg. Conc. 1.540 ppm

Gas analyzer checked:
10/5/09 DMT
DMT 10/8/09

	Start	Finish	
Tracer tank pressure	300	300	psig
Stack Temp	69	69.8	Fº
Center Pt. air vel.	1750	1760.0	fpm
Injection flowmeter	59	59	sccm
			DMT 10/8/09
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	995.00	996.00	mbar
Ambient humidity	30	29	RH
B&K vapor correction	n	n	Y/N
Back-Gd gas ppb	29,33,32,30	33,24,31,33	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	66.2	67.1	Fº



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	7/14/2010
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes:

DMT 10/8/09

Entries made by:	Donna Trott	10/8/2009	Technical Data Review performed by:	Ernest Antonio	
Signature/date	On File with Original		Signature/date	Signature on File	30 July 2010
				TI-RPP-WTP_690	

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06	Site	**LV-S1 Model**	Run No.	**GT-9**	
	Date	10/14/2009	Fan Configuration	**A only, Damper B and butterfly shut**	
	Testers	DMT, XYY	Fan Setting	**60 Hz**	
	Stack Dia.	11.813 in.	Stack Temp	59.3 deg F	
	Stack X-Area	109.6 $in.^2$	Start/End Time	1300/1439	
	Test Port	1	Center 2/3 from	1.08 to: 10.73	
	Distance to disturbance	209.625 inches	Points in Center 2/3	2 to: 7	
	Measurement units	ppm SF6	Injection Point	**A Center**	

Order -->		1				2			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	0.963	0.972	1.03	0.988	0.959	1.02	0.977	0.985
2	1.24	0.955	1.00	0.939	0.965	1.07	0.991	1.02	1.027
3	2.29	0.990	1.02	0.931	0.980	0.992	0.957	1.01	0.986
4	3.82	0.991	1.03	1.04	1.020	1.01	1.01	1.02	1.013
Center	5.91	0.958	0.943	0.959	0.953	0.979	1.02	0.992	0.997
5	8.00	0.970	0.994	1.08	1.015	1.00	0.979	1.04	1.006
6	9.52	0.997	0.982	1.04	1.006	1.02	1.05	1.01	1.027
7	10.57	0.978	0.983	0.994	0.985	0.988	1.01	0.999	0.999
8	11.31	0.988	0.972	1.05	1.003	1.05	1.02	0.990	1.020
Averages ---------->		0.977	0.988	1.007	0.991	1.008	1.006	1.006	1.007

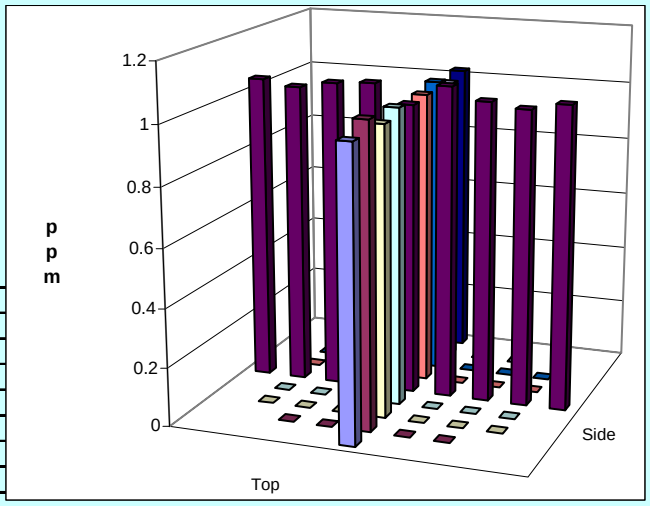
All	ppm	Dev. from mean	***Center 2/3***	Side	Top	All
Mean	1.00		Mean	0.99	1.01	1.00
Min Point	0.95	-4.5%	Std. Dev.	0.03	0.02	0.02
Max Point	1.03	2.8%	COV as %	2.6	1.5	**2.2**

Avg. Conc. 1.002 ppm

Gas analyzer checked:
10/12/09 DMT

XYY 10/14/2009

	Start	Finish	
Tracer tank pressure	200	200	psig
Stack Temp	58.4	60.2	Fº
Center Pt. air vel.	2820	3120.0	fpm
Injection flowmeter	59	59	sccm
		XYY 10/14/09	
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	976.00	975.00	mbar
Ambient humidity	48	44	RH
B&K vapor correction	y	y	Y/N
Back-Gd gas ppb	2.3, -3,-3,0.216	12,7.9,7.5,7.5	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	63.5	68.9	Fº



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	7/14/2010
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes: Due to higher RH we used vapor correction today.
A distance is 17.8 cm, center point is 8.9 cm, very close to that of B. RH varied from 48% to 39%, then 41% during testing.

XYY 10/14/09

Entries made by:	Xiao-Ying Yu	10/14/2009	Technical Data Review performed by:	Ernest Antonio	
Signature/date	On file with original		Signature/date	Signature on File 30 July 2010	
				TI-RPP-WTP_690	

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LV-S1 Model**	Run No.	**GT-10**
Date	10/14/2009	Fan Configuration	**A only, Damper B and butterfly shut**
Testers	DMT, XYY	Fan Setting	**60 Hz**
Stack Dia.	11.813 in.	Stack Temp	63.5 deg F
Stack X-Area	109.6 $in.^2$	Start/End Time	1439/1545
Test Port	1	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	209.625 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**A center**

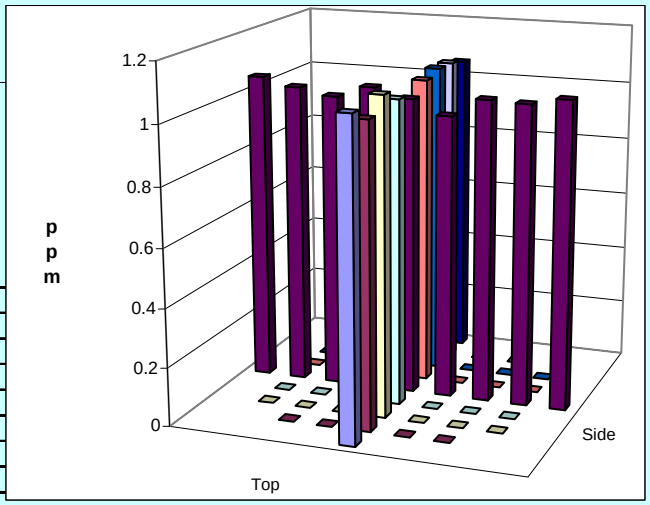
Order -->		2				1			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	1.04	1.08	1.03	1.050	1.06	1.07	0.99	1.039
2	1.24	1.04	1.01	1.03	1.027	1.00	1.01	0.98	0.996
3	2.29	1.08	1.00	1.02	1.032	1.02	1.09	1.03	1.047
4	3.82	0.96	0.92	1.03	0.969	0.97	1.01	1.05	1.009
Center	5.91	1.03	1.02	1.00	1.016	0.959	1.01	0.99	0.985
5	8.00	1.09	1.03	1.02	1.047	1.01	1.04	1.02	1.023
6	9.52	0.98	0.98	1.07	1.007	1.05	1.05	1.02	1.040
7	10.57	1.06	1.01	1.02	1.030	1.03	1.06	1.02	1.037
8	11.31	1.04	1.08	1.05	1.057	0.98	1.05	1.03	1.020
Averages ---------->		1.035	1.013	1.030	1.026	1.008	1.043	1.014	1.022

All	ppm	Dev. from mean	***Center 2/3***	Side	Top	All
Mean	1.02		Mean	1.02	1.02	1.02
Min Point	0.97	-5.4%	Std. Dev.	0.03	0.02	0.02
Max Point	1.06	3.2%	COV as %	2.5	2.3	**2.3**

Avg. Conc. 1.027 ppm

Gas analyzer checked:
10/12/09 DMT
10/14/2009

	Start	Finish	
Tracer tank pressure	200	200	psig
Stack Temp	60.1	66.9	Fº
Center Pt. air vel.	3090	2830	fpm
Injection flowmeter	59	59	sccm
		XYY10/14/09	
Sampling flowmeter	10	9	lpm Sierra
Ambient pressure	975	974	mbar
Ambient humidity	44	41	RH
B&K vapor correction	y	y	Y/N
Back-Gd gas ppb	6.6,7.5,5.3,10	6,8,6,5	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	69.8	72.5	Fº



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	7/14/2010
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes:

DMT 10/14/09

Entries made by:	Donna Trott	10/14/2009	Technical Data Review performed by:	Ernest Antonio
Signature/date	On file with original		Signature/date	Signature on File 30 July 2010
				TI-RPP-WTP_690

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06	Site	**LV-S1 Model**	Run No.	**GT-11**	
	Date	10/15/2009	Fan Configuration	**A only, Damper B and Butterfly Shut**	
	Testers	MSP, DMT	Fan Setting	**60 Hz**	
	Stack Dia.	11.813 in.	Stack Temp	65 deg F	
	Stack X-Area	109.6 $in.^2$	Start/End Time	1247/1417	
	Test Port	1	Center 2/3 from	1.08 to: 10.73	
	Distance to disturbance	209.625 inches	Points in Center 2/3	2 to: 7	
	Measurement units	ppm SF6	Injection Point	**A Center**	

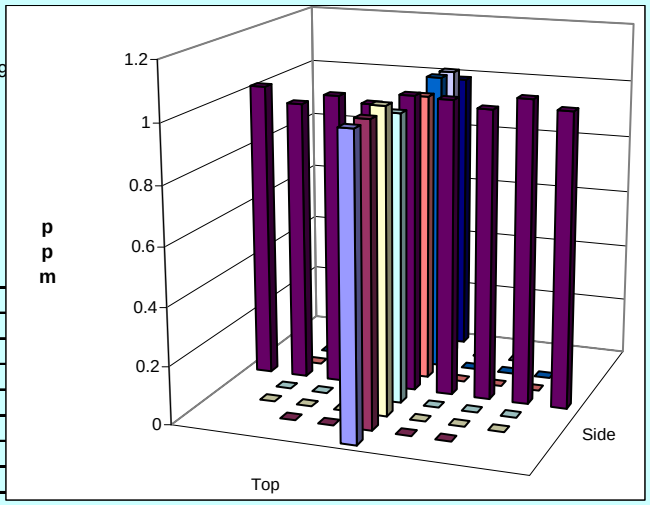
Order -->		1				2			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	1.03	0.994	0.976	1.000	0.992	1.03	1.04	1.021
2	1.24	1.04	1.01	1.04	1.030	1.01	1.04	1.02	1.023
3	2.29	1.03	0.954	0.977	0.987	1.03	1.02	1.07	1.040
4	3.82	0.999	1.02	1.01	1.010	0.981	0.97	1.02	0.990
Center	5.91	1.02	0.994	1.03	1.015	1.03	1.01	1.03	1.023
5	8.00	0.997	0.966	0.966	0.976	0.986	0.971	1.03	0.996
6	9.52	0.979	1.01	1.00	0.996	1.04	1.02	1.05	1.037
7	10.57	0.952	0.963	0.964	0.960	1.03	1.01	1.06	1.033
8	11.31	1.01	1.01	1.01	1.010	0.955	1.02	0.976	0.984
Averages ---------->		1.006	0.991	0.997	0.998	1.006	1.010	1.033	1.016

All	ppm	Dev. from mean	***Center 2/3***	Side	Top	All
Mean	1.01		Mean	1.00	1.02	1.01
Min Point	0.96	-4.7%	Std. Dev.	0.02	0.02	0.02
Max Point	1.04	3.3%	COV as %	2.4	1.9	**2.4**

Avg. Conc. 1.006 ppm

Gas analyzer checked:
10/12/09 DMT
DMT 10/15/09

	Start	Finish	
Tracer tank pressure	175	175	psig
Stack Temp	65	65	Fº
Center Pt. air vel.	2880	3030	fpm
Injection flowmeter	59	59	sccm
		DMT	10/15/2009
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	988.00	990.00	mbar
Ambient humidity	42	47	RH
B&K vapor correction	Y	Y	Y/N
Back-Gd gas ppb	3.5, 4.3,0,3.1	9.3,7.4,6.8,6.7	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	69.8	67.1	Fº



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	7/14/2010
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes:

DMT 10/15/09

Entries made by:	Donna Trott	10/15/2009	Technical Data Review performed by:	Ernest Antonio
Signature/date	On File with Original		Signature/date	Signature on File 30 July 2010
				TI-RPP-WTP_690

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06	Site	**LV-S1 Model**	Run No.	**GT-12**	
	Date	10/15/2009	Fan Configuration	**A only, Damper B and Butterfly Shut**	
	Testers	MSP, DMT	Fan Setting	**60 Hz**	
	Stack Dia.	11.844 in.	Stack Temp	64.5 deg F	
	Stack X-Area	110.2 $in.^2$	Start/End Time	1418/1506	
	Test Port	2	Center 2/3 from	1.09 to: 10.76	
	Distance to disturbance	149.25 inches	Points in Center 2/3	2 to: 7	
	Measurement units	ppm SF6	Injection Point	**A Center**	

Order -->		1				2			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	1.10	1.06	1.07	1.077	1.01	1.09	1.07	1.057
2	1.24	0.993	1.02	1.06	1.024	1.08	1.03	1.03	1.047
3	2.29	1.04	1.01	1.02	1.023	1.04	1.04	1.09	1.057
4	3.82	1.03	1.05	1.06	1.047	1.08	1.05	1.05	1.060
Center	5.91	1.04	1.08	1.02	1.047	1.05	1.00	1.01	1.020
5	8.00	1.06	1.02	1.07	1.050	1.06	1.04	1.04	1.047
6	9.52	1.09	1.08	1.02	1.063	1.10	1.07	1.01	1.060
7	10.57	1.04	1.05	0.988	1.026	0.958	1.10	1.07	1.043
8	11.31	1.08	0.995	1.01	1.028	1.05	1.05	1.10	1.067
Averages ---------->		1.053	1.041	1.035	1.043	1.048	1.052	1.052	1.051

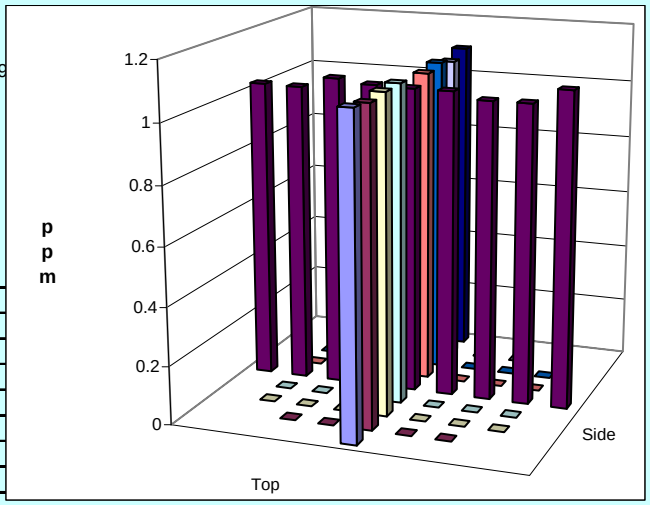
All	ppm	Dev. from mean	***Center 2/3***	Side	Top	All
Mean	1.05		Mean	1.04	1.05	1.04
Min Point	1.02	-2.6%	Std. Dev.	0.02	0.01	0.01
Max Point	1.08	2.9%	COV as %	1.5	1.3	**1.4**

Avg. Conc. 1.048 ppm

Gas analyzer checked:
10/12/09 DMT

DMT 10/15/09

	Start	Finish	
Tracer tank pressure	200	200	psig
Stack Temp	65	64	Fº
Center Pt. air vel.	3000	2910.0	fpm
Injection flowmeter	59	59	sccm
		DMT	10/15/2009
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	990.00	990.00	mbar
Ambient humidity	45	48	RH
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	33,35,32,35	42,39,38,37	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	67.1	65.3	Fº



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	7/14/2010
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes:

DMT 10/15/09

Entries made by:	Donna Trott	10/15/2009	Technical Data Review performed by:	Ernest Antonio
Signature/date	On File with Original		Signature/date	Signature on File 30 July 2010
				TI-RPP-WTP_690

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LV-S1 Model**	Run No.	**GT-13**
Date	10/15/2009	Fan Configuration	**A only, Damper B and Butterfly Shut**
Testers	MSP, DMT	Fan Setting	**60 Hz**
Stack Dia.	11.813 in.	Stack Temp	64 deg F
Stack X-Area	109.6 $in.^2$	Start/End Time	1509/1600
Test Port	3	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	88.875 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**A Center**

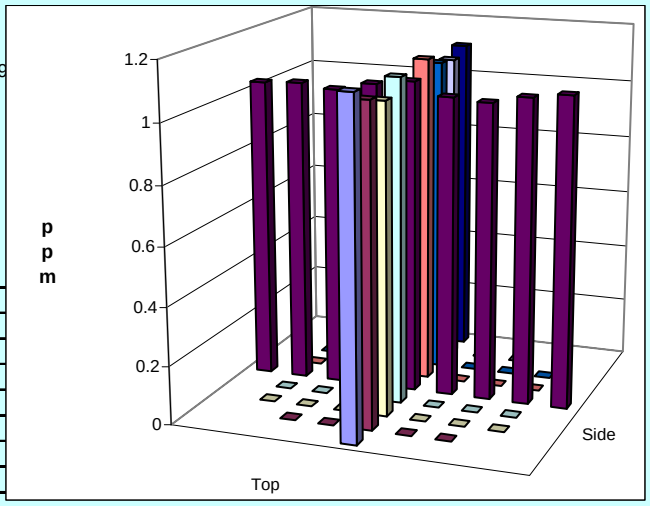
Order -->		1				2			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	1.09	1.06	1.03	1.060	1.09	1.09	1.08	1.087
2	1.24	1.05	1.03	1.05	1.043	1.02	1.09	1.01	1.040
3	2.29	1.04	1.02	0.992	1.017	1.01	1.01	1.02	1.013
4	3.82	1.00	1.05	1.03	1.027	1.04	1.08	1.07	1.063
Center	5.91	1.09	1.06	1.06	1.070	1.01	1.02	1.05	1.027
5	8.00	1.03	1.08	1.05	1.053	1.06	1.10	1.07	1.077
6	9.52	1.08	1.01	0.988	1.026	1.05	1.03	1.05	1.043
7	10.57	1.04	1.03	1.05	1.040	1.12	0.994	0.983	1.032
8	11.31	1.02	1.01	1.07	1.033	1.04	1.06	1.08	1.060
Averages ---------->		1.049	1.039	1.036	1.041	1.049	1.053	1.046	1.049

All	ppm	Dev. from mean	***Center 2/3***	Side	Top	All
Mean	1.05		Mean	1.04	1.04	1.04
Min Point	1.01	-3.0%	Std. Dev.	0.02	0.02	0.02
Max Point	1.09	4.0%	COV as %	1.7	2.1	**1.8**

Avg. Conc. 1.045 ppm

Gas analyzer checked:
10/12/09 DMT
DMT 10/15/09

	Start	Finish	
Tracer tank pressure	150	150	psig
Stack Temp	64	64	Fº
Center Pt. air vel.	2910	2840.0	fpm
Injection flowmeter	59	59	sccm
		DMT	10/15/2009
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	991	991	mbar
Ambient humidity	48	48	RH
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	37,33,33,38	41,38,42,43	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	65.3	63.5	Fº



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	7/14/2010
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes:

DMT 10/15/09

Entries made by:	Donna Trott	10/15/2009	Technical Data Review performed by: Ernest Antonio
Signature/date	On File with Original		Signature/date Signature on File 30 July 2010
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Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LV-S1 Model**	Run No.	**GT-14**
Date	10/16/2009	Fan Configuration	**B only, Damper A and Butterfly Shut**
Testers	MSP, DMT	Fan Setting	**60 Hz**
Stack Dia.	11.844 in.	Stack Temp	68.5 deg F
Stack X-Area	110.2 $in.^2$	Start/End Time	1340/1437
Test Port	2	Center 2/3 from	1.09 to: 10.76
Distance to disturbance	149.25 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**B bottom-near**

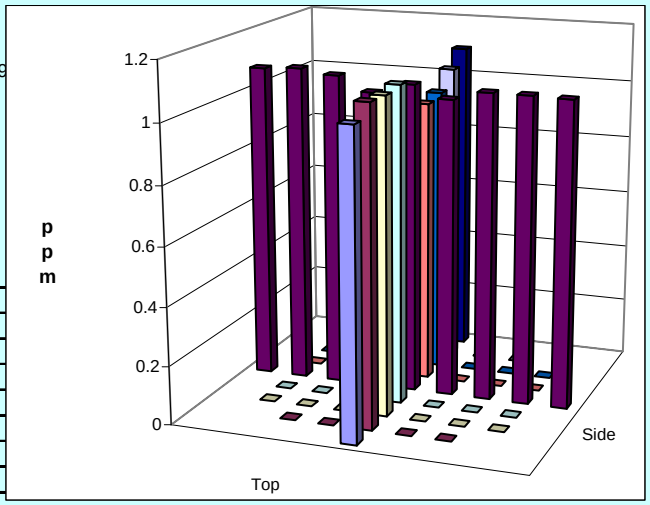
Order -->		1				2			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	0.933	1.02	1	0.984	1.1	0.92	1.08	1.033
2	1.24	0.899	1.07	0.994	0.988	1.08	1.08	1.07	1.077
3	2.29	0.971	0.963	1.03	0.988	1.19	0.978	1.05	1.073
4	3.82	0.873	1.05	0.952	0.958	1.03	1.02	1.2	1.083
Center	5.91	0.925	1.1	0.967	0.997	1.04	1.08	1.06	1.060
5	8.00	0.959	0.936	0.995	0.963	0.884	1.05	0.976	0.970
6	9.52	0.979	1.02	1.03	1.010	0.862	1.07	1.02	0.984
7	10.57	1.11	0.934	1.03	1.025	1.05	0.998	1.08	1.043
8	11.31	0.994	0.969	1.09	1.018	1.07	1.09	1.12	1.093
Averages ---------->		0.960	1.007	1.010	0.992	1.034	1.032	1.073	1.046

All	ppm	Dev. from mean	***Center 2/3***	Side	Top	All
Mean	1.02		Mean	0.99	1.04	1.02
Min Point	0.96	-6.0%	Std. Dev.	0.02	0.05	0.04
Max Point	1.09	7.3%	COV as %	2.4	4.4	**4.3**

Avg. Conc. 1.018 ppm

Gas analyzer checked:
10/12/09 DMT
DMT 10/6/09

	Start	Finish	
Tracer tank pressure	200	200	psig
Stack Temp	68	69	Fº
Center Pt. air vel.	2950	2920.0	fpm
Injection flowmeter	59	59	sccm
		DMT	10/16/2009
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	1001	1001	mbar
Ambient humidity	43	44	RH
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	36,38,36,39	39,38,40,40	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	68.9	70.7	Fº



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	7/14/2010
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes:
Sky
DMT 10/16/09
Ground

Entries made by:	Donna Trott	10/16/2009	Technical Data Review performed by:	Ernest Antonio	
Signature/date	On File with Original		Signature/date	Signature on File 30 July 2010	
				TI-RPP-WTP_690	

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LV-S1 Model**	Run No.	**GT-15**
Date	10/16/2009	Fan Configuration	**B only, Damper A and Butterfly Shut**
Testers	MSP, DMT	Fan Setting	**60 Hz**
Stack Dia.	11.844 in.	Stack Temp	69 deg F
Stack X-Area	110.2 $in.^2$	Start/End Time	1437/1529
Test Port	2	Center 2/3 from	1.09 to: 10.76
Distance to disturbance	149.25 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**B top-near**

Order -->		2				1			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	1.03	1.17	1.05	1.083	0.99	1.07	1.03	1.030
2	1.24	1.03	0.998	0.988	1.005	1.01	0.968	1.09	1.023
3	2.29	1.04	1.02	1.05	1.037	1.04	1.06	0.955	1.018
4	3.82	1.11	1.05	1.07	1.077	0.98	1.11	1.07	1.053
Center	5.91	1.02	1.05	0.987	1.019	1.02	1.02	1.00	1.013
5	8.00	1.05	1.02	1.04	1.037	1.04	1.01	1.07	1.040
6	9.52	0.991	1.04	1.03	1.020	0.975	0.991	1.03	0.999
7	10.57	1.10	1.10	1.05	1.083	1.01	1.06	1.08	1.050
8	11.31	0.987	1.06	1	1.016	0.988	0.994	1.01	0.997
Averages ---------->		1.040	1.056	1.029	1.042	1.006	1.031	1.037	1.025

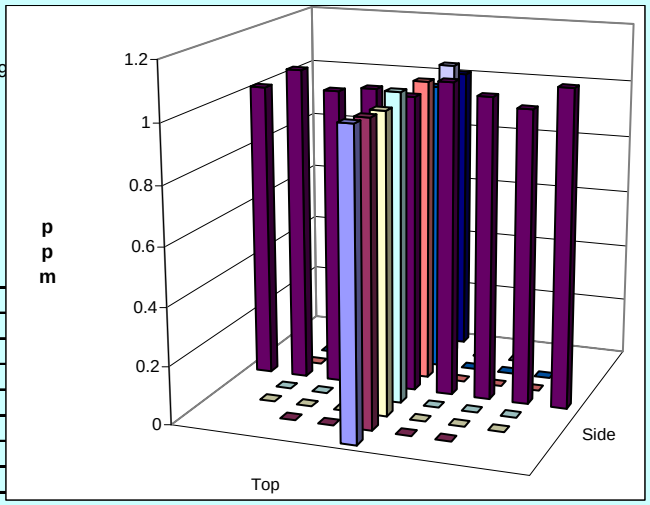
All	ppm	Dev. from mean	***Center 2/3***	Side	Top	All
Mean	1.03		Mean	1.04	1.03	1.03
Min Point	1.00	-3.5%	Std. Dev.	0.03	0.02	0.03
Max Point	1.08	4.8%	COV as %	2.9	2.0	**2.4**

Avg. Conc. 1.036 ppm

Gas analyzer checked:
10/12/09 DMT

DMT 10/6/09

	Start	Finish	
Tracer tank pressure	200	200	psig
Stack Temp	69	69	Fº
Center Pt. air vel.	2920	2950.0	fpm
Injection flowmeter	59	59	sccm
		DMT	10/16/2009
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	1001	1001	mbar
Ambient humidity	45	44	RH
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	39,38,40,40	41,36,35,40	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	69.8	69.8	Fº



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	7/14/2010
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes:

Sky

DMT 10/16/09

Ground

Entries made by:	Donna Trott	10/16/2009	Technical Data Review performed by:	Ernest Antonio	
Signature/date	On File with Original		Signature/date	Signature on File 30 July 2010	
				TI-RPP-WTP_690	

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LV-S1 Model**	Run No.	**GT-16**
Date	10/21/2009	Fan Configuration	**B only, Damper A and Butterfly Shut**
Testers	JEF, XYY	Fan Setting	**60 Hz**
Stack Dia.	11.844 in.	Stack Temp	65.6 deg F
Stack X-Area	110.2 $in.^2$	Start/End Time	1400/1606
Test Port	2	Center 2/3 from	1.09 to: 10.76
Distance to disturbance	149.25 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**B top-far**

Order -->		1				2			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	1.03	0.973	0.932	0.978	1.03	1.04	1.01	1.027
2	1.24	0.92	1.01	0.998	0.976	1.01	1.03	1.09	1.043
3	2.29	1.08	1.05	1.12	1.083	1.02	1.08	1.02	1.040
4	3.82	1.15	0.949	0.998	1.032	1.00	1.03	1.02	1.017
Center	5.91	1.14	0.950	0.991	1.027	0.975	0.979	0.925	0.960
5	8.00	1.06	1.13	1.04	1.077	1.07	0.958	0.970	0.999
6	9.52	0.917	1.11	1.02	1.016	1.08	0.998	1.02	1.033
7	10.57	0.967	1.09	0.938	0.998	0.998	1.02	1.02	1.013
8	11.31	0.950	0.937	1.07	0.986	0.965	1.05	0.956	0.990
Averages ---------->		1.024	1.022	1.012	1.019	1.016	1.021	1.003	1.013

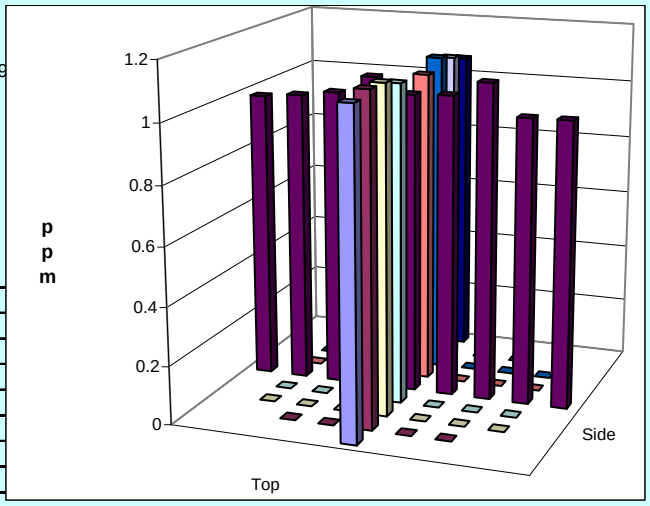
All	ppm	Dev. from mean	***Center 2/3***	Side	Top	All
Mean	1.02		Mean	1.03	1.01	1.02
Min Point	0.96	-5.6%	Std. Dev.	0.04	0.03	0.03
Max Point	1.08	6.6%	COV as %	3.8	2.9	**3.3**

Avg. Conc. 1.019 ppm

Gas analyzer checked:
10/21/09 DMT, XYY

XYY 10/21/09

	Start	Finish	
Tracer tank pressure	300	300	psig
Stack Temp	66	65.2	Fº
Center Pt. air vel.	3110	2910.0	fpm
Injection flowmeter	59	59	sccm
		XYY	10/21/2009
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	996	996	mbar
Ambient humidity	41	47	RH
B&K vapor correction	Y	Y	Y/N
Back-Gd gas ppb	2,1,0.5,0.5	7,5,2,6	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	72.5	68	Fº



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	7/14/2010
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes: RH changed from 41 to 48% during testing.
4 corners top away from port B. Heard loud noise from the fan and observed small decapitated mouse head out of the pipe.

XYY 10/21/09

Entries made by:	Xiao-Ying Yu	10/21/2009	Technical Data Review performed by:	Ernest Antonio	
Signature/date	On File with Original		Signature/date	Signature on File 30 July 2010	
				TI-RPP-WTP_690	

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LV-S1 Model**	Run No.	**GT-17**
Date	10/22/2009	Fan Configuration	**B only, Damper A and Butterfly Shut**
Testers	MSP, DMT	Fan Setting	**60 Hz**
Stack Dia.	11.844 in.	Stack Temp	62.6 deg F
Stack X-Area	110.2 $in.^2$	Start/End Time	1105/1153
Test Port	2	Center 2/3 from	1.09 to: 10.76
Distance to disturbance	149.25 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**B bottom-far**

Order -->		1				2			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	0.933	1.13	0.991	1.018	0.906	0.899	0.999	0.935
2	1.24	1.15	1.19	0.961	1.100	1.02	1.02	1.07	1.037
3	2.29	1.02	1.21	0.899	1.043	1.00	1.11	0.908	1.006
4	3.82	0.991	0.873	0.983	0.949	0.970	1.06	1.01	1.013
Center	5.91	0.986	1.08	0.949	1.005	1.06	1.09	1.00	1.050
5	8.00	0.876	0.947	1.02	0.948	1.00	1.08	1.27	1.117
6	9.52	1.05	0.938	0.942	0.977	1.10	0.988	1.03	1.039
7	10.57	1.08	1.06	1.14	1.093	1.04	1.02	0.981	1.014
8	11.31	1.05	0.976	0.96	0.995	0.974	1.20	1.08	1.085
Averages ---------->		1.015	1.045	0.983	1.014	1.008	1.052	1.039	1.033

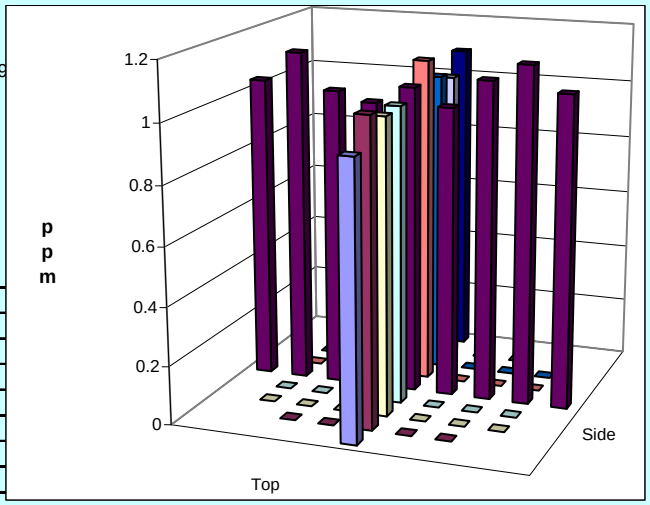
All	ppm	Dev. from mean	***Center 2/3***	Side	Top	All
Mean	1.02		Mean	1.02	1.04	1.03
Min Point	0.93	-8.7%	Std. Dev.	0.06	0.04	0.05
Max Point	1.12	9.1%	COV as %	6.3	3.6	**5.1**

Avg. Conc. 1.023 ppm

Gas analyzer checked:
10/21/09 DMT

DMT 10/6/09

	Start	Finish	
Tracer tank pressure	200	300	psig
Stack Temp	61.2	64	Fº
Center Pt. air vel.	2960	3080	fpm
Injection flowmeter	59	59	sccm
		DMT	10/22/2009
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	993	994	mbar
Ambient humidity	45	35	RH
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	40,39,42,39	40,35,35,35	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	60.8	65.3	Fº



Instuments Used:

B&K 1302 Gas Analyzer SN 1788615	Cat2 MTE
TSI VelociCalc SN 305039	7/14/2010
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes: Used different gas analyzer, entered tube (inlet) length into environmental settings.

DMT 10/22/09

Entries made by:	Donna Trott	10/22/2009
Signature/date	On File with Original	

Technical Data Review performed by:	Ernest Antonio
Signature/date	Signature on File 30 July 2010
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Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LV-S1 Model**	Run No.	**GT-18**
Date	10/29/2009	Fan Configuration	**B only, Damper A and Butterfly Shut**
Testers	MSP, DMT	Fan Setting	**60 Hz**
Stack Dia.	11.814 in.	Stack Temp	49.55 deg F
Stack X-Area	109.6 $in.^2$	Start/End Time	1515/1638
Test Port	2	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	149.25 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**B bottom-far**

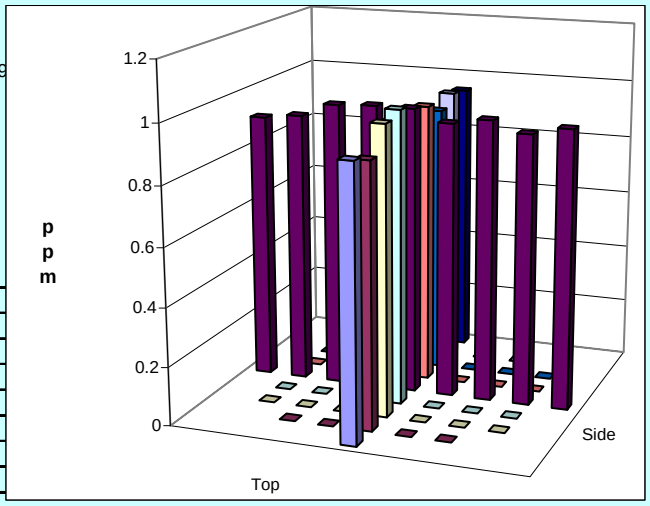
Order -->		1				2			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	0.961	0.942	0.900	0.934	0.908	1.00	0.856	0.921
2	1.24	0.902	0.932	0.890	0.908	0.896	0.892	0.893	0.894
3	2.29	0.931	0.926	0.974	0.944	0.869	1.11	0.966	0.982
4	3.82	0.885	0.963	0.922	0.923	0.991	0.972	1.04	1.001
Center	5.91	0.993	0.993	0.903	0.963	0.961	1.01	0.966	0.979
5	8.00	0.985	0.966	0.939	0.963	0.888	0.963	1.03	0.960
6	9.52	0.933	0.939	1.00	0.957	0.881	0.959	0.920	0.920
7	10.57	0.884	0.865	0.986	0.912	0.965	1.01	0.893	0.956
8	11.31	0.918	0.859	0.914	0.897	1.070	0.911	0.847	0.943
Averages ---------->		0.932	0.932	0.936	0.934	0.937	0.981	0.935	0.951

All	ppm	Dev. from mean	***Center 2/3***	Side	Top	All
Mean	0.94		Mean	0.94	0.96	0.95
Min Point	0.89	-5.1%	Std. Dev.	0.02	0.04	0.03
Max Point	1.00	6.3%	COV as %	2.6	3.9	**3.3**

Avg. Conc. 0.938 ppm

Gas analyzer checked:
10/27/09 JEF
DMT 10/29/09

	Start	Finish	
Tracer tank pressure	150	150	psig
Stack Temp	49.4	49.7	Fº
Center Pt. air vel.	2980	2880	fpm
Injection flowmeter	59	59	sccm
		DMT	10/29/2009
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	1001.00	1001.00	mbar
Ambient humidity	70	74	RH
B&K vapor correction	Y	Y	Y/N
Back-Gd gas ppb	33,22,21,17	28,15,16,11	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	49.1	47	Fº



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	7/14/2010
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes:

DMT 10/29/09

Entries made by:	Donna Trott	10/29/2009	Technical Data Review performed by:	Ernest Antonio	
Signature/date	On File with Original		Signature/date	Signature on File 30 July 2010	
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Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LV-S1 Model**	Run No.	**GT-19**
Date	11/3/2009	Fan Configuration	**B only, Damper A and Butterfly Shut**
Testers	JEF, DMT	Fan Setting	**60 Hz**
Stack Dia.	11.814 in.	Stack Temp	57.3 deg F
Stack X-Area	109.6 $in.^2$	Start/End Time	1320/1440
Test Port	2	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	149.25 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**B bottom-far**

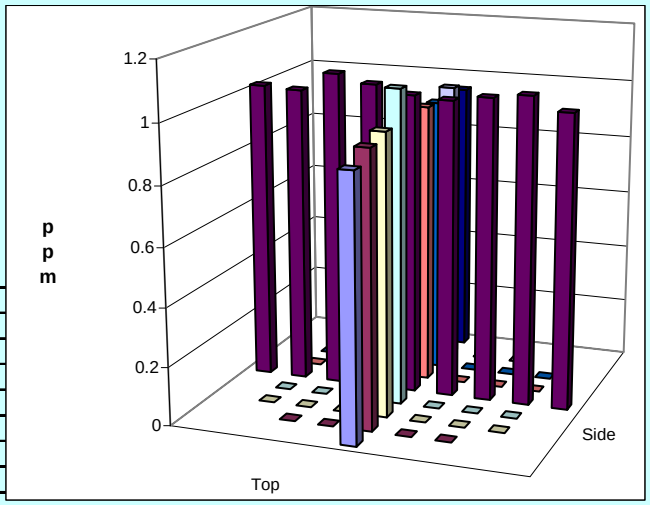
Order -->		1				2			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	0.969	0.835	0.926	0.910	0.852	0.911	0.913	0.892
2	1.24	1.01	0.95	0.897	0.952	0.984	0.877	0.94	0.934
3	2.29	0.863	1.01	0.94	0.938	0.912	0.984	0.973	0.956
4	3.82	0.916	0.971	0.877	0.921	1.09	1.07	1.05	1.070
Center	5.91	0.951	0.986	0.85	0.929	1.06	0.971	1.04	1.024
5	8.00	0.941	0.947	0.974	0.954	0.799	0.977	1.10	0.959
6	9.52	0.989	0.947	1.00	0.979	0.944	1.00	0.898	0.947
7	10.57	0.97	0.864	0.927	0.920	0.849	1.07	1.01	0.976
8	11.31	1.01	0.815	0.956	0.927	0.882	1.04	0.915	0.946
Averages ---------->		0.958	0.925	0.927	0.937	0.930	0.989	0.982	0.967

All	ppm	Dev. from mean	***Center 2/3***	Side	Top	All
Mean	0.95		Mean	0.94	0.98	0.96
Min Point	0.89	-6.3%	Std. Dev.	0.02	0.05	0.04
Max Point	1.07	12.4%	COV as %	2.2	5.0	**4.3**

Avg. Conc. 0.949 ppm

Gas analyzer checked:
11/2/2009 JEF
JEF 11/3/09

	Start	Finish	
Tracer tank pressure	250	250	psig
Stack Temp	58.6	56	Fº
Center Pt. air vel.	3100	2930	fpm
Injection flowmeter	59.0	59.0	sccm
		JEF	11/3/2009
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	29.65	29.65	mbar
Ambient humidity	33	34	RH
B&K vapor correction	Y	Y	Y/N
Back-Gd gas ppb	6,5,7,5	13,12,11,11	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	61.7	66.2	Fº



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	7/14/2010
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes:

JEF 11/3/09

Entries made by:	Julia Flaherty	11/3/2009	Technical Data Review performed by: Ernest Antonio
Signature/date	On File with Original		Signature/date Signature on File 30 July 2010
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Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LV-S1 Model**	Run No.	**GT-20**
Date	11/3/2009	Fan Configuration	**B only, Damper A and Butterfly Shut**
Testers	JEF, DMT	Fan Setting	**37.5 Hz**
Stack Dia.	11.813 in.	Stack Temp	55.15 deg F
Stack X-Area	109.6 $in.^2$	Start/End Time	1445/1600
Test Port	1	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	209.625 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**B center**

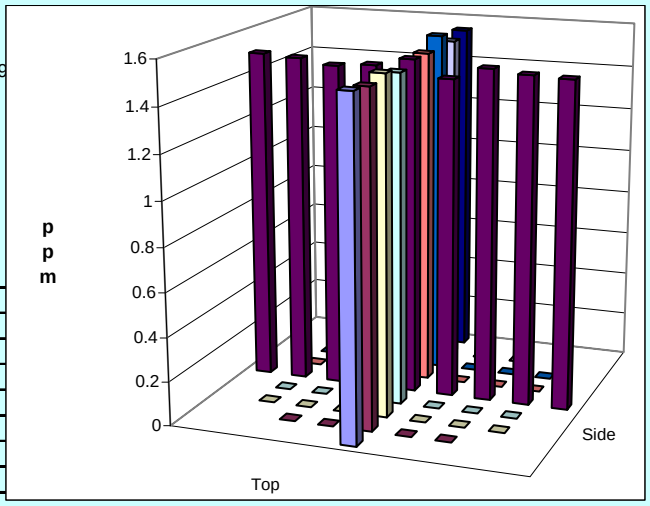
Order -->		1				2			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	1.49	1.50	1.45	1.480	1.47	1.47	1.50	1.480
2	1.24	1.51	1.48	1.47	1.487	1.47	1.46	1.47	1.467
3	2.29	1.58	1.46	1.47	1.503	1.51	1.52	1.44	1.490
4	3.82	1.46	1.42	1.46	1.447	1.45	1.47	1.47	1.463
Center	5.91	1.54	1.54	1.49	1.523	1.46	1.50	1.51	1.490
5	8.00	1.46	1.51	1.49	1.487	1.48	1.52	1.46	1.487
6	9.52	1.47	1.50	1.45	1.473	1.53	1.54	1.54	1.537
7	10.57	1.53	1.52	1.44	1.497	1.42	1.54	1.50	1.487
8	11.31	1.53	1.49	1.50	1.507	1.47	1.54	1.52	1.510
Averages ---------->		1.508	1.491	1.469	1.489	1.473	1.507	1.490	1.490

All	ppm	Dev. from mean	***Center 2/3***	Side	Top	All
Mean	1.49		Mean	1.49	1.49	1.49
Min Point	1.45	-2.9%	Std. Dev.	0.02	0.02	0.02
Max Point	1.54	3.2%	COV as %	1.6	1.6	**1.6**

Avg. Conc. 1.488 ppm

Gas analyzer checked:
11/2/2009 JEF
JEF 11/3/09

	Start	Finish	
Tracer tank pressure	250	250	psig
Stack Temp	56	54.3	Fº
Center Pt. air vel.	1910	1810	fpm
Injection flowmeter	59.0	59.0	sccm
		JEF	10/29/2009
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	29.65	29.65	mbar
Ambient humidity	34	41	RH
B&K vapor correction	Y	Y	Y/N
Back-Gd gas ppb	13,12,11,11	20,19,17,13	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	60	57.2	Fº



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	7/14/2010
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes: Initially forgot to take flow measure.

JEF 11/3/09

Entries made by:	Julia Flaherty	11/3/2009	Technical Data Review performed by: Ernest Antonio
Signature/date	On File with Original		Signature/date Signature on File 30 July 2010
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Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06	Site	**LV-S1 Model**	Run No.	**GT-21**	
	Date	11/4/2009	Fan Configuration	**B Only, Damper A and Butterfly Shut**	
	Testers	MSP, DMT	Fan Setting	**60 Hz**	
	Stack Dia.	11.844 in.	Stack Temp	56.9 deg F	
	Stack X-Area	110.2 $in.^2$	Start/End Time	1335/1425	
	Test Port	2	Center 2/3 from	1.09 to: 10.76	
	Distance to disturbance	149.25 inches	Points in Center 2/3	2 to: 7	
	Measurement units	ppm SF6	Injection Point	**8 center**	

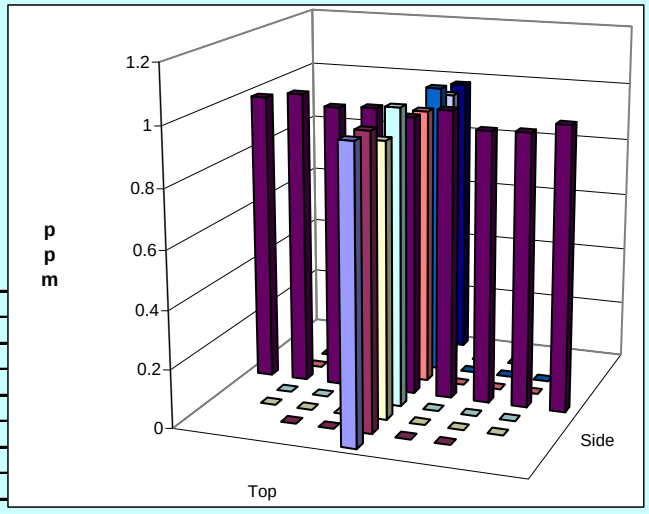
Order -->		1				2			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	0.958	0.944	0.947	0.950	1.02	1.02	0.935	0.992
2	1.24	0.910	0.925	0.913	0.916	0.977	1.06	0.951	0.996
3	2.29	1.01	0.830	0.893	0.911	0.949	0.956	0.906	0.937
4	3.82	0.977	0.985	0.944	0.969	1.03	1.04	0.984	1.018
Center	5.91	0.914	0.982	0.914	0.937	0.991	0.888	1.00	0.960
5	8.00	0.909	0.925	1.040	0.958	0.893	0.94	1.03	0.954
6	9.52	0.982	0.891	0.980	0.951	1.04	0.994	0.993	1.009
7	10.57	0.963	1.040	0.957	0.987	0.936	1.02	0.928	0.961
8	11.31	0.940	1.020	0.943	0.968	1.01	0.884	1.03	0.975
Averages ---------->		0.951	0.949	0.948	0.949	0.983	0.978	0.973	0.978

All	ppm	Dev. from mean	***Center 2/3***	Side	Top	All
Mean	0.96		Mean	0.95	0.98	0.96
Min Point	0.91	-5.5%	Std. Dev.	0.03	0.03	0.03
Max Point	1.02	5.6%	COV as %	2.9	3.2	**3.3**

Avg. Conc. 0.966 ppm

Gas analyzer checked:
11/2/09 JEF
DMT 11/4/09

	Start	Finish	
Tracer tank pressure	300	300	psig
Stack Temp	56.8	57	Fº
Center Pt. air vel.	3010	3020	fpm
Injection flowmeter	59	59	sccm
		DMT 11/4/09	
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	998	997	mbar
Ambient humidity	38	40	RH
B&K vapor correction	n	n	Y/N
Back-Gd gas ppb	21,22,24,20	25,30,26,27	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	59.9	58.1	Fº



Instuments Used:

B&K 1302 Gas Analyzer SN 1765229	Cat2 MTE
TSI VelociCalc SN 305039	7/14/2010
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes:
DMT 11/4/09

Entries made by:	Donna Trott	11/4/2009	Technical Data Review performed by:	Ernest Antonio
Signature/date	On File With Original		Signature/date	Signature on File 30 July 2010
				TI-RPP-WTP_690

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LV-S1 Model**	Run No.	**GT-22**
Date	11/4/2009	Fan Configuration	**B Only, Damper A and Butterfly Shut**
Testers	MSP, DMT	Fan Setting	**60 Hz**
Stack Dia.	11.844 in.	Stack Temp	57 deg F
Stack X-Area	110.2 $in.^2$	Start/End Time	1428/1516
Test Port	2	Center 2/3 from	1.09 to: 10.76
Distance to disturbance	149.25 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**7 center**

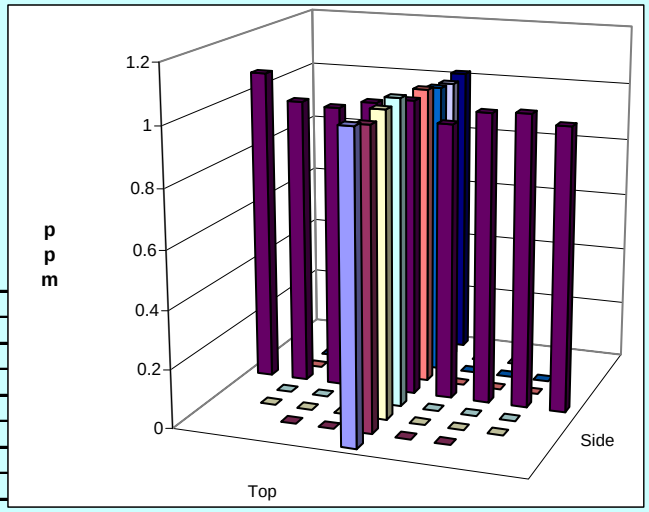
Order -->		2				1				
Traverse-->		Side				Top				
Trial ---->		1	2	3	Mean	1	2	3	Mean	
Point	Depth, in.	ppm				ppm				
1	0.50	0.961	1.00	0.944	0.968	1.04	1.02	0.97	1.010	
2	1.24	1.02	0.999	0.981	1.000	1.01	1.02	0.935	0.988	
3	2.29	1.01	0.984	0.986	0.993	1.00	1.00	1.03	1.010	
4	3.82	0.941	0.924	0.974	0.946	1.07	0.975	1.02	1.022	
Center	5.91	0.947	1.09	1.01	1.016	0.996	1.01	0.962	0.989	
5	8.00	1.04	0.991	0.967	0.999	0.982	0.962	1.06	1.001	
6	9.52	0.981	1.02	0.919	0.973	0.987	1.04	0.925	0.984	
7	10.57	0.982	0.98	0.993	0.985	0.947	0.958	1.02	0.975	
8	11.31	1.11	1.03	1.08	1.073	1.02	0.988	0.955	0.988	
Averages ---------->		0.999	1.002	0.984	0.995	1.006	0.997	0.986	0.996	

All	ppm	Dev. from mean	***Center 2/3***	Side	Top	All
Mean	1.00		Mean	0.99	1.00	0.99
Min Point	0.95	-5.0%	Std. Dev.	0.02	0.02	0.02
Max Point	1.07	7.8%	COV as %	2.3	1.6	**1.9**

Avg. Conc. 0.995 ppm

Gas analyzer checked:
11/2/09 JEF
DMT 11/4/09

	Start	Finish	
Tracer tank pressure	300	300	psig
Stack Temp	57	57	Fº
Center Pt. air vel.	3020	3000	fpm
Injection flowmeter	59	59	sccm
		DMT 11/4/09	
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	997	996	mbar
Ambient humidity	39	37	RH
B&K vapor correction	n	n	Y/N
Back-Gd gas ppb	26,24,24,25	27,24,29,29	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	59.0	62.6	Fº



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	7/14/2010
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes:
DMT 11/4/09

Entries made by:	Donna Trott	11/4/2009	Technical Data Review performed by:	Ernest Antonio	
Signature/date	On File With Original		Signature/date	Signature on File 30 July 2010	
				TI-RPP-WTP_690	

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06	Site	**LV-S1 Model**	Run No.	**GT-23**	
	Date	11/4/2009	Fan Configuration	**B Only, Damper A and Butterfly Shut**	
	Testers	MSP, DMT	Fan Setting	**60 Hz**	
	Stack Dia.	11.844 in.	Stack Temp	55.6 deg F	
	Stack X-Area	110.2 $in.^2$	Start/End Time	1522/1609	
	Test Port	2	Center 2/3 from	1.09 to:	10.76
	Distance to disturbance	149.25 inches	Points in Center 2/3	2 to:	7
	Measurement units	ppm SF6	Injection Point	**6 center**	

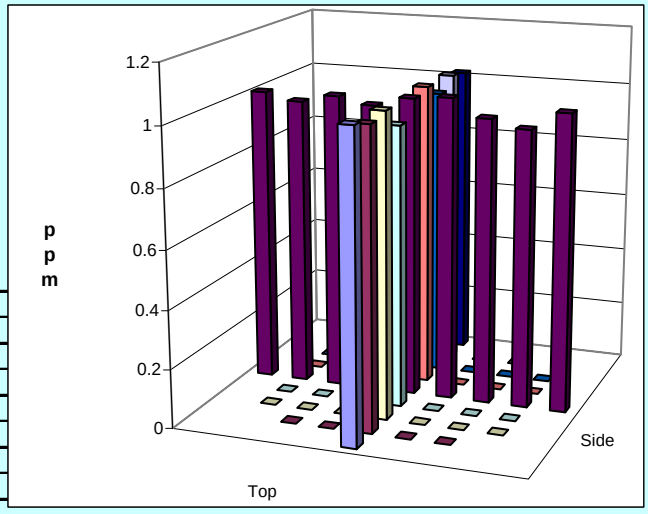
Order -->		1				2			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	1.04	0.872	1.09	1.001	1.03	1.12	0.970	1.040
2	1.24	0.938	0.906	0.969	0.938	1.03	1.02	1.00	1.017
3	2.29	0.965	0.993	0.935	0.964	0.979	1.09	1.03	1.033
4	3.82	1.05	1.02	1.00	1.023	0.984	0.951	0.942	0.959
Center	5.91	0.968	1.07	1.00	1.013	1.02	1.06	0.989	1.023
5	8.00	0.925	1.03	0.985	0.980	0.993	1.05	1.07	1.038
6	9.52	1.02	1.03	0.958	1.003	1.02	1	0.951	0.990
7	10.57	0.970	1.05	0.907	0.976	1.05	1.09	0.951	1.030
8	11.31	0.987	1.00	1.01	0.999	1.04	1.06	0.950	1.017
Averages ---------->		0.985	0.997	0.984	0.988	1.016	1.049	0.984	1.016

All	ppm	Dev. from mean	***Center 2/3***	Side	Top	All
Mean	1.00		Mean	0.99	1.01	1.00
Min Point	0.94	-6.5%	Std. Dev.	0.03	0.03	0.03
Max Point	1.04	3.8%	COV as %	3.0	2.8	**3.1**

Avg. Conc. 1.000 ppm

Gas analyzer checked:
11/2/09 JEF
DMT 11/4/09

	Start	Finish	
Tracer tank pressure	300	300	psig
Stack Temp	57	54.2	Fº
Center Pt. air vel.	3000	2930	fpm
Injection flowmeter	59	59	sccm
	DMT 11/12/09		
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	996	996	mbar
Ambient humidity	38	46	RH
B&K vapor correction	n	n	Y/N
Back-Gd gas ppb	30,24,26,24	32,27,25,24	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	60.8	54.5	Fº



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	7/14/2010
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes:
DMT 11/4/09

Entries made by:	Donna Trott	11/4/2009	Technical Data Review performed by:	Ernest Antonio
Signature/date	On File With Original		Signature/date	Signature on File 30 July 2010
				TI-RPP-WTP_690

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06	Site	**LV-S1 Model**	Run No.	**GT-24**	
	Date	11/5/2009	Fan Configuration	**B Only, Damper A and Butterfly Shut**	
	Testers	MSP, DMT	Fan Setting	**60 Hz**	
	Stack Dia.	11.844 in.	Stack Temp	58.15 deg F	
	Stack X-Area	110.2 $in.^2$	Start/End Time	1304/1354	
	Test Port	2	Center 2/3 from	1.09 to: 10.76	
	Distance to disturbance	149.25 inches	Points in Center 2/3	2 to: 7	
	Measurement units	ppm SF6	Injection Point	**5 center**	

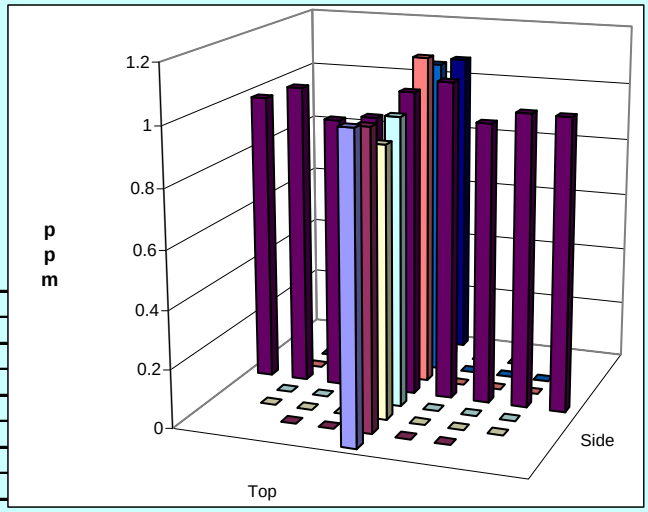
Order -->		1				2			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	0.903	1.12	0.971	0.998	0.875	1.08	1.08	1.012
2	1.24	1.04	1.03	0.932	1.001	1.16	0.877	0.93	0.989
3	2.29	1.02	0.992	0.861	0.958	0.851	0.857	1.011	0.906
4	3.82	0.975	1.12	1.16	1.085	1.02	1.06	0.824	0.968
Center	5.91	1.05	1.08	1.00	1.043	1.00	0.929	1.14	1.023
5	8.00	1.02	1.03	0.797	0.949	1.08	1.22	1.04	1.113
6	9.52	0.916	0.934	0.942	0.931	1.03	1.18	1.00	1.070
7	10.57	1.05	1.11	0.935	1.032	1.02	0.77	1.11	0.967
8	11.31	0.949	1.08	0.938	0.989	1.01	1.07	1.05	1.043
Averages ---------->		0.991	1.055	0.948	0.998	1.005	1.005	1.021	1.010

All	ppm	Dev. from mean	***Center 2/3***	Side	Top	All
Mean	1.00		Mean	1.00	1.01	1.00
Min Point	0.91	-9.7%	Std. Dev.	0.06	0.07	0.06
Max Point	1.11	10.9%	COV as %	5.7	6.9	**6.1**

Avg. Conc. 1.001 ppm

Gas analyzer checked:
11/2/09 JEF
DMT 11/5/09

	Start	Finish	
Tracer tank pressure	225	225	psig
Stack Temp	58.2	58.1	Fº
Center Pt. air vel.	2970	2880	fpm
Injection flowmeter	59	59	sccm
		DMT 11/5/09	
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	988	987	mbar
Ambient humidity	34	43	RH
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	27,23,19,25	29,34,32,31	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	60.8	57.2	Fº



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	7/14/2010
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes:
DMT 11/5/09

Entries made by:	Donna Trott	11/5/2009	Technical Data Review performed by:	Ernest Antonio	
Signature/date	On File With Original		Signature/date	Signature on File 30 July 2010	
				TI-RPP-WTP_690	

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06	Site	**LV-S1 Model**	Run No.	**GT-25**	
	Date	11/5/2009	Fan Configuration	**B Only, Damper A and Butterfly Shut**	
	Testers	MSP, DMT	Fan Setting	**60 Hz**	
	Stack Dia.	11.844 in.	Stack Temp	58.05 deg F	
	Stack X-Area	110.2 $in.^2$	Start/End Time	1356/1445	
	Test Port	2	Center 2/3 from	1.09 to:	10.76
	Distance to disturbance	149.25 inches	Points in Center 2/3	2 to:	7
	Measurement units	ppm SF6	Injection Point	**4 center**	

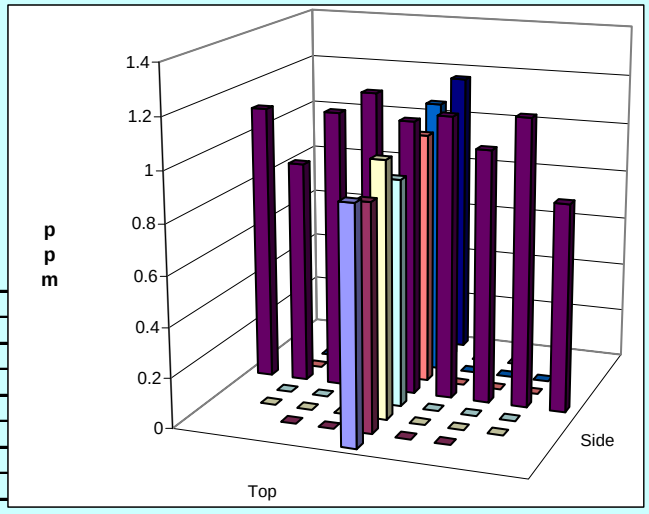
		Side				Top			
Order -->		2				1			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	0.604	0.936	0.880	0.807	0.819	0.94	1.04	0.933
2	1.24	1.04	1.36	0.951	1.117	0.716	0.879	1.10	0.898
3	2.29	0.878	0.904	1.17	0.984	1.02	0.881	1.16	1.020
4	3.82	1.11	1.11	1.08	1.100	0.861	0.869	1.00	0.910
Center	5.91	1.10	0.960	1.15	1.070	0.870	1.30	1.14	1.103
5	8.00	0.900	1.48	1.12	1.167	1.18	1.00	0.871	1.017
6	9.52	0.865	1.13	1.25	1.082	1.07	1.28	0.987	1.112
7	10.57	0.873	0.812	0.927	0.871	0.744	1.01	1.11	0.955
8	11.31	0.849	1.21	1.17	1.076	1.06	1.27	1.15	1.160
Averages ---------->		0.913	1.100	1.078	1.030	0.927	1.048	1.062	1.012

All	ppm	Dev. from mean	***Center 2/3***	Side	Top	All
Mean	1.02		Mean	1.06	1.00	1.03
Min Point	0.81	-21.0%	Std. Dev.	0.10	0.09	0.09
Max Point	1.17	14.2%	COV as %	9.3	8.6	**9.0**

Avg. Conc. 1.013 ppm

Gas analyzer checked:
11/2/09 JEF
DMT 11/5/09

	Start	Finish	
Tracer tank pressure	225	225	psig
Stack Temp	58.1	58	Fº
Center Pt. air vel.	2880	3020	fpm
Injection flowmeter	59	59	sccm
		DMT 11/5/09	
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	987	985	mbar
Ambient humidity	43	46	RH
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	27,26,22,25	36,27,32,30	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	57.2	56.3	Fº



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	7/14/2010
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes:
DMT 11/5/09

Entries made by:	Donna Trott	11/5/2009	Technical Data Review performed by:	Ernest Antonio	
Signature/date	On File With Original		Signature/date	Signature on File	30 July 2010
				TI-RPP-WTP_690	

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	LV-S1 Model	Run No.	GT-26
Date	11/9/2009	Fan Configuration	B Only, Damper A and Butterfly Shut
Testers	JEF, XYY	Fan Setting	60 Hz
Stack Dia.	14.844 in.	Stack Temp	49.7 deg F
Stack X-Area	173.1 in.^{2}	Start/End Time	1420/1615
Test Port	4	Center 2/3 from	1.36 to: 13.48
Distance to disturbance	5.125 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	B center

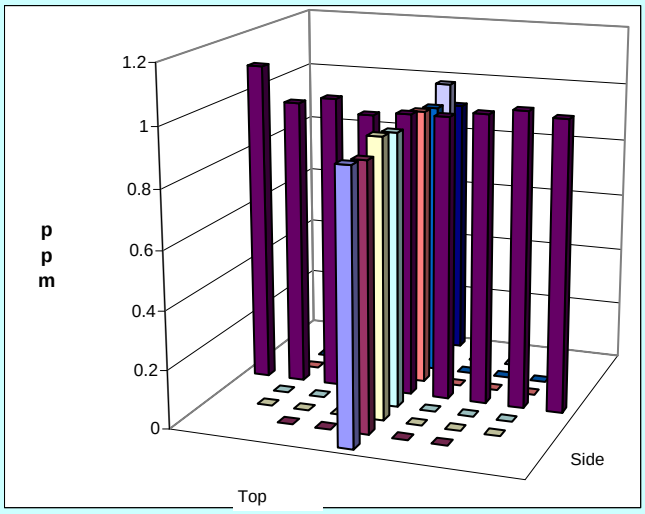
Order -->		1				2			
Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	0.942	0.946	0.925	0.938	0.956	0.959	0.841	0.919
2	1.56	0.933	0.918	1.01	0.954	0.847	0.877	0.989	0.904
3	2.87	0.952	0.904	0.948	0.935	0.986	0.882	0.987	0.952
4	4.78	0.917	0.932	0.904	0.918	0.967	0.971	0.875	0.938
Center	7.41	0.971	0.894	0.885	0.917	0.961	0.961	0.993	0.972
5	10.03	0.92	0.927	0.868	0.905	1.13	0.827	0.907	0.955
6	11.94	0.979	0.897	0.969	0.948	0.965	0.901	0.961	0.942
7	13.26	0.911	0.935	0.933	0.926	1.03	1.01	0.962	1.001
8	14.31	1.26	0.925	0.925	1.037	0.928	0.928	0.843	0.900
Averages ---------->		0.976	0.920	0.930	0.942	0.974	0.924	0.929	0.942

All	ppm	Dev. from mean	***Center 2/3***	Side	Top	All
Mean	0.94		Mean	0.93	0.95	0.94
Min Point	0.90	-4.5%	Std. Dev.	0.02	0.03	0.03
Max Point	1.04	10.0%	COV as %	1.9	3.1	**2.8**

Avg. Conc. 0.942 ppm

Gas analyzer checked:
11/9/09 JEF
XYY 11/9/09

	Start	Finish	
Tracer tank pressure	200	200	psig
Stack Temp	50.4	49	Fº
Center Pt. air vel.	3140	3010	fpm
Injection flowmeter	59	59	sccm
		XYY 11/9/09	
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	994	994	mbar
Ambient humidity	33	67	RH
B&K vapor correction	Y	Y	Y/N
Back-Gd gas ppb	13,17,11,6	18,13,9,11	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	60.8	46.4	Fº



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	7/14/2010
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes: Use water correction RH varied a lot, e.g., 33% - 68%

Repeat GT-26 XYY 11/09/09

Testing tube length 6 ft, calibration 7.5 ft, need to change setting

ambient temperature dropped to 49F. @ 3pm, & RH up to 54% @ 4:04

46F & 68% repeat 4th time from side due to very scattered reading during 2nd repeat.

Entries made by:	Xiao-Ying Yu	11/9/2009	Technical Data Review performed by: Ernest Antonio
Signature/date	On File With Original		Signature/date Signature on File 30 July 2010
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Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LV-S1 Model**	Run No.	**GT-27**
Date	11/10/2009	Fan Configuration	**B Only, Damper A and Butterfly Shut**
Testers	JAG, XYY	Fan Setting	**60 Hz**
Stack Dia.	14.844 in.	Stack Temp	62.85 deg F
Stack X-Area	173.1 $in.^2$	Start/End Time	1330/1500
Test Port	5	Center 2/3 from	1.36 to: 13.48
Distance to disturbance	7.25 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**B center**

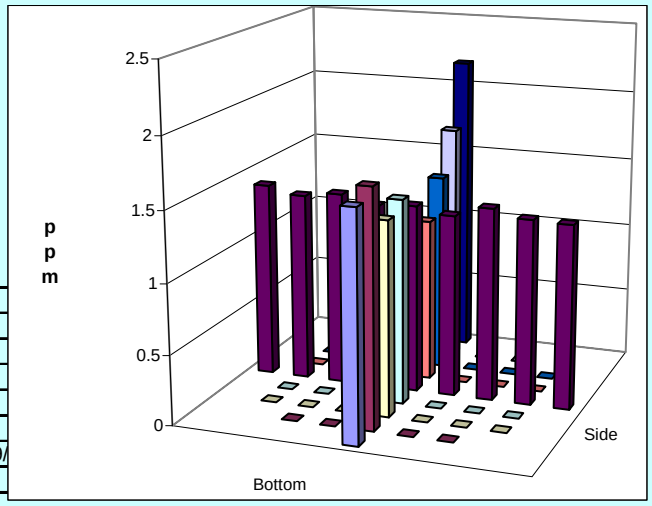
Order -->		1				2			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	1.05	1.50	1.22	1.257	1.49	1.21	2.16	1.620
2	1.56	1.40	1.24	1.16	1.267	1.84	1.39	1.84	1.690
3	2.87	1.50	1.16	1.29	1.317	1.31	1.32	1.55	1.393
4	4.78	1.45	1.15	1.13	1.243	1.26	1.28	1.86	1.467
Center	7.41	1.25	1.46	1.15	1.287	1.28	1.65	1.13	1.353
5	10.03	1.34	1.19	1.27	1.267	1.16	1.16	1.19	1.170
6	11.94	1.50	1.19	1.27	1.320	1.25	1.46	1.56	1.423
7	13.26	1.44	1.21	1.21	1.287	2.17	1.77	1.21	1.717
8	14.31	1.41	1.43	1.17	1.337	2.60	2.69	1.21	2.167
Averages ---------->		1.371	1.281	1.208	1.287	1.596	1.548	1.523	1.556

All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1.42		Mean	1.28	1.46	1.37
Min Point	1.17	-17.7%	Std. Dev.	0.03	0.19	0.16
Max Point	2.17	52.5%	COV as %	2.2	13.1	**11.7**

Avg. Conc. 1.434 ppm

Gas analyzer checked:
11/9/09 JEF
XYY 11/9/09

	Start	Finish	
Tracer tank pressure	200	200	psig
Stack Temp	63.7	62	Fº
Center Pt. air vel.	2620	2610	fpm
Injection flowmeter	59	59	sccm
		XYY 11/9/09	
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	1003	1002	mbar
Ambient humidity	35	36	RH
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	23,25,26,25	37,33,33,30	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	61.7	60	Fº



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	7/14/2010
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes:

Side and top-bottom diameters are different, so traverse points are all marked to reflect this difference for each. XYY 11/09/
An additional traverse is obtained, use the 3 cloest values for date entry. XYY 11/10/09

Entries made by:	Xiao-Ying Yu	11/10/2009	Technical Data Review performed by: Ernest Antonio
Signature/date	On File With Original		Signature/date Signature on File 30 July 2010
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TRACER GAS TRAVERSE DATA FORM

31-Jul-06	Site	**LV-S1 Model**	Run No.	**GT-28**	
	Date	11/10/2009	Fan Configuration	**B Only, Damper A and Butterfly Shut**	
	Testers	JAG, XYY	Fan Setting	**60 Hz**	
	Stack Dia.	14.688 in.	Stack Temp	60.25 deg F	
	Stack X-Area	169.4 $in.^2$	Start/End Time	1510/1615	
	Test Port	6	Center 2/3 from	1.35 to:	13.34
	Distance to disturbance	7.25 inches	Points in Center 2/3	2 to:	7
	Measurement units	ppm SF6	Injection Point	**B center**	

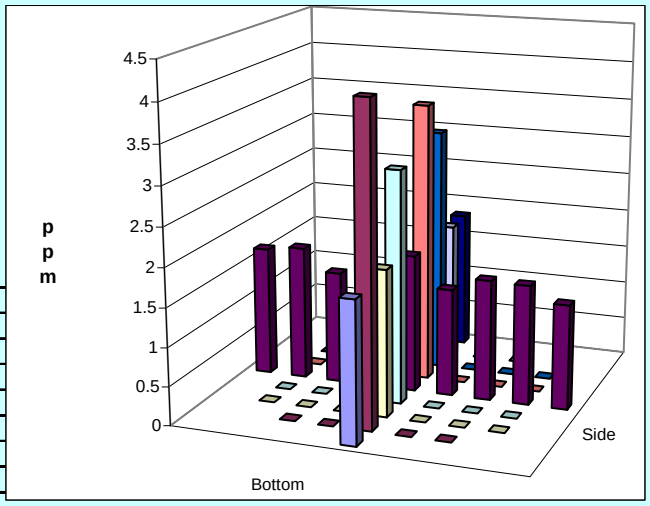
Order -->		1st				2nd			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	1.41	1.46	1.21	1.360	1.23	1.32	2.09	1.275
2	1.54	2.21	1.33	1.13	1.557	2.61	3.13	1.31	2.870
3	2.85	1.63	1.54	1.53	1.567	1.18	1.47	1.26	1.325
4	4.74	1.31	1.71	1.16	1.393	1.19	3.03	1.09	2.110
Center	7.34	1.79	2.23	1.33	1.783	1.14	1.36	1.19	1.250
5	9.94	1.28	1.25	1.40	1.310	1.55	3.52	1.08	2.535
6	11.84	1.16	1.38	1.83	1.457	3.16	1.27	3.01	2.215
7	13.15	1.40	1.91	1.90	1.737	1.38	1.11	1.42	1.245
8	14.19	1.08	2.24	1.71	1.677	1.39	1.14	1.13	1.265
Averages ---------->		1.474	1.672	1.467	1.538	1.648	1.928	1.509	1.788

All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1.66		Mean	1.54	1.94	1.74
Min Point	1.25	-25.1%	Std. Dev.	0.17	0.67	0.51
Max Point	2.87	72.6%	COV as %	11.2	34.4	**29.3**

Avg. Conc. 1.681 ppm

Gas analyzer checked:
11/9/09 JEF
XYY 11/10/09

	Start	Finish	
Tracer tank pressure	200	200	psig
Stack Temp	62	58.5	Fº
Center Pt. air vel.	2610	2440	fpm
Injection flowmeter	59	59	sccm
	XYY 11/10/09		
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	1002	1002	mbar
Ambient humidity	36	40	RH
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	25,29,20,22	35,28,29,27	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	58	54	Fº



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	7/14/2010
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes:

For bottom data, use the last 3 traverse, deleting 1st traverse.
XYY 11/10/09

Entries made by:	John Glissmeyer	11/10/2009	Technical Data Review performed by:	Ernest Antonio
Signature/date	On File With Original		Signature/date	Signature on File 30 July 2010
				TI-RPP-WTP_690

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LV-S1 Model**	Run No.	**GT-29**
Date	11/11/2009	Fan Configuration	**B only**
Testers	JAG	Fan Setting	**60 Hz**
Stack Dia.	14.813 in.	Stack Temp	54.75 deg F
Stack X-Area	172.3 $in.^2$	Start/End Time	1420 / 1519
Test Port	7	Center 2/3 from	1.36 to: 13.45
Distance to disturbance	20.25 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**B center**

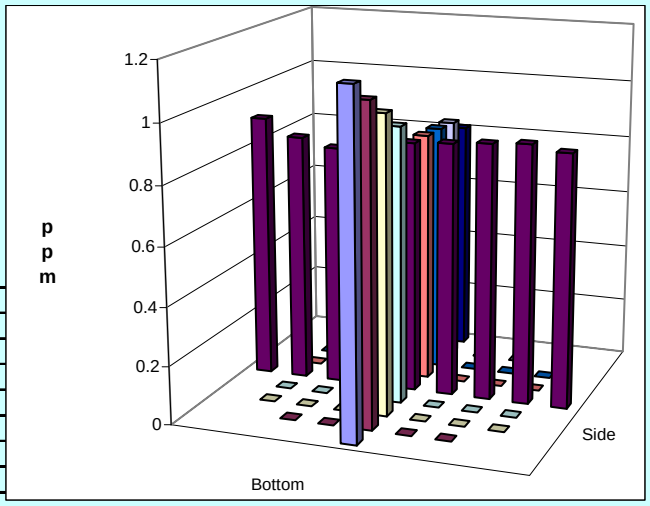
Order -->		1st				2nd			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	0.778	0.941	0.895	0.871	1.13	1.10	1.09	1.107
2	1.56	0.859	0.969	0.844	0.891	1.07	1.03	1.01	1.037
3	2.87	0.879	0.922	0.844	0.882	0.991	0.936	0.990	0.972
4	4.78	0.877	0.861	0.877	0.872	0.928	0.879	0.911	0.906
Center	7.41	0.848	0.853	0.890	0.864	0.814	0.878	0.787	0.826
5	10.03	0.824	0.847	0.840	0.837	0.791	0.832	0.848	0.824
6	11.94	0.855	0.833	0.787	0.825	0.833	0.781	0.849	0.821
7	13.26	0.891	0.854	0.811	0.852	0.752	0.803	0.892	0.816
8	14.31	0.945	0.923	0.855	0.908	0.811	0.719	0.787	0.772
Averages ---------->		0.862	0.889	0.849	0.867	0.902	0.884	0.907	0.898

All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	0.88		Mean	0.86	0.89	0.87
Min Point	0.77	-12.5%	Std. Dev.	0.02	0.09	0.06
Max Point	1.11	25.4%	COV as %	2.8	10.0	**7.3**

Avg. Conc. 0.887 ppm

Gas analyzer checked:
11/9/09 JEF

	Start	Finish	
Tracer tank pressure	200	100	psig
Stack Temp	55.5	54	Fº
Center Pt. air vel.	3220	2950	fpm
Injection flowmeter	59	59	sccm
	---	----	
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	997	997	mbar
Ambient humidity	49	49	RH
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	21, 22, 20, 23	32, 30, 26, 26	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	54	52	Fº



Instuments Used:

TSI VelociCalc SN 305039	7/14/2010
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010
B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE

Notes:

JAG 11/11/09

Entries made by:	John Glissmeyer	11/11/2009	Technical Data Review performed by:	Ernest Antonio
Signature/date	Signature on original		Signature/date	Signature on File 30 July 2010
				TI-RPP-WTP_690

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LV-S1 Model**	Run No.	**GT-30**
Date	11/11/2009	Fan Configuration	**B only**
Testers	JAG	Fan Setting	**60 Hz**
Stack Dia.	14.906 in.	Stack Temp	52.5 deg F
Stack X-Area	174.5 $in.^2$	Start/End Time	1519 / 1645
Test Port	8	Center 2/3 from	1.37 to: 13.54
Distance to disturbance	18.25 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**B center**

Order -->		1st				2nd			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	0.431	0.396	0.446	0.424	0.355	0.623	0.586	0.521
2	1.57	0.365	0.329	0.382	0.359	0.314	0.527	0.378	0.406
3	2.89	0.367	0.394	0.335	0.365	0.300	0.363	0.313	0.325
4	4.81	0.410	0.437	0.402	0.416	0.365	0.387	0.352	0.368
Center	7.45	0.460	0.415	0.439	0.438	0.471	0.422	0.409	0.434
5	10.09	0.402	0.437	0.416	0.418	0.624	0.587	0.501	0.571
6	12.01	0.401	0.444	0.396	0.414	1.20	1.06	1.06	1.107
7	13.34	0.371	0.298	0.317	0.329	2.08	1.75	1.73	1.853
8	14.41	0.280	0.303	0.244	0.276	1.94	2.21	2.11	2.087
Averages ---------->		0.387	0.384	0.375	0.382	0.850	0.881	0.827	0.852

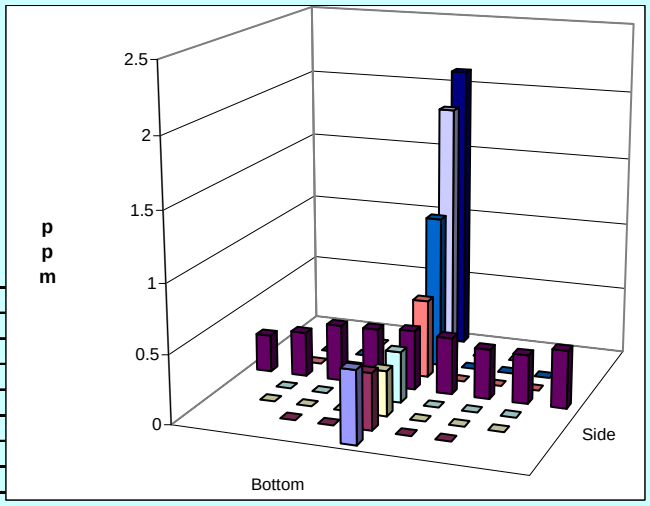
All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	0.62		Mean	0.39	0.72	0.56
Min Point	0.28	-55.3%	Std. Dev.	0.04	0.57	0.42
Max Point	2.09	238.0%	COV as %	10.3	78.1	**75.7**

Avg. Conc. 0.640 ppm

Gas analyzer checked:
11/9/09 JEF

JAG 11/11/09

	Start	Finish	
Tracer tank pressure	100	100	psig
Stack Temp	54	51	F°
Center Pt. air vel.	2950	2920	fpm
Injection flowmeter	59	59	sccm
	---	---	
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	997	997	mbar
Ambient humidity	51	72	RH
B&K vapor correction	Y	Y	Y/N
Back-Gd gas ppb	7, 5, 8, 10	17, 10, 4, 4	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	52	46	F°



Instuments Used:

B&K 1302 Gas Analyzer SN 1765299	Cat2 MTE
TSI VelociCalc SN 305039	7/14/2010
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	4/9/2010

Notes:

JAG 11/11/09

Entries made by:	John Glissmeyer	11/11/2009	Technical Data Review performed by:	Ernest Antonio
Signature/date	Signature on original		Signature/date	Signature on File 30 July 2010
				TI-RPP-WTP_690

Sulfur hexafluoride Gas Calibration performed on B&K on 9/23/2009 **by** DMT, JEF

B&K Model 1302: Serial No. 1765299 Property No. WD17210

Setup:
- 6 ft B&K sample inlet tube length
- 1000 mbar station pressure
- 67.1 deg F ambient temp — analyzer corrects to 20 deg C
- 39 percent RH

0.0996 ppm				4.998 ppm			
Cylinder	SV17680	start P =	1500 psi	Cylinder	SV17805	start P =	1000 psi
		end P =	1200 psi			end P =	1000 psi
B&K				B&K			
Calibration readings: (ppm)				Calibration readings: (ppm)			
0.0969	Compensating for water vapor			4.96	Compensating for water vapor		
0.0978				4.96			
0.0969				4.95			
0.1010				4.95			
0.0987				4.97			
0.0981	Not compensating for water vapor			4.95	Not compensating for water vapor		
0.0944				4.96			
0.0973				4.95			
0.0983				4.96			
0.0983				4.95			
0.0978 = avg				**4.96** = avg			

Pre-Test Room background, ppb

Not compensating for water vapor, monitoring task 2

43.3, 45.3, 42.4, 43.6, 42.1

Compensating for water vapor, monitoring task 1

4.77, 5.52, 5.61, 7.38, 4.68

Standards Used:	Expiration date:
SV17680	6/19/2010
SV17805	6/19/2010

Entries made by:	Julia Flaherty	9/23/2009	Technical Data Review performed by:	Ernest Antonio
Signature/date	On file with original		Signature/date	Signature on File 30 July 2010 TI-RPP-WTP_690

Sulfur hexafluoride Gas Calibration performed on B&K on 10/5/2009 **by** DMT, XYY

B&K Model 1302: Serial No. 1765299 Property No. WD17210

Setup:

6.0	ft	B&K sample inlet tube length
987	mbar	station pressure
65.3	deg F	ambient temp analyzer corrects to 20 deg C
33	percent	RH

0.0996	ppm				4.998	ppm			
Cylinder	SV17680	start P =	1400	psi	Cylinder	SV17805	start P =	1400	psi
		end P =	1380	psi			end P =	1350	psi
B&K					B&K				
Calibration readings: (ppm)					Calibration readings: (ppm)				
0.1000	Compensating for water vapor				5.04	Compensating for water vapor			
0.1020					5.05				
0.0997					5.04				
0.1020					5.05				
0.0992					5.04				
0.1030	Not compensating for water vapor				5.03	Not compensating for water vapor			
0.0989					5.02				
0.1000					5.03				
0.1020					5.02				
0.1010					5.01				
0.1008 = avg					**5.033** = avg				

Pre-Test Room background, ppb
Not compensating for water vapor, monitoring task 2
21, 17, 19.3, 16.5
Compensating for water vapor, monitoring task 1
2.9, 5.6, 5.8, 5.0

Standards Used:	Expiration date:
SV17680	6/19/2010
SV17805	6/19/2010

Entries made by:	Donna Trott	10/5/2009	Technical Data Review performed by:	Ernest Antonio
Signature/date	On file with original		Signature/date	Signature on File 30 July 2010 TI-RPP-WTP_690

Sulfur hexafluoride Gas Calibration performed on B&K on 10/12/2009 **by** DMT, XYY, MSP

B&K Model 1302: Serial No. 1765299 Property No. WD17210

Setup:
- 6.0 ft B&K sample inlet tube length
- 993 mbar station pressure
- 67.5 deg F ambient temp analyzer corrects to 20 deg C
- 30 percent RH

0.0996 ppm				4.998 ppm			
Cylinder	SV17680	start P =	1250 psi	Cylinder	SV17805	start P =	1300 psi
		end P =	1250 psi			end P =	1300 psi
B&K				B&K			
Calibration readings: (ppm)				Calibration readings: (ppm)			
0.0960	Compensating for water vapor			4.96	Compensating for water vapor		
0.0970				4.96			
0.0985				4.95			
0.1010				4.96			
0.0963				4.96			
0.1020	Not compensating for water vapor			4.95	Not compensating for water vapor		
0.0974				4.94			
0.0991				4.95			
0.1000				4.94			
0.1030				4.94			
0.0990 = avg				**4.95** = avg			

Pre-Test Room background, ppb

Not compensating for water vapor, monitoring task 2

14.8, 14.1, 14.3, 10.5, 11.7

Compensating for water vapor, monitoring task 1

6.77, 4.95, 5.68,. 8.12

Standards Used:	Expiration date:
SV17680	6/19/2010
SV17805	6/19/2010

Entries made by:	Donna Trott	10/12/2009	Technical Data Review performed by:	Ernest Antonio	
Signature/date	On file with original		Signature/date	Signature on File 30 July 2010	
				TI-RPP-WTP_690	

Sulfur hexafluoride Gas Calibration performed on B&K on 10/21/2009 **by** DMT, XYY

B&K Model 1302: Serial No. 1765299 Property No. WD17210

Setup:

6	ft	B&K sample inlet tube length
997	mbar	station pressure
66.2	deg F	ambient temp analyzer corrects to 20 deg C
46	percent	RH

0.0996	ppm			4.998	ppm		
Cylinder	SV17680	start P =	1000 psi	Cylinder	SV17805	start P =	1200 psi
		end P =	1000 psi			end P =	1200 psi

B&K

Calibration readings: (ppm)

0.0974	Compensating for water vapor	4.91	Compensating for water vapor
0.0976		4.92	
0.0991		4.91	
0.0975		4.91	
0.0975		4.91	
0.1020	Not compensating for water vapor	4.87	Not compensating for water vapor
0.0993		4.91	
0.1020		4.90	
0.1000		4.90	
0.1040		4.89	
0.0996	= avg	**4.90**	= avg

Pre-Test Room background, ppb
Not compensating for water vapor, monitoring task 2
37.3, 38.5, 43.4, 39.2, 42.9
Compensating for water vapor, monitoring task 1
0, 4.68, 0.607, 0, 3.08

Standards Used:	Expiration date:
SV17680	6/19/2010
SV17805	6/19/2010

Entries made by:	Donna Trott	10/21/2009	Technical Data Review performed by:	Ernest Antonio	
Signature/date	On file with original		Signature/date	Signature on File 30 July 2010	
				TI-RPP-WTP_690	

Sulfur hexafluoride Gas Calibration performed on B&K on 10/28/2009 **by** JEF

B&K Model 1302: Serial No. 1765299 Property No. WD17210

Setup:
- 7.5 ft B&K sample inlet tube length
- 1000 mbar station pressure
- 67 deg F ambient temp analyzer corrects to 20 deg C
- 30 percent RH

0.0996 ppm				4.998 ppm			
Cylinder	SV17680	start P =	750 psi	Cylinder	SV17805	start P =	680 psi
		end P =	700 psi			end P =	620 psi
B&K				B&K			
Calibration readings: (ppm)				Calibration readings: (ppm)			
0.101	Compensating for water vapor			4.90	Compensating for water vapor		
0.100				4.92			
0.100				4.92			
0.102				4.92			
0.100				4.91			
0.102	Not compensating for water vapor			4.90	Not compensating for water vapor		
0.102				4.89			
0.100				4.88			
0.0979				4.88			
0.100				4.80			
0.10049 = avg				**4.89** = avg			

Pre-Test Room background, ppb
Not compensating for water vapor, monitoring task 2
32.0, 32.7, 25.7, 32.8, 30.0
Compensating for water vapor, monitoring task 1
11.9, 14.6, 11.6, 13.2, 10.4

Standards Used:	Expiration date:
Matheson SV17680	6/19/2010
Matheson SV17805	6/19/2010

Entries made by:	Julia Flaherty	10/28/2009	Technical Data Review performed by:	Ernest Antonio
Signature/date	*On file with original*		Signature/date	Signature on File 30 July 2010 TI-RPP-WTP_690

Sulfur hexafluoride Gas Calibration performed on B&K on 11/2/2009 **by** JEF

B&K Model 1302: Serial No. 1765299 Property No. WD17210

Setup:
- 7.5 ft B&K sample inlet tube length
- 1008 mbar station pressure
- 67.1 deg F ambient temp analyzer corrects to 20 deg C
- 30 percent RH

0.0996 ppm					4.998 ppm				
Cylinder	SV17680	start P =	650	psi	Cylinder	SV17805	start P =	650	psi
		end P =	650	psi			end P =	650	psi
B&K					B&K				
Calibration readings: (ppm)					Calibration readings: (ppm)				
0.0960	Compensating for water vapor				4.89	Compensating for water vapor			
0.0951					4.90				
0.1010					4.89				
0.0972					4.90				
0.0960					4.90				
0.0996	Not compensating for water vapor				4.90	Not compensating for water vapor			
0.0999					4.89				
0.0993					4.88				
0.0982					4.88				
0.0998					4.88				
0.0982 = avg					**4.891** = avg				

Pre-Test Room background, ppb
Not compensating for water vapor, monitoring task 2
27.7, 27.4, 29.7, 26.8, 30.9
Compensating for water vapor, monitoring task 1
10.6, 7.32, 11.0, 8.42, 10.7

Standards Used:	Expiration date:
Matheson SV17680	6/19/2010
Matheson SV17805	6/19/2010

Entries made by: Julia Flaherty 11/2/2009	Technical Data Review performed by: Ernest Antonio
Signature/date On file with original	Signature/date Signature on File 30 July 2010 TI-RPP-WTP_690

Sulfur hexafluoride Gas Calibration performed on B&K on 11/9/2009 **by** JEF XYY

B&K Model 1302: Serial No. 1765299 Property No. WD17210

Setup:
- 7.5 ft B&K sample inlet tube length
- 994 mbar station pressure
- 66.2 deg F ambient temp analyzer corrects to 20 deg C
- 30 percent RH

0.0996 ppm				4.998 ppm			
Cylinder	SV17680	start P =	625 psi	Cylinder	SV17805	start P =	500 psi
		end P =	600 psi			end P =	500 psi
B&K				B&K			
Calibration readings: (ppm)				Calibration readings: (ppm)			
0.0959	Compensating for water vapor			4.92	Compensating for water vapor		
0.1000				4.93			
0.0994				4.93			
0.0983				4.93			
0.1020				4.94			
0.0989	Not compensating for water vapor			4.93	Not compensating for water vapor		
0.0986				4.91			
0.0963				4.92			
0.0995				4.91			
0.1010				4.90			
0.0990 = avg				**4.92** = avg			

Pre-Test Room background, ppb

Not compensating for water vapor, monitoring task 2

24.1, 26.5, 25.4, 26.7, 22.8

Compensating for water vapor, monitoring task 1

6.11, 4.60, 9.02, 6.72, 3.41

Standards Used:	Expiration date:
Matheson SV17680	6/19/2010
Matheson SV17605	6/19/2010

Entries made by:	Julia Flaherty	11/9/2009	Technical Data Review performed by:	Ernest Antonio
Signature/date	On File with original		Signature/date	Signature on File 30 July 2010 TI-RPP-WTP_690

Sulfur hexafluoride Gas Calibration performed on B&K on 11/12/2009 **by** JAG

B&K Model 1302: Serial No. 1765299 Property No. WD17210

Setup:
- 7.5 ft B&K sample inlet tube length
- 1001 mbar station pressure
- 65 deg F ambient temp analyzer corrects to 20 deg C
- 34 percent RH

0.0996 ppm					4.998 ppm				
Cylinder	SV17680	start P =	600	psi	Cylinder	SV17805	start P =	500	psi
		end P =	550	psi			end P =	450	psi
B&K					B&K				
Calibration readings: (ppm)					Calibration readings: (ppm)				
0.0967	Compensating for water vapor				4.89	Compensating for water vapor			
0.0944					4.88				
0.0945					4.87				
0.0954					4.86				
0.0960					4.88				
0.0939	Not compensating for water vapor				4.86	Not compensating for water vapor			
0.0943					4.85				
0.0941					4.85				
0.0954					4.85				
0.0962					4.85				
0.0951 = avg					**4.86** = avg				

Pre-Test Room background, ppb

Not compensating for water vapor, monitoring task 2

23, 28, 29, 25, 28

Compensating for water vapor, monitoring task 1

9, 4, 9, 5, 6

Standards Used:	Expiration date:
Matheson SV17680	6/19/2010
Matheson SV17805	6/19/2010
Fisher weather station SN 90936818	9/29/2010

Entries made by:	John Glissmeyer	11/12/2009	Technical Data Review performed by:	Ernest Antonio
Signature/date	On File with original		Signature/date	Signature on File 30 July 2010 TI-RPP-WTP_690

Appendix B.5: LV-S1 Tracer Particle Uniformity Data Sheets

Rev. 0
3 Aug. 2006

PARTICLE TRACER TRAVERSE DATA FORM

Site	**LV-S1 Model**	Run No.	**PT-1**
Date	1/7/2010	Fan configuration	**B fully open, Damper A and Butterfly shut**
Tester	MSP, JEF	Fan Setting	**60 Hz**
Stack Dia.	11.813 in.	Stack Temp	58 deg F
Stack X-Area	109.6 in.2	Start/End Time	1410/1625
Test Port	1	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	209.625 inches	Points in Center 2/3	2 to: 7
Measurement units	particles/ft3	Injection Point	**B Centerline**
Order ----->	2		1

		Side				Top			
Traverse-->									
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	particles/ft3				particles/ft3			
1	0.50	1059	972	881	970.7	1091	1138	1213	1147.3
2	1.24	1042	975	933	983.3	1150	1148	1151	1149.7
3	2.29	1085	995	1141	1073.7	1251	1157	1133	1180.3
4	3.82	1343	1064	1540	1315.7	1300	1210	1177	1229.0
Center	5.91	997	967	1453	1139.0	1288	1234	1259	1260.3
5	8.00	980	1335	955	1090.0	1268	1232	1214	1238.0
6	9.52	1056	981	971	1002.7	1208	1193	1230	1210.3
7	10.57	1229	1021	901	1050.3	1121	1108	1147	1125.3
8	11.31	1171	869	775	938.3	1003	1030	992	1008.3
Averages ---------->		1106.9	1019.9	1061.1	1062.6	1186.7	1161.1	1168.4	1172.1

All	pt/ft3	Dev. from mean
Mean	1117.4	
Min Point	938.3	-16.0%
Max Point	1315.7	17.7%

Center 2/3	Side	Top	All	Normlzd
Mean	1093.5	1199.0	1146.3	1204.51
Std. Dev.	111.1	49.2	99.1	90.15
COV as %	10.2	4.1	**8.6**	**7.48**

Avg Conc 1107 pt/ft3

	Start	Finish	
Generator Inlet Press	9	9	psig
Stack Temp	58	58	F
Centerline vel.	3040	2790	fpm
Ambient pressure	29.85	29.85	inHg
Ambient humidity	28%	28%	RH
Ambient temp	52	53.6	F
Back-Gd aerosol	3,2,2,2	3,5,6,8	pt/ft3
No. Bk-Gd samples	4	4	
Compressor output	100	110	psig

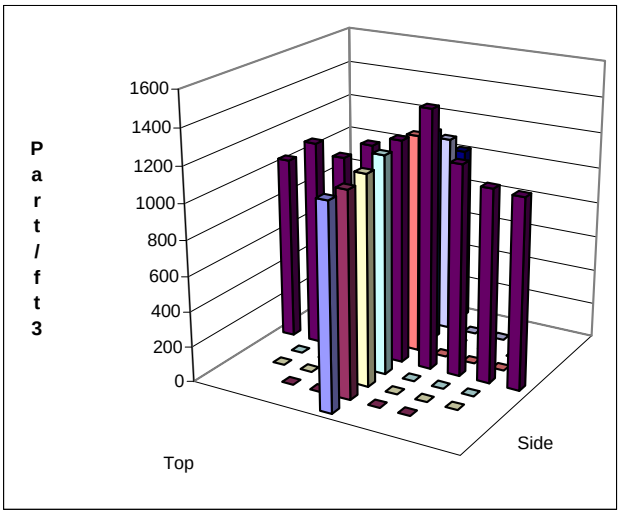
Instuments Used:

		Cal. Due
TSI Velocicalc	SN305039	7/14/2010
Met One A2408	96258675	4/16/2010
Fisher Scientific	61876141	4/9/2010

Notes: At side, #5 the counts dropped to ~ 600 particles and remained at that level. We added 1 L of oil, and restarted the traverse.

Oil Used: Edwards 19

JEF 1/8/10



Entries made by:	Julia Flaherty	1/7/2010	Technical Data Review performed by: Ernest Antonio
Signature/date	On File with original		Signature/date Signature on File 30 July 2010 TI-RPP-WTP_691

Rev. 0

3 Aug. 2006

PARTICLE TRACER TRAVERSE DATA FORM

Site	**LV-S1 Model**	Run No.	**PT-2**
Date	12/30/2009	Fan configuration	**B only, Damper A and butterfly shut**
Tester	DMT, MSP	Fan Setting	**60** **Hz**
Stack Dia.	11.844 in.	Stack Temp	56 deg F
Stack X-Area	110.2 in.2	Start/End Time	1355/1542
Test Port	2	Center 2/3 from	1.09 to: 10.76
Distance to disturbance	149.25 inches	Points in Center 2/3	2 to: 7
Measurement units	particles/ft3	Injection Point	**B Centerline**
Order ----->	1		2

		Side				Top			
Traverse-->									
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	particles/ft3				particles/ft3			
1	0.50	2064	1924	2375	2121.0	1540	1133	851	1174.7
2	1.24	2301	2349	2489	2379.7	1661	1144	998	1267.7
3	2.29	2658	2370	2495	2507.7	1714	1192	1011	1305.7
4	3.82	2639	2237	2637	2504.3	1753	1209	975	1312.3
Center	5.91	2524	2290	2508	2440.7	1734	1130	1035	1299.7
5	8.00	2632	2505	2096	2411.0	1726	1206	1016	1316.0
6	9.52	2654	2364	2032	2350.0	1667	1271	1026	1321.3
7	10.57	2724	2404	1937	2355.0	1684	1215	1020	1306.3
8	11.31	1837	2006	1873	1905.3	1323	886	825	1011.3
Averages ---------->		2448.1	2272.1	2271.3	2330.5	1644.7	1154.0	973.0	1257.2

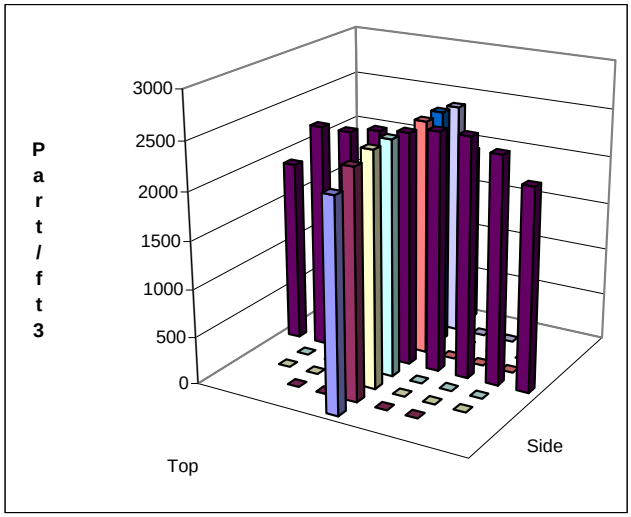
All	pt/ft3	Dev. from mean
Mean	1793.9	
Min Point	1011.3	-43.6%
Max Point	2507.7	39.8%

Center 2/3	Side	Top	All	Normlzd
Mean	2421.2	1304.1	1862.7	2435.13
Std. Dev.	65.9	17.6	581.5	52.13
COV as %	2.7	1.4	**31.2**	**2.14**

Avg Conc 1784 pt/ft3

	Start	Finish	
Generator Inlet Press	9	9	psig
Stack Temp	59	53	F
Centerline vel.	3170	3050	fpm
Ambient pressure	1004	1008	inHg
Ambient humidity	35%	36%	RH
Ambient temp	52.7	53.6	F
Back-Gd aerosol	1,0,3,1	2,3,2,0	pt/ft3
No. Bk-Gd samples	4	4	
Compressor output	110	95	psig

Instuments Used:		Cal. Due
TSI Velocicalc	SN305039	6/23/2010
Met One A2408	96258674	3/24/2010
Fisher Scientific	90936818	9/29/2010



Notes: Heater A & B are on, run 1 hour before test start.

DMT 12/30/09

Oil Used: Edwards 19

XYY 6/30/10

Entries made by:	Donna Trott	12/30/2009
Signature/date	On file with original	

Technical Data Review performed by:	Ernest Antonio
Signature/date	Signature on File 30 July 2010
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Rev. 0

3 Aug. 2006

PARTICLE TRACER TRAVERSE DATA FORM

Site	**LV-S1 Model**	Run No.	**PT-3**
Date	12/31/2009	Fan configuration	**B only, Damper A and butterfly shut**
Tester	DMT, MSP	Fan Setting	**60 Hz**
Stack Dia.	11.844 in.	Stack Temp	56.95 deg F
Stack X-Area	110.2 in.2	Start/End Time	1205/1340
Test Port	2	Center 2/3 from	1.09 to: 10.76
Distance to disturbance	149.25 inches	Points in Center 2/3	2 to: 7
Measurement units	particles/ft3	Injection Point	**B Centerline**
Order ----->	2		1

		Side				Top			
Traverse-->									
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	particles/ft3				particles/ft3			
1	0.50	1005	1115	1156	1092.0	817	844	996	885.7
2	1.24	990	1237	1233	1153.3	859	971	937	922.3
3	2.29	1109	1208	1210	1175.7	868	984	895	915.7
4	3.82	1122	1174	1270	1188.7	912	981	928	940.3
Center	5.91	1037	1318	1171	1175.3	905	942	995	947.3
5	8.00	1122	1230	1270	1207.3	883	965	935	927.7
6	9.52	1104	1282	1288	1224.7	939	956	914	936.3
7	10.57	1072	1302	1299	1224.3	868	928	921	905.7
8	11.31	1066	1245	1206	1172.3	757	837	765	786.3
Averages ---------->		1069.7	1234.6	1233.7	1179.3	867.6	934.2	920.7	907.5

All	pt/ft3	Dev. from mean
Mean	1043.4	
Min Point	786.3	-24.6%
Max Point	1224.7	17.4%

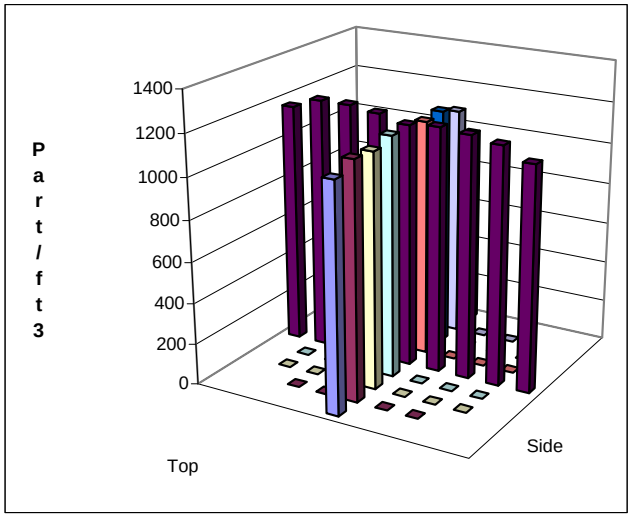
Center 2/3	Side	Top	All	Normlzd
Mean	1192.8	927.9	1060.3	1172.00
Std. Dev.	27.1	14.6	139.0	30.88
COV as %	2.3	1.6	**13.1**	**2.64**

Avg Conc 1041 pt/ft3

	Start	Finish	
Generator Inlet Press	10	10	psig
Stack Temp	53.9	60	F
Centerline vel.	3070	3050	fpm
Ambient pressure	29.47	29.47	inHg
Ambient humidity	43%	40%	RH
Ambient temp	51.3	51.8	F
Back-Gd aerosol	4,1,3,2	8,5,2,8	pt/ft3
No. Bk-Gd samples	4	4	
Compressor output	115	110	psig

Instuments Used:

		Cal. Due
TSI Velocicalc	SN305039	6/23/2010
Met One A2408	96258674	3/24/2010
Fisher Scientific	61876141	4/9/2010



Notes: Running both heaters on blowers, warm up for approx. one hour.

DMT 12/31/09

Oil Used: Edwards 19 XYY 7/28/10

XYY 7/28/10

Entries made by:	Donna Trott	12/31/2009	Technical Data Review performed by: Ernest Antonio
Signature/date	On file with original		Signature/date Signature on File 30 July 2010
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Rev. 0

3 Aug. 2006

PARTICLE TRACER TRAVERSE DATA FORM

Site	**LV-S1 Model**	Run No.	**PT-4**
Date	1/6/2010	Fan configuration	**B only, Damper A and butterfly shut**
Tester	DMT, MSP	Fan Setting	**60 Hz**
Stack Dia.	11.844 in.	Stack Temp	63.9 deg F
Stack X-Area	110.2 in.2	Start/End Time	1040/1215
Test Port	2	Center 2/3 from	1.09 to: 10.76
Distance to disturbance	149.25 inches	Points in Center 2/3	2 to: 7
Measurement units	particles/ft3	Injection Point	**B Centerline**
Order ----->	1		2

		Side				Top			
Traverse-->									
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	particles/ft3				particles/ft3			
1	0.50	1600	1259	878	1245.7	686	469	501	552.0
2	1.24	1571	1207	784	1187.3	658	483	513	551.3
3	2.29	1560	1233	910	1234.3	556	527	518	533.7
4	3.82	1349	1213	975	1179.0	530	486	522	512.7
Center	5.91	1286	1178	832	1098.7	553	540	488	527.0
5	8.00	1333	1219	920	1157.3	556	496	487	513.0
6	9.52	1256	1188	807	1083.7	577	551	518	548.7
7	10.57	1280	1099	845	1074.7	545	514	521	526.7
8	11.31	1137	990	743	956.7	478	461	429	456.0
Averages ---------->		1374.7	1176.2	854.9	1135.3	571.0	503.0	499.7	524.6

All	pt/ft3	Dev. from mean
Mean	829.9	
Min Point	456.0	-45.1%
Max Point	1245.7	50.1%

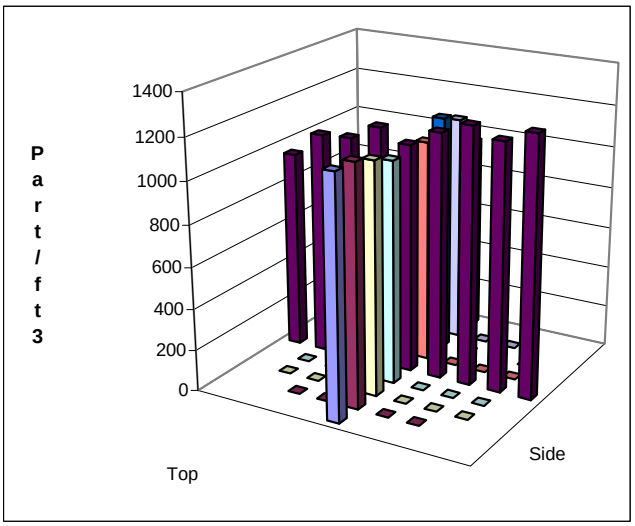
Center 2/3	Side	Top	All	Normlzd
Mean	1145.0	530.4	837.7	1125.41
Std. Dev.	60.5	15.4	321.7	50.77
COV as %	5.3	2.9	**38.4**	**4.51**

Avg Conc 832 pt/ft3

	Start	Finish	
Generator Inlet Press	8	8	psig
Stack Temp	62.7	65.1	F
Centerline vel.	3080	3470	fpm
Ambient pressure	29.91	29.91	inHg
Ambient humidity	37%	35%	RH
Ambient temp	53.6	56.3	F
Back-Gd aerosol	4,0,2,4	7,5,4,9	pt/ft3
No. Bk-Gd samples	4	4	
Compressor output	100	125	psig

Instuments Used:

		Cal. Due
TSI Velocicalc	SN305039	6/23/2010
Met One A2408	96258674	3/24/2010
Fisher Scientific	61876141	4/9/2010



Notes:

DMT 1/6/10

Oil Used: Edwards

DMT 1/8/10

Entries made by:	Donna Trott	1/6/2010	Technical Data Review performed by:	Ernest Antonio	
Signature/date	On File with original		Signature/date	Signature on File 30 July 2010	
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Rev. 0
3 Aug. 2006

PARTICLE TRACER TRAVERSE DATA FORM

Site	**LV-S1 Model**	Run No.	**PT-5**
Date	1/8/2010	Fan configuration	**B only, Damper A and Butterfly shut**
Tester	DMT, JEF	Fan Setting	**60** **Hz**
Stack Dia.	11.813 in.	Stack Temp	61 deg F
Stack X-Area	109.6 in.2	Start/End Time	1330/1525
Test Port	3	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	88.875 inches	Points in Center 2/3	2 to: 7
Measurement units	particles/ft3	Injection Point	**B Centerline**
Order ----->	1		2

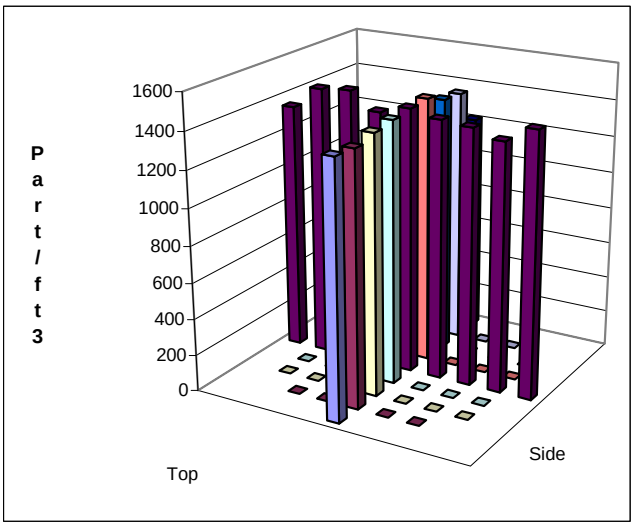
		Side				Top			
Traverse-->									
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	particles/ft3				particles/ft3			
1	0.50	1402	1566	1135	1367.7	1500	1381	1284	1388.3
2	1.24	1451	1197	1209	1285.7	1407	1396	1337	1380.0
3	2.29	1449	1243	1289	1327.0	1455	1372	1410	1412.3
4	3.82	1492	1238	1295	1341.7	1492	1403	1400	1431.7
Center	5.91	1520	1255	1344	1373.0	1516	1454	1374	1448.0
5	8.00	1419	1306	1268	1331.0	1459	1494	1417	1456.7
6	9.52	1546	1307	1395	1416.0	1451	1366	1409	1408.7
7	10.57	1596	1322	1287	1401.7	1444	1392	1359	1398.3
8	11.31	1406	1258	1193	1285.7	1244	1197	1189	1210.0
Averages ---------->		1475.7	1299.1	1268.3	1347.7	1440.9	1383.9	1353.2	1392.7

All	pt/ft3	Dev. from mean	***Center 2/3***	Side	Top	All	Normlzd
Mean	1370.2		Mean	1353.7	1419.4	1386.5	1423.52
Min Point	1210.0	-11.7%	Std. Dev.	45.7	27.4	49.7	37.95
Max Point	1456.7	6.3%	COV as %	3.4	1.9	**3.6**	**2.67**

Avg Conc 1365 pt/ft3

	Start	Finish	
Generator Inlet Press	9.4	9.4	psig
Stack Temp	61	61	F
Centerline vel.	2930	3000	fpm
Ambient pressure	29.71	29.71	inHg
Ambient humidity	25%	26%	RH
Ambient temp	62.6	60.8	F
Back-Gd aerosol	2,3,4,1	3,6,5,6	pt/ft3
No. Bk-Gd samples	4	4	
Compressor output	110	110	psig

Instuments Used:		Cal. Due
TSI Velocicalc	SN305039	7/14/2010
Met One A2408	96258674	3/24/2010
Fisher Scientific	61876141	4/9/2010



Notes: Ran MetOne SN96258675 @ Port 1 Centerline.

JEF 1/8/10

Oil Used: Edwards 19

JEF 1/8/10

Entries made by:	Julia Flaherty	1/8/2010	Technical Data Review performed by:	Ernest Antonio
Signature/date	On File with original		Signature/date	Signature on File 30 July 2010
				TI-RPP-WTP_691

Rev. 0

3 Aug. 2006

PARTICLE TRACER TRAVERSE DATA FORM

Site	**LV-S1 Model**	Run No.	**PT-6**
Date	1/11/2010	Fan configuration	**B only, Damper A and Butterfly shut**
Tester	DMT, JEF	Fan Setting	**37.5** **Hz**
Stack Dia.	11.813 in.	Stack Temp	55.75 deg F
Stack X-Area	109.6 in.2	Start/End Time	1135/1315
Test Port	3	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	88.875 inches	Points in Center 2/3	2 to: 7
Measurement units	particles/ft3	Injection Point	**B Centerline**
Order ----->	2		1

		Side				Top			
Traverse-->									
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	particles/ft3				particles/ft3			
1	0.50	2075	3936	2111	2707.3	3679	3542	3829	3683.3
2	1.24	2617	2240	2128	2328.3	3631	3705	3682	3672.7
3	2.29	2105	2287	2283	2225.0	3535	3872	3796	3734.3
4	3.82	2291	2261	2176	2242.7	3623	3827	3843	3764.3
Center	5.91	2154	2195	2031	2126.7	3528	3735	4040	3767.7
5	8.00	2166	2158	2118	2147.3	3774	3960	3704	3812.7
6	9.52	2143	2285	2481	2303.0	3601	3795	3823	3739.7
7	10.57	2390	2171	2309	2290.0	3486	3806	3686	3659.3
8	11.31	2098	2100	2193	2130.3	3091	3496	3552	3379.7
Averages ---------->		2226.6	2403.7	2203.3	2277.9	3549.8	3748.7	3772.8	3690.4

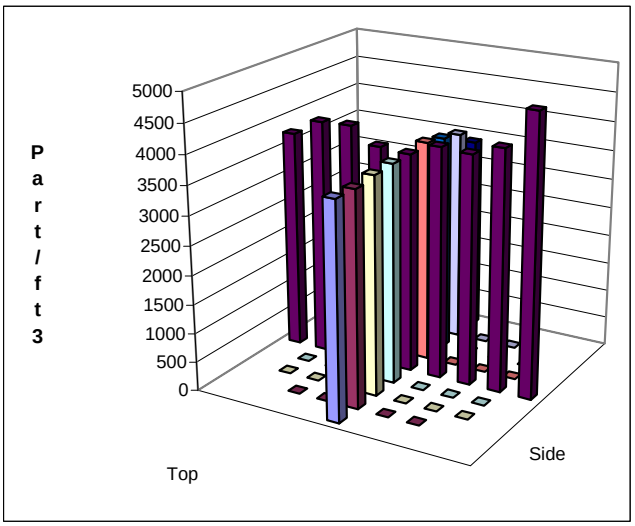
All	pt/ft3	Dev. from mean	***Center 2/3***	Side	Top	All	Normlzd
Mean	2984.1		Mean	2237.6	3735.8	2986.7	3849.98
Min Point	2126.7	-28.7%	Std. Dev.	77.3	54.1	780.0	155.10
Max Point	3812.7	27.8%	COV as %	3.5	1.4	**26.1**	**4.03**

Avg Conc 2989 pt/ft3

	Start	Finish	
Generator Inlet Press	7.5	7.5	psig
Stack Temp	58	53.5	F
Centerline vel.	1880	1840	fpm
Ambient pressure	29.77	29.74	inHg
Ambient humidity	36%	33%	RH
Ambient temp	64.4	69.8	F
Back-Gd aerosol	1,0,2,0	0,1,0,1	pt/ft3
No. Bk-Gd samples	4	4	
Compressor output	115	120	psig

Instuments Used: Cal. Due

TSI Velocicalc	SN305039	7/14/2010
Met One A2408	96258674	3/24/2010
Fisher Scientific	90936818	9/29/2010



Notes: Ran MetOne SN96258675 @ Port 1 Centerline.
C shaped probe, same Ø as Port 3 probe.

Oil Used: Edwards 19

XYY 7/28/10

Entries made by:	Julia Flaherty	1/11/2010	Technical Data Review performed by:	Ernest Antonio	
Signature/date	On File with original		Signature/date	Signature on File 30 July 2010	
				TI-RPP-WTP_691	

Rev. 0

3 Aug. 2006

PARTICLE TRACER TRAVERSE DATA FORM

Site	**LV-S1 Model**	Run No.	**PT-7**
Date	1/13/2010	Fan configuration	**B only, Damper A and Butterfly shut**
Tester	DMT, JEF	Fan Setting	**37.5** **Hz**
Stack Dia.	11.813 in.	Stack Temp	61.5 deg F
Stack X-Area	109.6 in.2	Start/End Time	1200/1325
Test Port	3	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	88.875 inches	Points in Center 2/3	2 to: 7
Measurement units	particles/ft3	Injection Point	**B Centerline**
Order ----->	2		1

		Side				Top			
Traverse-->									
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	particles/ft3				particles/ft3			
1	0.50	2351	2999	3685	3011.7	2664	2382	2595	2547.0
2	1.24	2358	3269	3449	3025.3	2532	2338	2668	2512.7
3	2.29	2775	3241	3305	3107.0	2636	2641	2539	2605.3
4	3.82	2887	3098	2980	2988.3	2566	2593	2663	2607.3
Center	5.91	2692	2914	3067	2891.0	2718	2709	2870	2765.7
5	8.00	2665	2917	2806	2796.0	2837	2701	2839	2792.3
6	9.52	2596	2671	3046	2771.0	2854	2854	2987	2898.3
7	10.57	2512	2679	2881	2690.7	2927	2756	2967	2883.3
8	11.31	2672	2687	2875	2744.7	2457	2720	2708	2628.3
Averages ---------->		2612.0	2941.7	3121.6	2891.7	2687.9	2632.7	2759.6	2693.4

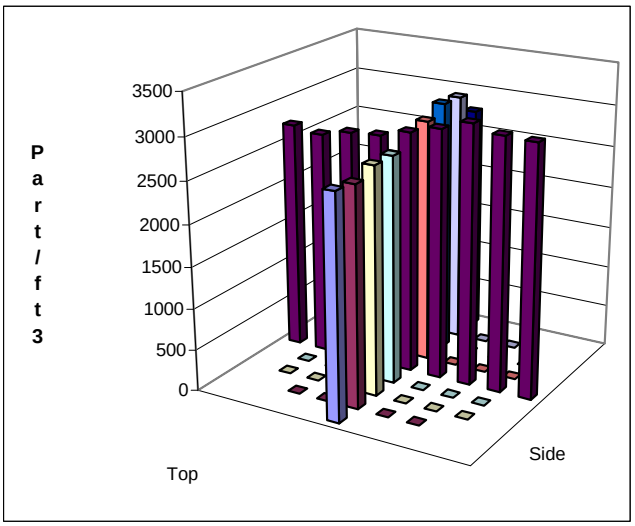
All	pt/ft3	Dev. from mean	***Center 2/3***	Side	Top	All	Normlzd
Mean	2792.6		Mean	2895.6	2723.6	2809.6	2871.31
Min Point	2512.7	-10.0%	Std. Dev.	151.4	149.7	170.0	150.09
Max Point	3107.0	11.3%	COV as %	5.2	5.5	**6.1**	**5.23**

Avg Conc 2788 pt/ft3

	Start	Finish	
Generator Inlet Press	5.5	5.5	psig
Stack Temp	58	65	F
Centerline vel.	1790	1810	fpm
Ambient pressure	29.5	29.5	inHg
Ambient humidity	47%	40%	RH
Ambient temp	62	69	F
Back-Gd aerosol	1,0,0,0	0,0,0,0	pt/ft3
No. Bk-Gd samples	4	4	
Compressor output	100	100	psig

Instuments Used:

		Cal. Due
TSI Velocicalc	SN305039	7/14/2010
Met One A2408	96258674	3/24/2010
Fisher Scientific	90936818	9/29/2010



Notes: Ran MetOne SN96258675 @ Port 1 Centerline. C shaped probe, same Ø as Port 3 probe. Switched to #3 nozzle in aerosol generator #2.

Oil Used: Edwards 19

JEF 1/13/10

Entries made by:	Julia Flaherty	1/13/2010	Technical Data Review performed by:	Ernest Antonio	
Signature/date	On File with original		Signature/date	Signature on File 30 July 2010	
				TI-RPP-WTP_691	

Rev. 0

3 Aug. 2006

PARTICLE TRACER TRAVERSE DATA FORM

Site	**LV-S1 Model**	Run No.	**PT-8**
Date	1/13/2010	Fan configuration	**B only, Damper A and Butterfly shut**
Tester	DMT, JEF	Fan Setting	**37.5** **Hz**
Stack Dia.	11.813 in.	Stack Temp	62 deg F
Stack X-Area	109.6 in.2	Start/End Time	1325/1445
Test Port	3	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	88.875 inches	Points in Center 2/3	2 to: 7
Measurement units	particles/ft3	Injection Point	**B Centerline**
Order ----->	1		2

		Side				Top			
Traverse-->									
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	particles/ft3				particles/ft3			
1	0.50	3243	3708	3608	3519.7	4353	4876	4822	4683.7
2	1.24	3296	3534	3539	3456.3	4406	4985	5024	4805.0
3	2.29	3275	3534	3769	3526.0	4527	4948	4869	4781.3
4	3.82	3014	3255	3169	3146.0	4675	4788	4947	4803.3
Center	5.91	2760	3270	2787	2939.0	4608	4907	4874	4796.3
5	8.00	2911	3215	2760	2962.0	4657	4688	4743	4696.0
6	9.52	2950	2946	3030	2975.3	4567	4844	4716	4709.0
7	10.57	3017	2941	3138	3032.0	4779	4734	4686	4733.0
8	11.31	2945	3070	3124	3046.3	4463	4615	4344	4474.0
Averages ---------->		3045.7	3274.8	3213.8	3178.1	4559.4	4820.6	4780.6	4720.2

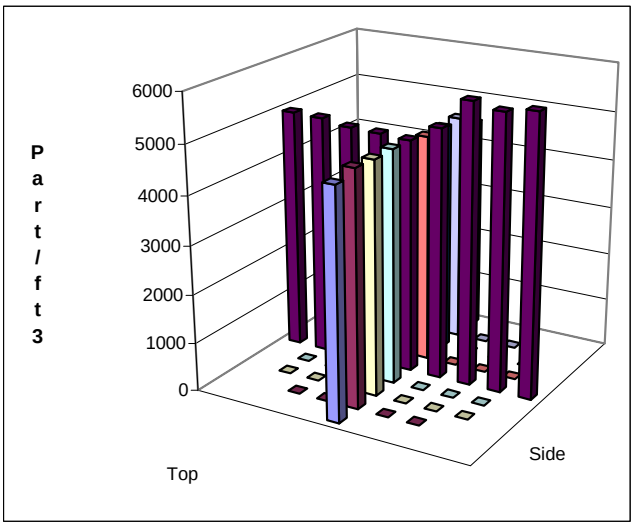
All	pt/ft3	Dev. from mean	***Center 2/3***	Side	Top	All	Normlzd
Mean	3949.1		Mean	3148.1	4760.6	3954.3	4949.07
Min Point	2939.0	-25.6%	Std. Dev.	244.8	46.7	853.6	336.04
Max Point	4805.0	21.7%	COV as %	7.8	1.0	**21.6**	**6.79**

Avg Conc 3959 pt/ft3

	Start	Finish	
Generator Inlet Press	5.5	5.5	psig
Stack Temp	65	59	F
Centerline vel.	1810	1910	fpm
Ambient pressure	29.5	29.5	inHg
Ambient humidity	40%	37%	RH
Ambient temp	69	73	F
Back-Gd aerosol	0,0,0,0	0,0,0,0	pt/ft3
No. Bk-Gd samples	4	4	
Compressor output	100	110	psig

Instuments Used:

		Cal. Due
TSI Velocicalc	SN305039	7/14/2010
Met One A2408	96258674	3/24/2010
Fisher Scientific	90936818	9/29/2010



Notes: Ran MetOne SN96258675 @ Port 1 Centerline.
C shaped probe, same Ø as Port 3 probe.

Oil Used: Edwards 19

JEF 1/13/10

Entries made by:	Julia Flaherty	1/13/2010	Technical Data Review performed by:	Ernest Antonio	
Signature/date	On File with original		Signature/date	Signature on File	30 July 2010
				TI-RPP-WTP_691	

Rev. 0
3 Aug. 2006

PARTICLE TRACER TRAVERSE DATA FORM

Site	**LV-S1 Model**	Run No.	**PT-9**
Date	1/18/2010	Fan configuration	**B only**
Tester	JAG, JEF	Fan Setting	**37.5** **Hz**
Stack Dia.	11.844 in.	Stack Temp	59.5 deg F
Stack X-Area	110.2 in.2	Start/End Time	13:15 / 15:10
Test Port	2	Center 2/3 from	1.09 to: 10.76
Distance to disturbance	149.25 inches	Points in Center 2/3	2 to: 7
Measurement units	particles/ft3	Injection Point	**B Centerline**
Order ----->	2		1

		Side				Top			
Traverse-->									
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	particles/ft3				particles/ft3			
1	0.50	1844	1689	1493	1675.3	2490	3038	2844	2790.7
2	1.24	1921	1710	1575	1735.3	2581	3185	2935	2900.3
3	2.29	1879	1718	1554	1717.0	2862	3139	2768	2923.0
4	3.82	1837	1714	1567	1706.0	2720	2955	2692	2789.0
Center	5.91	1941	1738	1585	1754.7	2593	2836	2696	2708.3
5	8.00	1975	1727	1570	1757.3	2855	2713	2731	2766.3
6	9.52	1966	1709	1500	1725.0	2816	2703	2663	2727.3
7	10.57	1972	1634	1533	1713.0	3028	2705	2477	2736.7
8	11.31	1915	1655	1475	1681.7	2589	2514	2431	2511.3
Averages ---------->		1916.7	1699.3	1539.1	1718.4	2726.0	2865.3	2693.0	2761.4

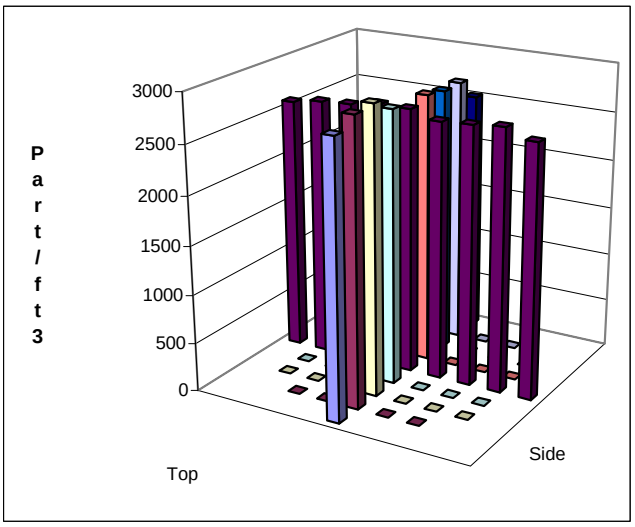
All	pt/ft3	Dev. from mean	***Center 2/3***	Side	Top	All	Normlzd
Mean	2239.9		Mean	1729.8	2793.0	2261.4	2731.45
Min Point	1675.3	-25.2%	Std. Dev.	20.2	85.4	554.9	88.87
Max Point	2923.0	30.5%	COV as %	1.2	3.1	**24.5**	**3.25**

Avg Conc 2241 pt/ft3

	Start	Finish	
Generator Inlet Press	3	3	psig
Stack Temp	65	54	F
Centerline vel.	1600	1760	fpm
Ambient pressure	29.21	29.23	inHg
Ambient humidity	47%	43%	RH
Ambient temp	63	67	F
Back-Gd aerosol	0, 4, 3, 1	3, 0, 0, 1	pt/ft3
No. Bk-Gd samples	4	4	
Compressor output	110	110	psig

Instuments Used:

		Cal. Due
TSI Velocicalc	SN305039	7/14/2010
Met One A2408	96258674	3/24/2010
Fisher Scientific	90936818	9/29/2010



Notes: Reference OPC SN=96258675 in Port 1, Side, Center.

JEF 1/18/10

Oil Used: Edwards 19

JEF 1/18/10

Entries made by:	Julia Flaherty	1/18/2010	Technical Data Review performed by:	Ernest Antonio	
Signature/date	*On File with original*		Signature/date	Signature on File 30 July 2010	
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Rev. 0
3 Aug. 2006

PARTICLE TRACER TRAVERSE DATA FORM

Site	**LV-S1 Model**	Run No.	**PT-10**
Date	1/19/2010	Fan configuration	**B Only, Damper A and Butterfly Shut**
Tester	DMT, JEF	Fan Setting	**60** **Hz**
Stack Dia.	11.844 in.	Stack Temp	65 deg F
Stack X-Area	110.2 in.2	Start/End Time	13:05 / 14:48
Test Port	2	Center 2/3 from	1.09 to: 10.76
Distance to disturbance	149.25 inches	Points in Center 2/3	2 to: 7
Measurement units	particles/ft3	Injection Point	**B Centerline**
Order ----->	1st		2nd

		Side				Top			
Traverse-->									
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	particles/ft3				particles/ft3			
1	0.50	1561	1320	836	1239.0	1198	945	623	922.0
2	1.24	1592	1261	888	1247.0	1253	889	600	914.0
3	2.29	1552	1391	937	1293.3	1322	690	594	868.7
4	3.82	1402	1314	911	1209.0	1235	652	597	828.0
Center	5.91	1243	1346	915	1168.0	1119	645	573	779.0
5	8.00	1292	1374	773	1146.3	1117	642	557	772.0
6	9.52	1260	1111	743	1038.0	1016	634	542	730.7
7	10.57	1319	1011	774	1034.7	983	575	539	699.0
8	11.31	1282	794	775	950.3	833	511	454	599.3
Averages ---------->		1389.2	1213.6	839.1	1147.3	1119.6	687.0	564.3	790.3

All	pt/ft3	Dev. from mean
Mean	968.8	
Min Point	599.3	-38.1%
Max Point	1293.3	33.5%

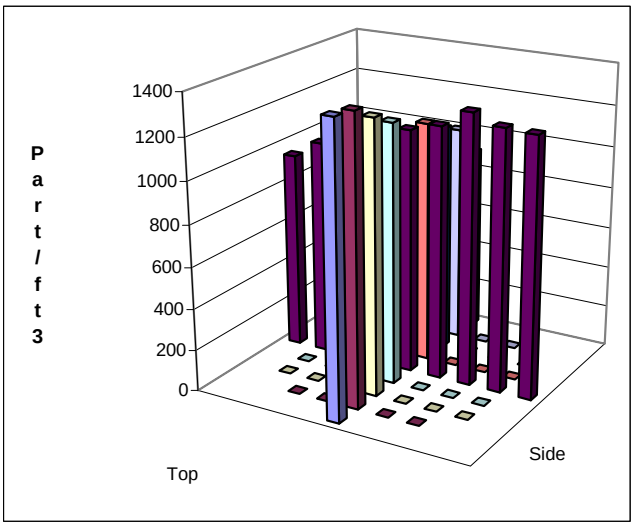
Center 2/3	Side	Top	All	Normlzd
Mean	1162.3	798.8	980.5	1179.98
Std. Dev.	98.8	76.1	206.8	104.13
COV as %	8.5	9.5	**21.1**	**8.82**

Avg Conc 968 pt/ft3

	Start	Finish	
Generator Inlet Press	5.0	5.0	psig
Stack Temp	65	65	F
Centerline vel.	2900	3100	fpm
Ambient pressure	29.0	29.03	inHg
Ambient humidity	37%	36%	RH
Ambient temp	64	69	F
Back-Gd aerosol	1, 0, 1, 0	1, 0, 0, 0	pt/ft3
No. Bk-Gd samples	4	4	
Compressor output	110	110	psig

Instuments Used:

		Cal. Due
TSI Velocicalc	SN305039	7/14/2010
Met One A2408	96258674	3/24/2010
Fisher Scientific	90936818	9/29/2010



Notes: MetOne SN 96258675 used at Port 1, Side, centerline, as reference

JEF 1/19/10

Oil Used: Edwards 19

JEF 1/19/10

Entries made by:	Julia Flaherty	1/19/2010	Technical Data Review performed by:	Ernest Antonio	
Signature/date	*On File with original*		Signature/date	Signature on File 30 July 2010	
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Rev. 0
3 Aug. 2006

PARTICLE TRACER TRAVERSE DATA FORM

Site	**LV-S1 Model**	Run No.	**PT-11**
Date	1/19/2010	Fan configuration	**B Only, Damper A and Butterfly Shut**
Tester	DMT, JEF	Fan Setting	**60 Hz**
Stack Dia.	11.844 in.	Stack Temp	65.5 deg F
Stack X-Area	110.2 in.2	Start/End Time	14:48 / 16:10
Test Port	2	Center 2/3 from	1.09 to: 10.76
Distance to disturbance	149.25 inches	Points in Center 2/3	2 to: 7
Measurement units	particles/ft3	Injection Point	**B Centerline**
Order ----->	2nd		1st

		Side				Top			
Traverse-->									
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	particles/ft3				particles/ft3			
1	0.50	1143	1181	1034	1119.3	1078	1138	1025	1080.3
2	1.24	1099	1201	1113	1137.7	1146	1189	1098	1144.3
3	2.29	1213	1155	1138	1168.7	1214	1267	1128	1203.0
4	3.82	1126	1216	1065	1135.7	1177	1202	1141	1173.3
Center	5.91	1144	1126	1002	1090.7	1147	1166	1084	1132.3
5	8.00	1179	1188	1081	1149.3	1154	1204	1096	1151.3
6	9.52	1112	1068	1017	1065.7	1098	1165	1007	1090.0
7	10.57	1051	1038	976	1021.7	1211	1133	1008	1117.3
8	11.31	908	960	822	896.7	970	1016	905	963.7
Averages ---------->		1108.3	1125.9	1027.6	1087.3	1132.8	1164.4	1054.7	1117.3

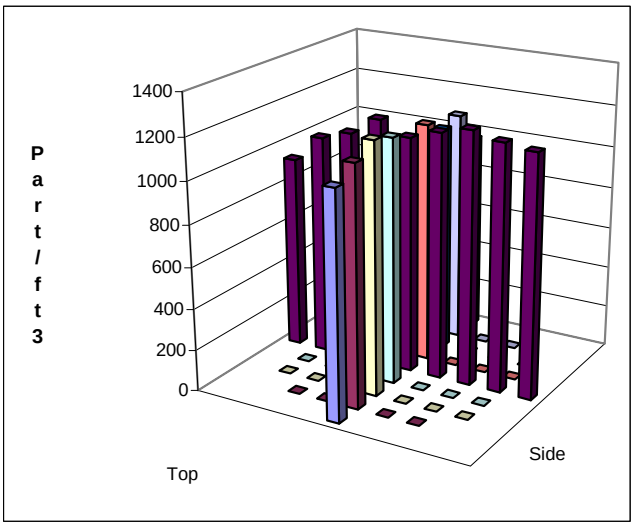
All	pt/ft3	Dev. from mean	***Center 2/3***	Side	Top	All	Normlzd
Mean	1102.3		Mean	1109.9	1144.5	1127.2	1148.42
Min Point	896.7	-18.7%	Std. Dev.	52.5	36.9	47.2	44.90
Max Point	1203.0	9.1%	COV as %	4.7	3.2	**4.2**	**3.91**

Avg Conc 1101 pt/ft3

	Start	Finish	
Generator Inlet Press	8	8	psig
Stack Temp	65	66	F
Centerline vel.	3100	2920	fpm
Ambient pressure	29.03	29.03	inHg
Ambient humidity	36%	38%	RH
Ambient temp	69	66	F
Back-Gd aerosol	1, 0, 0, 0	1, 2, 0, 1	pt/ft3
No. Bk-Gd samples	4	4	
Compressor output	110	95	psig

Instuments Used:

		Cal. Due
TSI Velocicalc	SN305039	7/14/2010
Met One A2408	96258674	3/24/2010
Fisher Scientific	90936818	9/29/2010



Notes: MetOne SN 96258675 used at Port 1, Side, centerline, as reference

JEF 1/19/10

Oil Used: Edwards 19

JEF 1/19/10

Entries made by:	Julia Flaherty	1/19/2010	Technical Data Review performed by:	Ernest Antonio	
Signature/date	*On File with original*		Signature/date	Signature on File 30 July 2010	
				TI-RPP-WTP_691	

Rev. 0
3 Aug. 2006

PARTICLE TRACER TRAVERSE DATA FORM

Site	**LV-S1 Model**	Run No.	**PT-12**
Date	1/20/2010	Fan configuration	**B Only, Damper A and Butterfly Shut**
Tester	DMT, JEF	Fan Setting	**37.5** **Hz**
Stack Dia.	11.813 in.	Stack Temp	66 deg F
Stack X-Area	109.6 in.2	Start/End Time	13:15 / 14:50
Test Port	1	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	209.625 inches	Points in Center 2/3	2 to: 7
Measurement units	particles/ft3	Injection Point	**B Centerline**
Order ----->	1st		2nd

		Side				Top			
Traverse-->									
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	particles/ft3				particles/ft3			
1	0.50	2795	3096	2203	2698.0	1614	1639	1552	1601.7
2	1.24	3019	3194	2471	2894.7	1712	1606	1588	1635.3
3	2.29	3174	3140	2536	2950.0	1759	1593	1588	1646.7
4	3.82	3064	2627	2531	2740.7	1696	1684	1623	1667.7
Center	5.91	3008	2719	2788	2838.3	1704	1620	1687	1670.3
5	8.00	3120	2720	2710	2850.0	1640	1670	1525	1611.7
6	9.52	3220	2748	2624	2864.0	1642	1627	1597	1622.0
7	10.57	3258	2802	2525	2861.7	1605	1471	1532	1536.0
8	11.31	3072	2686	2435	2731.0	1525	1456	1443	1474.7
Averages ---------->		3081.1	2859.1	2535.9	2825.4	1655.2	1596.2	1570.6	1607.3

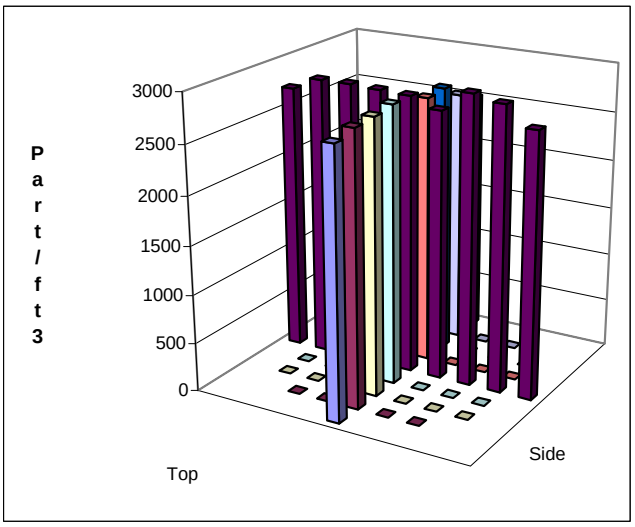
All	pt/ft3	Dev. from mean	***Center 2/3***	Side	Top	All	Normlzd
Mean	2216.4		Mean	2857.0	1627.1	2242.1	2810.95
Min Point	1474.7	-33.5%	Std. Dev.	63.3	45.7	640.4	83.20
Max Point	2950.0	33.1%	COV as %	2.2	2.8	**28.6**	**2.96**

Avg Conc 2212 pt/ft3

	Start	Finish	
Generator Inlet Press	4	4	psig
Stack Temp	66	66	F
Centerline vel.	1620	1800	fpm
Ambient pressure	28.97	28.97	inHg
Ambient humidity	40%	35%	RH
Ambient temp	64	66	F
Back-Gd aerosol	1, 3, 1, 3	1, 1, 0, 1	pt/ft3
No. Bk-Gd samples	4	4	
Compressor output	120	110	psig

Instuments Used:

		Cal. Due
TSI Velocicalc	SN305039	7/14/2010
Met One A2408	96258674	3/24/2010
Fisher Scientific	90936818	9/29/2010



Notes: MetOne SN 96258675 used at Port 3, Side, centerline, as reference

JEF 1/20/10

Oil Used: Edwards 19

JEF 1/20/10

Entries made by:	Julia Flaherty	1/20/2010	Technical Data Review performed by:	Ernest Antonio	
Signature/date	*On File with original*		Signature/date	Signature on File 30 July 2010	
				TI-RPP-WTP_691	

Rev. 0
3 Aug. 2006

PARTICLE TRACER TRAVERSE DATA FORM

Site	**LV-S1 Model**	Run No.	**PT-13**
Date	1/20/2010	Fan configuration	**A Only, Damper B and Butterfly Shut**
Tester	DMT, JEF	Fan Setting	**60** **Hz**
Stack Dia.	11.813 in.	Stack Temp	66 deg F
Stack X-Area	109.6 in.2	Start/End Time	15:00 / 16:30
Test Port	1	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	209.625 inches	Points in Center 2/3	2 to: 7
Measurement units	particles/ft3	Injection Point	**A Centerline**
Order ----->	2nd		1st

		Side				Top			
Traverse-->									
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	particles/ft3				particles/ft3			
1	0.50	2876	3525	3605	3335.3	2228	2238	2227	2231.0
2	1.24	3054	3736	3883	3557.7	2418	2409	2384	2403.7
3	2.29	3411	3722	3942	3691.7	2448	2456	2463	2455.7
4	3.82	3846	3793	3975	3871.3	2600	2494	2413	2502.3
Center	5.91	3662	3821	3880	3787.7	2412	2469	2499	2460.0
5	8.00	3630	3741	3695	3688.7	2591	2434	2579	2534.7
6	9.52	3788	3920	3991	3899.7	2404	2379	2347	2376.7
7	10.57	3609	3741	3754	3701.3	2281	2183	2266	2243.3
8	11.31	3389	3095	3284	3256.0	1911	1832	1770	1837.7
Averages ---------->		3473.9	3677.1	3778.8	3643.3	2365.9	2321.6	2327.6	2338.3

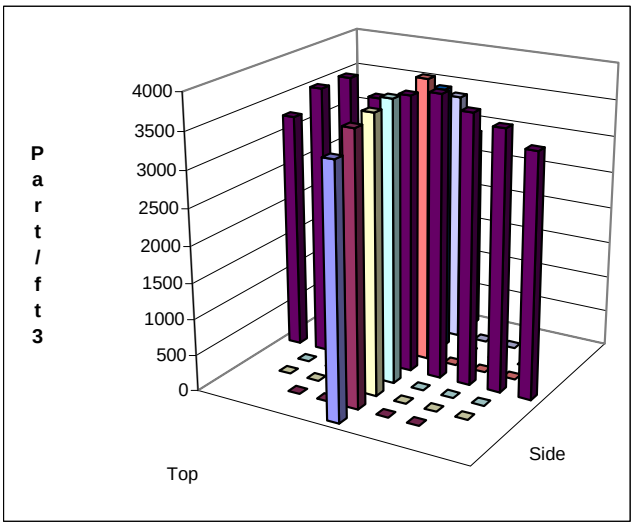
All	pt/ft3	Dev. from mean	***Center 2/3***	Side	Top	All	Normlzd
Mean	2990.8		Mean	3742.6	2425.2	3083.9	3738.32
Min Point	1837.7	-38.6%	Std. Dev.	118.8	96.6	691.4	129.38
Max Point	3899.7	30.4%	COV as %	3.2	4.0	**22.4**	**3.46**

Avg Conc 2974 pt/ft3

	Start	Finish	
Generator Inlet Press	7	7	psig
Stack Temp	67	65	F
Centerline vel.	2020	2750	fpm
Ambient pressure	28.97	28.97	inHg
Ambient humidity	37%	38%	RH
Ambient temp	64	65	F
Back-Gd aerosol	3, 4, 0, 5	2, 0, 2, 2	pt/ft3
No. Bk-Gd samples	4	4	
Compressor output	100	110	psig

Instuments Used:

		Cal. Due
TSI Velocicalc	SN305039	7/14/2010
Met One A2408	96258674	3/24/2010
Fisher Scientific	90936818	9/29/2010



Notes: MetOne SN 96258675 used at Port 3, Side, centerline, as reference

JEF 1/20/10

Oil Used: Edwards 19

JEF 1/20/10

Entries made by:	Julia Flaherty	1/20/2010	Technical Data Review performed by:	Ernest Antonio	
Signature/date	*On File with original*		Signature/date	Signature on File 30 July 2010	
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Rev. 0
3 Aug. 2006

PARTICLE TRACER TRAVERSE DATA FORM

Site	**LV-S1 Model**	Run No.	**PT-14**
Date	1/21/2010	Fan configuration	**A Only, Damper B and Butterfly Shut**
Tester	JAG, XYY	Fan Setting	**60 Hz**
Stack Dia.	11.813 in.	Stack Temp	65.35 deg F
Stack X-Area	109.6 in.2	Start/End Time	14:00 / 15:36
Test Port	1	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	209.625 inches	Points in Center 2/3	2 to: 7
Measurement units	particles/ft3	Injection Point	**A Centerline**
Order ----->	1st		2nd

Traverse-->		Side				Top			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	particles/ft3				particles/ft3			
1	0.50	2707	2888	2791	2795.3	2546	2487	2374	2469.0
2	1.24	3033	3263	2970	3088.7	2645	2641	2561	2615.7
3	2.29	3192	3455	3247	3298.0	2745	2582	2517	2614.7
4	3.82	3305	3276	3260	3280.3	2795	2618	2454	2622.3
Center	5.91	3192	3167	3017	3125.3	2676	2604	2450	2576.7
5	8.00	3229	3175	2801	3068.3	2470	2487	2383	2446.7
6	9.52	3209	3215	2889	3104.3	2328	2453	2316	2365.7
7	10.57	3309	2994	2679	2994.0	2303	2310	1995	2202.7
8	11.31	2631	2371	2288	2430.0	1612	1547	1572	1577.0
Averages ---------->		3089.7	3089.3	2882.4	3020.5	2457.8	2414.3	2291.3	2387.8

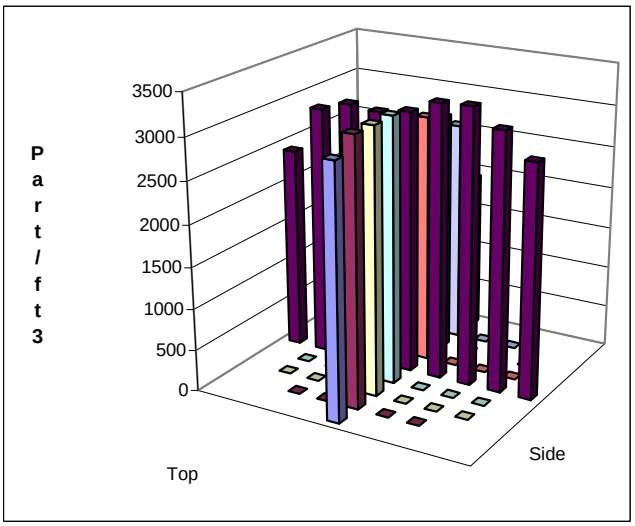
All	pt/ft3	Dev. from mean	***Center 2/3***	Side	Top	All	Normlzd
Mean	2704.1		Mean	3137.0	2492.0	2814.5	3079.85
Min Point	1577.0	-41.7%	Std. Dev.	111.9	161.4	360.3	164.26
Max Point	3298.0	22.0%	COV as %	3.6	6.5	**12.8**	**5.33**

Avg Conc 2686 pt/ft3

	Start	Finish	
Generator Inlet Press	4.5	4.5	psig
Stack Temp	65.4	65.3	F
Centerline vel.	2620	2580	fpm
Ambient pressure	28.82	28.88	inHg
Ambient humidity	36%	36%	RH
Ambient temp	63.5	64.4	F
Back-Gd aerosol	3,1,2,3	5,1,2,6	pt/ft3
No. Bk-Gd samples	4	4	
Compressor output	175	185	psig

Instuments Used:

		Cal. Due
TSI Velocicalc	SN305039	7/14/2010
Met One A2408	96258674	3/24/2010
Fisher Scientific	90936818	9/29/2010



Notes: MetOne SN 96258675 used at Port 3, Side, centerline, as reference.
Aerosol generator valve open 1 turn.
JAG 1/21/10

Oil Used: Edwards 19
JAG 1/21/10

Entries made by:	John Glissmeyer	1/21/2010	Technical Data Review performed by:	Ernest Antonio	
Signature/date	*On File with original*		Signature/date	Signature on File 30 July 2010	
				TI-RPP-WTP_691	

Rev. 0
3 Aug. 2006

PARTICLE TRACER TRAVERSE DATA FORM

Site	**LV-S1 Model**	Run No.	**PT-15**
Date	1/21/2010	Fan configuration	**A Only, Damper B and Butterfly Shut**
Tester	JAG, XYY	Fan Setting	**60 Hz**
Stack Dia.	11.813 in.	Stack Temp	65.75 deg F
Stack X-Area	109.6 in.2	Start/End Time	1540/ 1710
Test Port	1	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	209.625 inches	Points in Center 2/3	2 to: 7
Measurement units	particles/ft3	Injection Point	**A Centerline**
Order ----->	2nd		1st

		Side				Top			
Traverse-->									
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	particles/ft3				particles/ft3			
1	0.50	1336	1316	1157	1269.7	2233	2050	2068	2117.0
2	1.24	1415	1616	1357	1462.7	2234	2276	2207	2239.0
3	2.29	1411	1707	1395	1504.3	2337	2230	2293	2286.7
4	3.82	1441	1643	1546	1543.3	2274	2249	2168	2230.3
Center	5.91	1429	1559	1652	1546.7	2217	2127	2144	2162.7
5	8.00	1357	1400	1547	1434.7	2134	2068	1999	2067.0
6	9.52	1419	1397	1397	1404.3	2014	1953	1894	1953.7
7	10.57	1294	1392	1359	1348.3	1835	1912	1801	1849.3
8	11.31	1122	1073	1002	1065.7	1386	1330	1308	1341.3
Averages ---------->		1358.2	1455.9	1379.1	1397.7	2073.8	2021.7	1986.9	2027.4

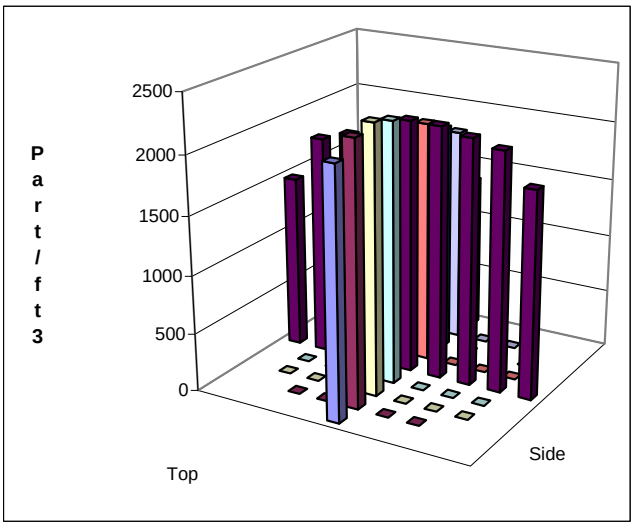
All	pt/ft3	Dev. from mean	***Center 2/3***	Side	Top	All	Normlzd
Mean	1712.6		Mean	1463.5	2112.7	1788.1	2079.51
Min Point	1065.7	-37.8%	Std. Dev.	73.7	162.9	358.1	135.40
Max Point	2286.7	33.5%	COV as %	5.0	7.7	**20.0**	**6.51**

Avg Conc 1695 pt/ft3

Instuments Used:

		Cal. Due
TSI Velocicalc	SN305039	7/14/2010
Met One A2408	96258674	3/24/2010
Fisher Scientific	90936818	9/29/2010

	Start	Finish	
Generator Inlet Press	4.5	4.5	psig
Stack Temp	65.3	66.2	F
Centerline vel.	2580	2680	fpm
Ambient pressure	28.88	28.88	inHg
Ambient humidity	36%	36%	RH
Ambient temp	64.4	62.6	F
Back-Gd aerosol	5,1,2,6	1,0,0,4	pt/ft3
No. Bk-Gd samples	4	4	
Compressor output	185	170	psig



Notes: MetOne SN 96258675 used at Port 3, Side, centerline, as reference.
Aerosol generator valve open 1 turn until traverse side2, then fully open.
JAG 1/21/10

Oil Used: Edwards 19
JAG 1/21/10

Entries made by:	John Glissmeyer	1/21/2010	Technical Data Review performed by:	Ernest Antonio	
Signature/date	*On File with original*		Signature/date	Signature on File 30 July 2010	
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Rev. 0

3 Aug. 2006

PARTICLE TRACER TRAVERSE DATA FORM

Site	**LV-S1 Model**	Run No.	**PT-16**
Date	1/22/2010	Fan configuration	**A Only, Damper B and Butterfly Shut**
Tester	JEF, XYY	Fan Setting	**60 Hz**
Stack Dia.	11.813 in.	Stack Temp	65.5 deg F
Stack X-Area	109.6 in.2	Start/End Time	1:30/3:20
Test Port	3	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	88.875 inches	Points in Center 2/3	2 to: 7
Measurement units	particles/ft3	Injection Point	**A Centerline**
Order ----->	1st		2nd

		Side				Top			
Traverse-->									
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	particles/ft3				particles/ft3			
1	0.50	1951	2150	2037	2046.0	1670	1573	1478	1573.7
2	1.24	2238	2268	2278	2261.3	1661	1641	1629	1643.7
3	2.29	2319	2361	2405	2361.7	1697	1543	1587	1609.0
4	3.82	2514	2412	2372	2432.7	1620	1661	1541	1607.3
Center	5.91	2618	2486	2552	2552.0	1617	1540	1445	1534.0
5	8.00	2530	2450	2528	2502.7	1411	1399	1286	1365.3
6	9.52	2524	2546	2489	2519.7	1400	1280	1307	1329.0
7	10.57	2390	2458	2449	2432.3	1328	1318	1209	1285.0
8	11.31	2299	2122	2041	2154.0	1147	1060	1032	1079.7
Averages ---------->		2375.9	2361.4	2350.1	2362.5	1505.7	1446.1	1390.4	1447.4

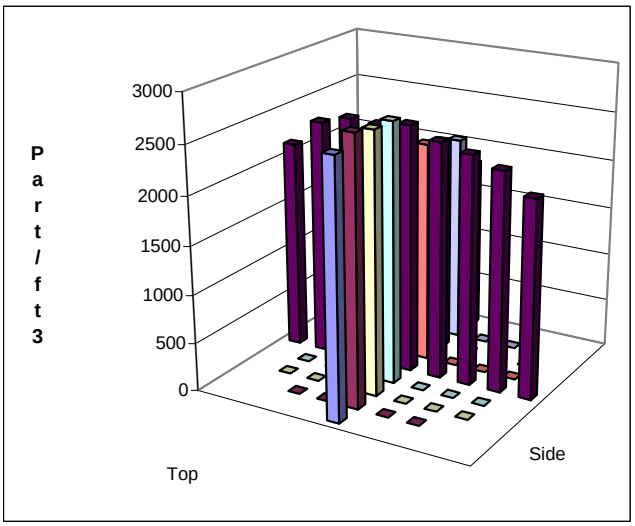
All	pt/ft3	Dev. from mean	***Center 2/3***	Side	Top	All	Normlzd
Mean	1904.9		Mean	2437.5	1481.9	1959.7	2451.40
Min Point	1079.7	-43.3%	Std. Dev.	100.8	150.8	510.9	184.28
Max Point	2552.0	34.0%	COV as %	4.1	10.2	**26.1**	**7.52**

Avg Conc 1888 pt/ft3

	Start	Finish	
Generator Inlet Press	4.5	4.5	psig
Stack Temp	65	66	F
Centerline vel.	2630	2470	fpm
Ambient pressure	28.59	28.64	inHg
Ambient humidity	30%	35%	RH
Ambient temp	64.4	60.8	F
Back-Gd aerosol	4,2,4,3	3,7,7,14	pt/ft3
No. Bk-Gd samples	4	4	
Compressor output	175	115	psig

Instuments Used:

		Cal. Due
TSI Velocicalc	SN305039	7/14/2010
Met One A2408	96258674	3/24/2010
Fisher Scientific	90936818	9/29/2010



Notes: MetOne SN 96258675 used at Port 1, Side, centerline, as reference.

XYY 1/22/10

Oil Used: Edwards 19

XYY 1/22/10

Entries made by:	Xiao-Ying Yu	1/22/2010	Technical Data Review performed by:	Ernest Antonio	
Signature/date	*On File with original*		Signature/date	Signature on File 30 July 2010	
				TI-RPP-WTP_691	

Rev. 0

3 Aug. 2006

PARTICLE TRACER TRAVERSE DATA FORM

Site	**LV-S1 Model**	Run No.	**PT-17**
Date	1/22/2010	Fan configuration	**A Only, Damper B and Butterfly Shut**
Tester	JEF, XYY	Fan Setting	**60** **Hz**
Stack Dia.	11.844 in.	Stack Temp	65.5 deg F
Stack X-Area	110.2 in.2	Start/End Time	3:20/5:15
Test Port	2	Center 2/3 from	1.09 to: 10.76
Distance to disturbance	149.25 inches	Points in Center 2/3	2 to: 7
Measurement units	particles/ft3	Injection Point	**A Centerline**
Order ----->	2nd		1st

		Side				Top			
Traverse-->									
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	particles/ft3				particles/ft3			
1	0.50	1006	945	806	919.0	1172	1055	1179	1135.3
2	1.24	1056	1190	1047	1097.7	1142	1108	1164	1138.0
3	2.29	990	1108	1063	1053.7	1181	1069	1217	1155.7
4	3.82	1091	1141	1059	1097.0	1125	1142	1153	1140.0
Center	5.91	1156	1137	1048	1113.7	1270	1067	1309	1215.3
5	8.00	1165	1124	1202	1163.7	1365	1304	1329	1332.7
6	9.52	1132	1219	1088	1146.3	1374	1437	1314	1375.0
7	10.57	957	1052	1125	1044.7	1204	1189	1171	1188.0
8	11.31	847	933	914	898.0	1093	1039	1028	1053.3
Averages ---------->		1044.4	1094.3	1039.1	1059.3	1214.0	1156.7	1207.1	1192.6

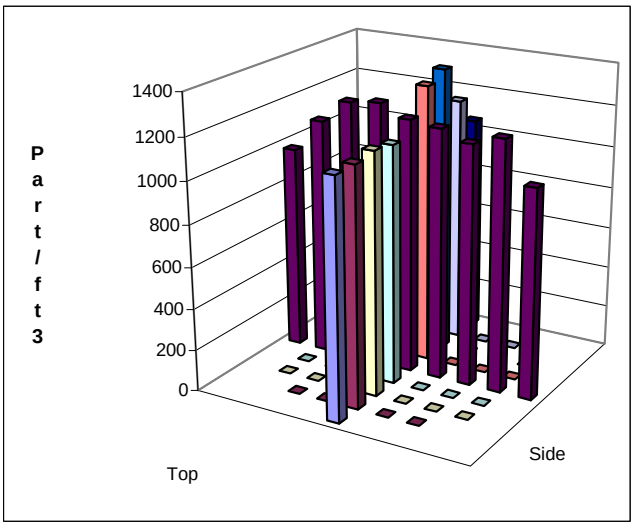
All	pt/ft3	Dev. from mean	***Center 2/3***	Side	Top	All	Normlzd
Mean	1125.9		Mean	1102.4	1220.7	1161.5	1211.84
Min Point	898.0	-20.2%	Std. Dev.	43.9	95.8	94.3	73.32
Max Point	1375.0	22.1%	COV as %	4.0	7.8	**8.1**	**6.05**

Avg Conc 1121 pt/ft3

	Start	Finish	
Generator Inlet Press	4.6	4.5	psig
Stack Temp	66	65	F
Centerline vel.	2470	2740	fpm
Ambient pressure	28.64	28.85	inHg
Ambient humidity	35%	35%	RH
Ambient temp	61.7	63.5	F
Back-Gd aerosol	7,2,3,4	1,5,5,2	pt/ft3
No. Bk-Gd samples	4	4	
Compressor output	175	175	psig

Instuments Used:

		Cal. Due
TSI Velocicalc	SN305039	7/14/2010
Met One A2408	96258674	3/24/2010
Fisher Scientific	90936818	9/29/2010



Notes: MetOne SN 96258675 used at Port 1, Side, centerline, as reference.
Sudden drop in particle counts after switching from top to side traverse, repeat runs. Drop probably caused by drop outdoor temp also seen yesterday XYY 1/22/10

Oil Used: Edwards 19

XYY 1/22/10

Entries made by:	Xiao-Ying Yu	1/22/2010	Technical Data Review performed by:	Ernest Antonio	
Signature/date	*On File with original*		Signature/date	Signature on File 30 July 2010	
				TI-RPP-WTP_691	

Rev. 0
3 Aug. 2006

PARTICLE TRACER TRAVERSE DATA FORM

Site	**LV-S1 Model**	Run No.	**PT-18**
Date	2/8/2010	Fan configuration	**A Only, Damper B and Butterfly Shut**
Tester	JAG, XYY	Fan Setting	**60 Hz**
Stack Dia.	11.844 in.	Stack Temp	65 deg F
Stack X-Area	110.2 in.2	Start/End Time	1320/1540
Test Port	2	Center 2/3 from	1.09 to: 10.76
Distance to disturbance	149.25 inches	Points in Center 2/3	2 to: 7
Measurement units	particles/ft3	Injection Point	**A Centerline**
Order ----->	1st		2nd

		Side				Top			
Traverse-->									
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	particles/ft3				particles/ft3			
1	0.50	895	830	969	898.0	884	916	981	927.0
2	1.24	967	1005	1050	1007.3	1036	988	956	993.3
3	2.29	951	952	1044	982.3	981	1038	1015	1011.3
4	3.82	964	997	1081	1014.0	1032	1088	1039	1053.0
Center	5.91	998	991	1086	1025.0	1016	1083	1100	1066.3
5	8.00	1083	1062	1066	1070.3	1140	1207	1172	1173.0
6	9.52	1003	1016	1028	1015.7	1197	1167	1181	1181.7
7	10.57	1016	954	938	969.3	1151	1085	1164	1133.3
8	11.31	843	878	879	866.7	983	954	936	957.7
Averages ---------->		968.9	965.0	1015.7	983.2	1046.7	1058.4	1060.4	1055.2

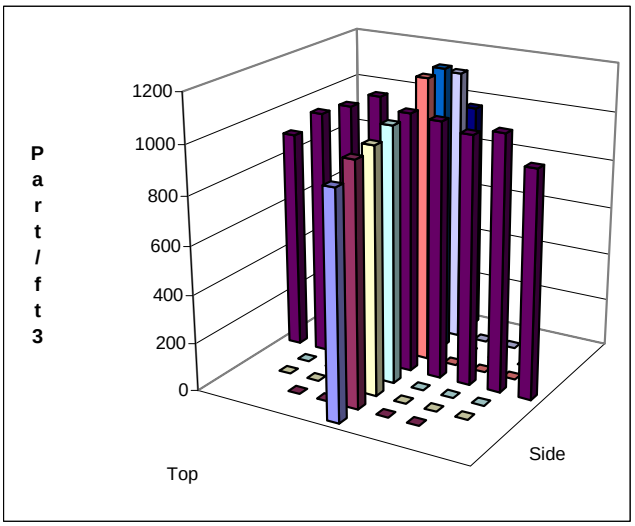
All	pt/ft3	Dev. from mean	***Center 2/3***	Side	Top	All	Normlzd
Mean	1019.2		Mean	1012.0	1087.4	1049.7	1070.12
Min Point	866.7	-15.0%	Std. Dev.	32.4	75.9	68.4	59.23
Max Point	1181.7	15.9%	COV as %	3.2	7.0	**6.5**	**5.54**

Avg Conc 1016 pt/ft3

	Start	Finish	
Generator Inlet Press	4.5	4.5	psig
Stack Temp	65	65	F
Centerline vel.	2900	2980	fpm
Ambient pressure	29.44	29.44	inHg
Ambient humidity	46%	38%	RH
Ambient temp	62	68	F
Back-Gd aerosol	2,1,1,0	0,0,01	pt/ft3
No. Bk-Gd samples	4	4	
Compressor output	100	110	psig

Instuments Used:

		Cal. Due
TSI Velocicalc	SN305039	7/14/2010
Met One A2408	96258674	4/16/2010
Fisher Scientific	90936818	9/29/2010



Notes: Repeat of PT-17; Switched OPC 96258675 to fixed position because its flow was reading high. But it is reading very low particle counts.
It was not correctly connected to the probe.
JAG 2/8/10

Oil Used: Edwards 19
When OPC's were swapped back after the run, the connection problem was discovered. Response was corrected when connection was corrected.
JAG 2/8/10

Entries made by:	John Glissmeyer	2/8/2010	Technical Data Review performed by:	Ernest Antonio	
Signature/date	*On File with original*		Signature/date	Signature on File 30 July 2010	
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Rev. 0
3 Aug. 2006

PARTICLE TRACER TRAVERSE DATA FORM

Site	**LV-S1 Model**	Run No.	**PT-19**
Date	2/9/2010	Fan configuration	**B Only, Damper A and Butterfly Shut**
Tester	JMB, JAG	Fan Setting	**37.5** **Hz**
Stack Dia.	11.813 in.	Stack Temp	65 deg F
Stack X-Area	109.6 in.2	Start/End Time	1325/1530
Test Port	3	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	88.875 inches	Points in Center 2/3	2 to: 7
Measurement units	particles/ft3	Injection Point	**B Centerline**
Order ----->	1st		2nd

		Side				Top			
Traverse-->									
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	particles/ft3				particles/ft3			
1	0.50	2028	1711	1690	1809.7	1394	1152	1175	1240.3
2	1.24	2135	1739	1738	1870.7	1428	1111	1407	1315.3
3	2.29	2050	1720	1652	1807.3	1280	1129	1313	1240.7
4	3.82	1994	1657	1706	1785.7	1247	1079	1371	1232.3
Center	5.91	1954	1822	1681	1819.0	1427	1137	1462	1342.0
5	8.00	1985	1906	1639	1843.3	1267	1206	1456	1309.7
6	9.52	1967	1766	1720	1817.7	1303	1196	1525	1341.3
7	10.57	1786	1695	1723	1734.7	1332	1238	1511	1360.3
8	11.31	1748	1560	1552	1620.0	947	966	1631	1181.3
Averages ---------->		1960.8	1730.7	1677.9	1789.8	1291.7	1134.9	1427.9	1284.8

All	pt/ft3	Dev. from mean
Mean	1537.3	
Min Point	1181.3	-23.2%
Max Point	1870.7	21.7%

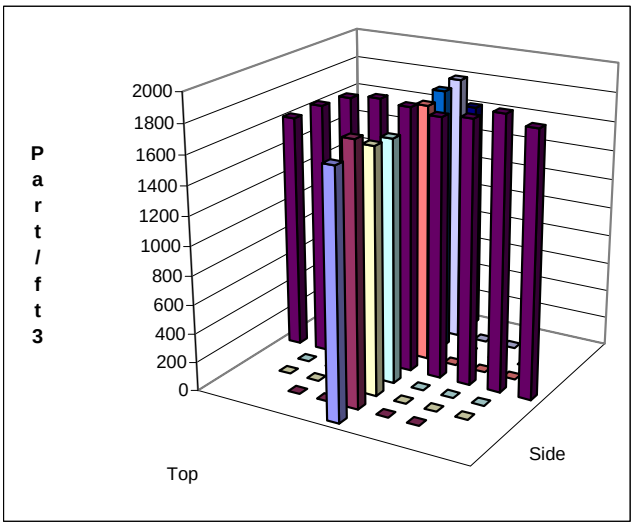
Center 2/3	Side	Top	All	Normlzd
Mean	1811.2	1306.0	1558.6	1790.67
Std. Dev.	43.2	50.5	266.0	58.96
COV as %	2.4	3.9	**17.1**	**3.29**

Avg Conc 1532 pt/ft3

	Start	Finish	
Generator Inlet Press	3.5	3.5	psig
Stack Temp	65	65	F
Centerline vel.	1980	1990	fpm
Ambient pressure	29.74	29.74	inHg
Ambient humidity	33%	32%	RH
Ambient temp	64	70	F
Back-Gd aerosol	3, 1, 0, 0	0, 3, 0, 0	pt/ft3
No. Bk-Gd samples	4	4	
Compressor output	90	95	psig

Instuments Used: Cal. Due

TSI Velocicalc	SN305039	7/14/2010
Met One A2408	96258675	4/16/2010
Fisher Scientific	90936818	9/29/2010



Notes: OPC 96258674 used in fixed position -- Port 1, Side, Center. Cal due 3/24/2010
A repeat of PT-8
JAG 2/9/10

Oil Used: Edwards 19
JAG 2/9/10

Entries made by:	John Glissmeyer	2/9/2010	Technical Data Review performed by:	Ernest Antonio	
Signature/date	*On File with original*		Signature/date	Signature on File 30 July 2010	
				TI-RPP-WTP_691	

Rev. 0

3 Aug. 2006

PARTICLE TRACER TRAVERSE DATA FORM

Site	**LV-S1 Model**	Run No.	**PT-20**
Date	2/15/2010	Fan configuration	**B Only, Damper A and Butterfly Shut**
Tester	JMB, JEF	Fan Setting	**37.5** **Hz**
Stack Dia.	11.813 in.	Stack Temp	65.5 deg F
Stack X-Area	109.6 in.2	Start/End Time	13:40 / 15:40
Test Port	3	Center 2/3 from	1.08 to: 10.73
Distance to disturbance	88.875 inches	Points in Center 2/3	2 to: 7
Measurement units	particles/ft3	Injection Point	**B Centerline**
Order ----->	2nd		1st

		Side				Top			
Traverse-->									
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	particles/ft3				particles/ft3			
1	0.50	2460	2804	3057	2773.7	2001	2003	2038	2014.0
2	1.24	2500	2955	3246	2900.3	1932	1937	2118	1995.7
3	2.29	2601	3153	3247	3000.3	1888	1883	1927	1899.3
4	3.82	2613	3290	3209	3037.3	1963	1993	2124	2026.7
Center	5.91	2564	3255	3177	2998.7	1984	1988	2102	2024.7
5	8.00	2573	3148	3109	2943.3	1964	1988	2095	2015.7
6	9.52	2650	3187	2993	2943.3	1956	1998	2108	2020.7
7	10.57	2607	3212	3109	2976.0	1932	1882	2035	1949.7
8	11.31	2104	3087	2795	2662.0	1570	1751	1946	1755.7
Averages ---------->		2519.1	3121.2	3104.7	2915.0	1910.0	1935.9	2054.8	1966.9

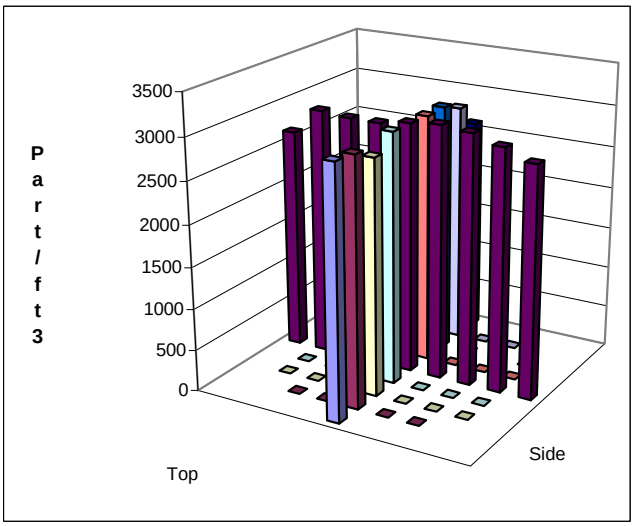
All	pt/ft3	Dev. from mean	***Center 2/3***	Side	Top	All	Normlzd
Mean	2440.9		Mean	2971.3	1990.3	2480.8	2959.58
Min Point	1755.7	-28.1%	Std. Dev.	45.8	48.3	511.0	59.01
Max Point	3037.3	24.4%	COV as %	1.5	2.4	**20.6**	**1.99**

Avg Conc 2432 pt/ft3

	Start	Finish	
Generator Inlet Press	4	4	psig
Stack Temp	66	65	F
Centerline vel.	1980	1850	fpm
Ambient pressure	29.91	29.94	inHg
Ambient humidity	42%	36%	RH
Ambient temp	65.3	69.8	F
Back-Gd aerosol	1, 1, 1, 2	1, 1, 2, 1	pt/ft3
No. Bk-Gd samples	4	4	
Compressor output	115	110	psig

Instuments Used:

		Cal. Due
TSI Velocicalc	SN305039	7/14/2010
Met One A2408	96258674	3/24/2010
Fisher Scientific	90936818	9/29/2010



Notes: Ran MetOne SN 96258675 at Port 1, Side, centerline as reference.
Port 3 instrument flow was stuck at around 1.09 at min. Shut off instrument fan, & flow was able to be adjusted to 1.0. Repeat of PT-8 (again).

Oil Used: Edwards 19

JEF 2/15/10

Entries made by:	Julia Flaherty	2/15/2010	Technical Data Review performed by:	Ernest Antonio	
Signature/date	*On File with original*		Signature/date	Signature on File 30 July 2010	
				TI-RPP-WTP_691	

Appendix C

LB-S2 Data Sheets

Appendix C.1: LB-S2 Calibration of Ventilation Flow Controller Data Sheets

VELOCITY TRAVERSE DATA FORM

Site	**LB-S2 Model**	Run No.	**VT-1**
Date	**8/16/10**	Fan Configuration	**Fans A & B**
Testers	JEF, YFS	Fan Setting	**31** **Hz**
Stack Dia.	11.9 in.	Stack Temp	90.1 / 89.5 deg F
Stack X-Area	111.2 in.2	Start/End Time	0900 / 0950
Test Port	2	Center 2/3 from	1.09 to: 10.81
Distance to disturbance	300.0625 in.	Points in Center 2/3	2 to: 7
Velocity units	ft/min	Data Files:	NA

Order -->		1				2			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	950	960	940	950.0	950	880	920	916.7
2	1.25	1040	1050	1040	1043.3	1030	1010	1030	1023.3
3	2.31	1090	1130	1150	1123.3	1160	1090	1140	1130.0
4	3.84	1250	1240	1240	1243.3	1230	1200	1220	1216.7
Center	5.95	1290	1290	1290	1290.0	1310	1270	1260	1280.0
5	8.06	1280	1280	1280	1280.0	1290	1240	1280	1270.0
6	9.59	1230	1220	1220	1223.3	1200	1210	1200	1203.3
7	10.65	1150	1160	1120	1143.3	1070	1120	1100	1096.7
8	11.52	1020	1120	1090	1076.7	1010	1000	1030	1013.3
Averages ---------->		1144.4	1161.1	1152.2	1152.6	1138.9	1113.3	1131.1	1127.8

All	ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1140.2		Mean	1192.4	1174.3	1183.3
Min Point	916.7	-19.6%	Std. Dev.	91.4	94.6	89.9
Max Point	1290.0	13.1%	COV as %	7.7	8.1	**7.6**

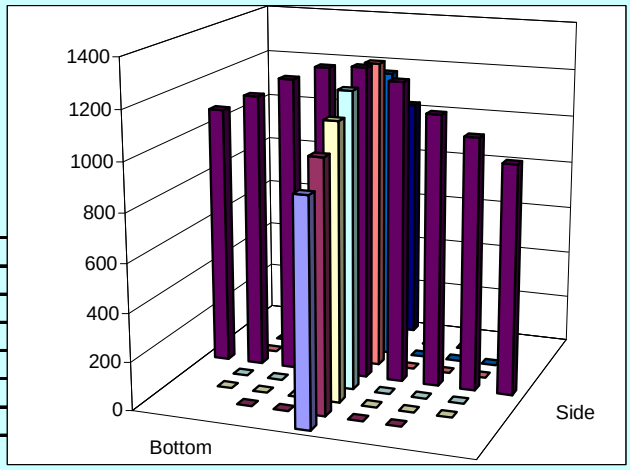
Flow w/o C-Pt 867 acfm

Vel Avg w/o C-Pt 1122 fpm

Instuments Used: Cal Due

TSI VelociCalc	SN 305039	6/2011
Fisher Scientific	SN 61876141	5/17/2011
N/A		

	Start	Finish	
Stack temp	90.1	89.5	F
Equipment temp	N/A	N/A	F
Ambient temp	80	82.5	F
Stack static	N/A	N/A	mbars
Ambient pressure	994.00	994.00	in Hg
Total Stack pressure	994.00	994.00	mbars
Ambient humidity	32%	29%	RH



Notes: No Pre-filter installed on HEPA.
TSI was marked incorrectly - backwards.
Corrected on data sheet.

JEF 8/16/10

Entries made by:	Julia Flaherty	Technical Data Review performed by:	Carmen Arimescu
Signature/date	*On File w/ Original* 8/16/2010	Signature/date	Signature on File 10/5/2010
			TI-RPP-WTP_022

VELOCITY vs. FREQUENCY DATA FORM

VELFR_Rev0 8/11/2006

Site	**LB-S2 model**	Run No.	**VF-1**
Date	8/16/2010	Stack Temp	89.5 / 90.6
Tester	JEF, YFS	Stack RH%	29 / 26%
Stack Dia.	11.9 in.	Baro Press	994 mbar
Stack X-Area	111.2 in2	Fan Configuration	Fans A & B
Test Port	2	Start/End Time	0950 / 1040

Dist. from disturbance 300.0625 inches Reference point from velocity test VC : Bottom, Point 6

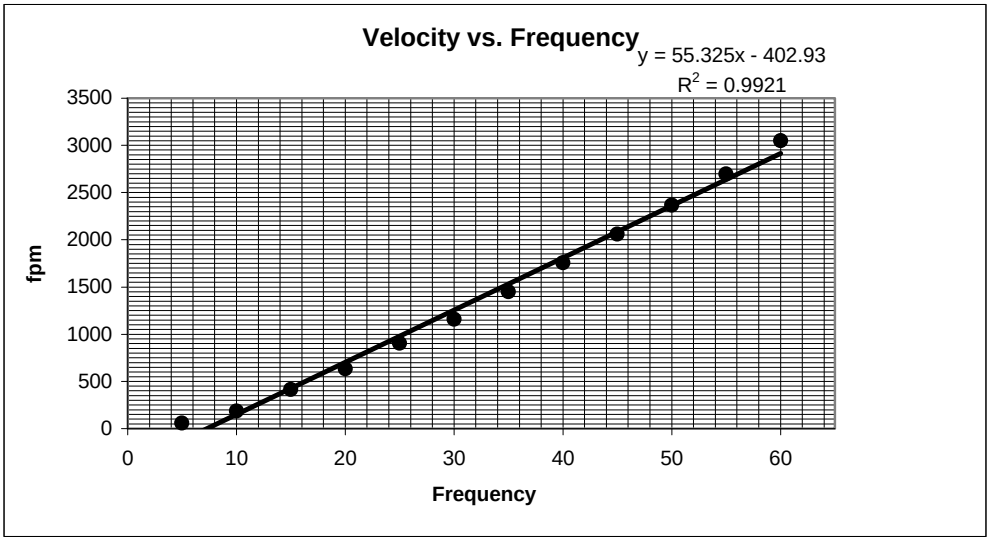
Velocity Readings, units = fpm

					Target cfm	Target fpm	Estmtd Hz
					1216	1548	35
	fpm				740	942	24
Hz	1	2	3	Mean	StDev	2 StDev	cfm
5	61	62	55	59.33	3.79	7.57	45.83
10	189	182	188	186.33	3.79	7.57	143.92
15	416	420	412	416.00	4.00	8.00	321.30
20	625	640	640	635.00	8.66	17.32	490.45
25	895	910	910	905.00	8.66	17.32	698.99
30	1160	1150	1170	1160.00	10.00	20.00	895.94
35	1450	1450	1450	1450.00	0.00	0.00	1119.93
40	1730	1800	1740	1756.67	37.86	75.72	1356.78
45	2070	2060	2050	2060.00	10.00	20.00	1591.07
50	2380	2350	2370	2366.67	15.28	30.55	1827.93
55	2700	2690	2700	2696.67	5.77	11.55	2082.80
60	3040	3050	3060	3050.00	10.00	20.00	2355.71

Instuments Used: **Cal Exp. Date:**

TSI VelociCalc SN 209060 JF 8/16/10 6/2011

JF 8/16/10



Entries made by:	Yin-Fong Su	Technical Data Review performed by:	Carmen Arimescu
Signature/date	*On File w/ Original* 8/16/2010	Signature/date	Signature on File 10/5/2010 TI-RPP-WTP_022

Appendix C.2: LB-S2 Velocity Uniformity Data Sheets

VELOCITY TRAVERSE DATA FORM

Site	**LB-S2 Model**	Run No.	**VT-1**		
Date	**7/20/10**	Fan Configuration	**A only, B damper closed**		
Testers	EA, BMS	Fan Setting	**60**	**Hz**	
Stack Dia.	11.9 in.	Stack Temp		deg F	
Stack X-Area	111.2 in.2	Start/End Time	14:40		
Test Port	2	Center 2/3 from	1.09	to:	10.81
Distance to disturbance	300.06 in.	Points in Center 2/3	2	to:	7
Velocity units	ft/min	Data Files:	NA		

Order --> 2nd 1st EA 7/20/10

Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50				#DIV/0!	1350			1350.0
2	1.25				#DIV/0!	1470			1470.0
3	2.31				#DIV/0!	1540			1540.0
4	3.81		XYY 8/3/10		#DIV/0!	1600			1600.0
Center	5.95				#DIV/0!	1610			1610.0
5	8.00				#DIV/0!	1600	XYY 8/3/10		1600.0
6	9.50				#DIV/0!	1590			1590.0
7	10.56				#DIV/0!	1430			1430.0
8	11.31				#DIV/0!	1370			1370.0
Averages ---------->		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	1506.7	#DIV/0!	#DIV/0!	1506.7

All	ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	#DIV/0!		Mean	#DIV/0!	1548.6	#DIV/0!
Min Point	#DIV/0!	#DIV/0!	Std. Dev.	#DIV/0!	72.0	#DIV/0!
Max Point	#DIV/0!	#DIV/0!	COV as %	#DIV/0!	4.6	**#DIV/0!**

Flow w/o C-Pt #DIV/0! acfm

Vel Avg w/o C-Pt #DIV/0! fpm

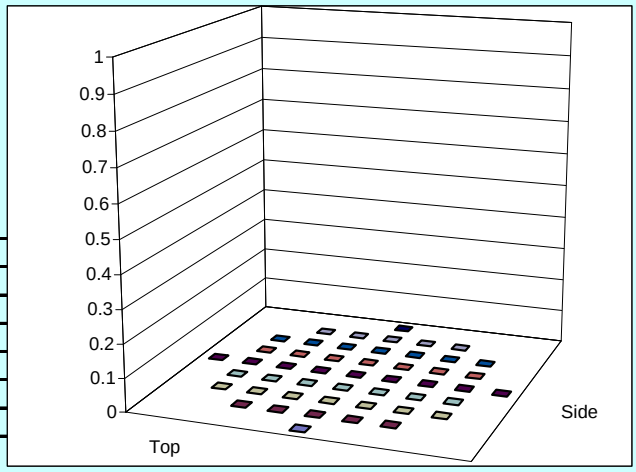
Instuments Used: Cal Due

TSI VelociCalc SN 209060 06/01/11

Fisher Scientific SN 61876141 05/17/11

EA 7/20/10

	Start	Finish	
Stack temp	102		F
Equipment temp		XYY 8/3/10	F
Ambient temp	94		F
Stack static			mbars
Ambient pressure	1006.00		mbars
Total Stack pressure			mbars
Ambient humidity	18%		RH



Notes: Took average of 5 velocity readings for each entry. Point 1 is closest to far stack wall; point 8 is closest to port opening. Stopped testing due to low flow conditions. EA 7/20/10

Entries made by:	EA 7/20/10	Technical Data Review performed by:	Carmen Arimescu
Signature/date	Signature on original	Signature/date	Signatures on original 10/5/2010

TI-RPP-WTP_019

VELOCITY TRAVERSE DATA FORM

Site	**LB-S2 Model**	Run No.	**VT-2**
Date	**7/21/10**	Fan Configuration	**A only; B damper closed**
Testers	YFSu, EA	Fan Setting	**60 Hz**
Stack Dia.	11.9 in.	Stack Temp	91.1 deg F
Stack X-Area	111.2 in.2	Start/End Time	9:25 10:17
Test Port	2	Center 2/3 from	1.09 to: 10.81
Distance to disturbance	300.06 inches	Points in Center 2/3	2 to: 7
Velocity units	ft/min	Data Files:	NA

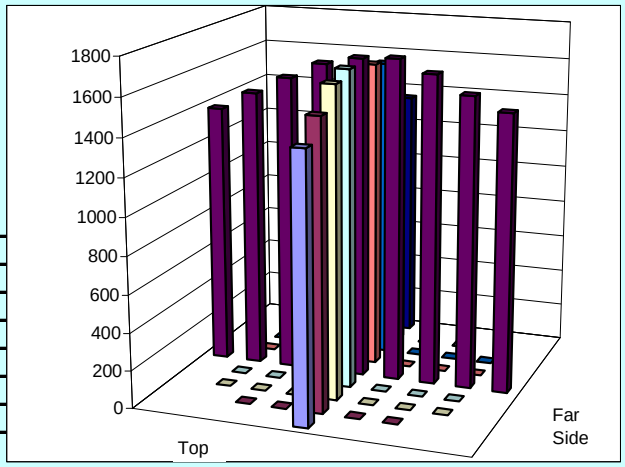
Order -->		2				1			YFSu 7/21/10	
Traverse-->		Side				Bottom				
Trial ---->		1	2	3	Mean	1	2	3	Mean	
Point	Depth, in.	Velocity				Velocity				
1	0.50	1500	1510	1420	1476.7	1210	1460	1490	1386.7	
2	1.25	1580	1540	1530	1550.0	1500	1490	1510	1500.0	
3	2.31	1670	1600	1670	1646.7	1590	1630	1630	1616.7	
4	3.81	1730	1710	1700	1713.3	1670	1650	1650	1656.7	
Center	5.95	1720	1710	1680	1703.3	1640	1650	1740	1676.7	
5	8.00	1710	1650	1630	1663.3	1660	1610	1570	1613.3	
6	9.50	1590	1560	1580	1576.7	1580	1580	1590	1583.3	
7	10.56	1460	1490	1500	1483.3	1480	1420	1420	1440.0	
8	11.31	1380	1390	1390	1386.7	1290	1370	1320	1326.7	
Averages ---------->		1593.3	1573.3	1566.7	1577.8	1513.3	1540.0	1546.7	1533.3	

All	ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1555.6		Mean	1619.5	1583.8	1601.7
Min Point	1326.7	-14.7%	Std. Dev.	85.3	85.2	84.0
Max Point	1713.3	10.1%	COV as %	5.3	5.4	**5.2**

Flow w/o C-Pt	1188	scfm
Vel Avg w/o C-Pt	1539	fpm

Instuments Used:	Cal Due
TSI VelociCalc SN 209060	06/01/11
Fisher Scientific SN 61876141	05/17/11
EA 7/21/10	

	Start	Finish	
Stack temp	90.8	91.3	F
Equipment temp	N/A		F
Ambient temp	83.3	85.1	F
Stack static BMS 7/21/1(	0	0	mbars
Ambient pressure	1003	1003	mbars
Total Stack pressure	1003	1003	mbars
Ambient humidity	30%	27%	RH



Notes: Repeat VT-1. Point 1 near far stack wall, point 8 near port opening. Recorded data points are average of 5 TSI VelociCalc readings.
EA 7/21/10

Entries made by:	YFSu 7/21/10 EA 7/21/10	Technical Data Review performed by:	Carmen Arimescu
Signature/date	Signatures on original	Signature/date	Signatures on original 10/5/2010
			TI-RPP-WTP_019

VELOCITY TRAVERSE DATA FORM

Site	**LB-S2 Model**	Run No.	**VT-3**
Date	**7/21/10**	Fan Configuration	**B only; Damper A closed**
Testers	EA YFSu	Fan Setting	**60 Hz**
Stack Dia.	11.9 in.	Stack Temp	92.9 deg F
Stack X-Area	111.2 in.2	Start/End Time	10:25 11:03
Test Port	2	Center 2/3 from	1.09 to: 10.81
Distance to disturbance	300.06 inches	Points in Center 2/3	2 to: 7
Velocity units	ft/min	Data Files:	NA

Order -->		1				2			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	1460	1510	1510	1493.3	1440	1540	1440	1473.3
2	1.25	1700	1640	1620	1653.3	1570	1670	1530	1590.0
3	2.31	1790	1730	1780	1766.7	1680	1670	1700	1683.3
4	3.81	1840	1850	1860	1850.0	1750	1750	1790	1763.3
Center	5.95	1850	1810	1790	1816.7	1750	1780	1790	1773.3
5	8.00	1810	1810	1830	1816.7	1730	1720	1770	1740.0
6	9.50	1720	1670	1740	1710.0	1690	1670	1640	1666.7
7	10.56	1600	1560	1590	1583.3	1570	1550	1570	1563.3
8	11.31	1520	1480	1490	1496.7	1400	1390	1470	1420.0
Averages ---------->		1698.9	1673.3	1690.0	1687.4	1620.0	1637.8	1633.3	1630.4

All	ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1658.9		Mean	1742.4	1682.9	1712.6
Min Point	1420.0	-14.4%	Std. Dev.	97.9	82.8	92.4
Max Point	1850.0	11.5%	COV as %	5.6	4.9	**5.4**

Flow w/o C-Pt 1268 scfm

Vel Avg w/o C-Pt 1642 fpm

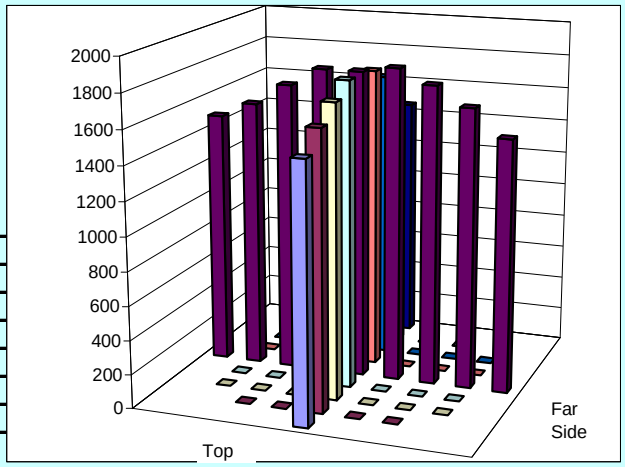
Instuments Used: Cal Due

TSI VelociCalc SN 209060 06/01/11

Fisher Scientific SN 61876141 05/17/11

EA 7/21/10

	Start	Finish	
Stack temp	92.3	93.4	F
Equipment temp	N/A		F
Ambient temp	86	88.7	F
Stack static	0	0	mbars
Ambient pressure	1003	1003	mbars
Total Stack pressure	1003	1003	mbars
Ambient humidity	27%	24%	RH



Notes: Point 1 is near far stack wall; Point 8 is near port opening.

EA 7/21/10

Entries made by:	EA 7/21/10 YFSu 7/21/10	Technical Data Review performed by:	Carmen Arimescu
Signature/date	Signatures on original	Signature/date	Signatures on original 10/5/2010
			TI-RPP-WTP_019

VELOCITY TRAVERSE DATA FORM

Site	**LB-S2 Model**	Run No.	**VT-4**
Date	**7/21/10**	Fan Configuration	**B only; damper A closed**
Testers	EA YFSu	Fan Setting	**60 Hz**
Stack Dia.	11.9 in.	Stack Temp	93.8 deg F
Stack X-Area	111.2 in.2	Start/End Time	11:06 11:45
Test Port	2	Center 2/3 from	1.09 to: 10.81
Distance to disturbance	300.06 inches	Points in Center 2/3	2 to: 7
Velocity units	ft/min	Data Files:	NA

Order -->		2				1			EA 7/21/10	
Traverse-->		Side				Bottom				
Trial ---->		1	2	3	Mean	1	2	3	Mean	
Point	Depth, in.	Velocity				Velocity				
1	0.50	1610	1570	1560	1580.0	1440	1440	1540	1473.3	
2	1.25	1650	1640	1630	1640.0	1650	1660	1640	1650.0	
3	2.31	1740	1730	1690	1720.0	1680	1770	1770	1740.0	
4	3.81	1840	1830	1830	1833.3	1800	1760	1820	1793.3	
Center	5.95	1840	1800	1810	1816.7	1770	1800	1820	1796.7	
5	8.00	1830	1810	1800	1813.3	1750	1740	1740	1743.3	
6	9.50	1710	1710	1680	1700.0	1700	1670	1640	1670.0	
7	10.56	1580	1620	1560	1586.7	1530	1590	1500	1540.0	
8	11.31	1450	1490	1450	1463.3	1390	1380	1370	1380.0	
Averages ---------->		1694.4	1688.9	1667.8	1683.7	1634.4	1645.6	1648.9	1643.0	

All	ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1663.3		Mean	1730.0	1704.8	1717.4
Min Point	1380.0	-17.0%	Std. Dev.	95.5	91.6	90.9
Max Point	1833.3	10.2%	COV as %	5.5	5.4	**5.3**

Flow w/o C-Pt 1271 scfm

Vel Avg w/o C-Pt 1645 fpm

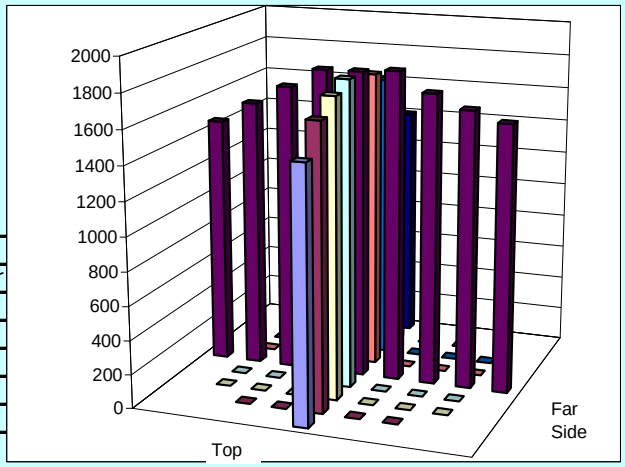
Instuments Used: Cal Due

TSI VelociCalc SN 209060 06/01/11

Fisher Scientific SN 61876141 05/17/11

EA 7/21/10

	Start	Finish	
Stack temp	93.4	94.2	F
Equipment temp	N/A		F
Ambient temp	87.8	89.6	F
Stack static	0	0	mbars
Ambient pressure	1003	1004	mbars
Total Stack pressure	1003	1004	mbars
Ambient humidity	22%	21%	RH



Notes: Point 1 is near far stack wall, Point 8 is nearest port opening. All data points are average of 5 TSI VelociCalc readings.

EA 7/21/10

Entries made by:	YFSu 7/21/10 EA 7/21/10	Technical Data Review performed by:	Carmen Arimescu
Signature/date	Signatures on original	Signature/date	Signatures on original 10/5/2010

TI-RPP-WTP_019

VELOCITY TRAVERSE DATA FORM

Site	**LB-S2 Model**	Run No.	**VT-5**
Date	**7/21/10**	Fan Configuration	**B only; Damper A closed**
Testers	EA YFSu	Fan Setting	**60 Hz**
Stack Dia.	11.9 in.	Stack Temp	95.6 deg F
Stack X-Area	111.2 in.2	Start/End Time	11:54 12:40
Test Port	2	Center 2/3 from	1.09 to: 10.81
Distance to disturbance	300.06 inches	Points in Center 2/3	2 to: 7
Velocity units	ft/min	Data Files:	NA

Order -->		1				2			BMS 7/21/10
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	1460	1490	1470	1473.3	1580	1440	1480	1500.0
2	1.25	1580	1580	1570	1576.7	1560	1520	1670	1583.3
3	2.31	1660	1710	1700	1690.0	1660	1730	1810	1733.3
4	3.81	1790	1770	1760	1773.3	1810	1750	1780	1780.0
Center	5.95	1820	1810	1790	1806.7	1780	1850	1770	1800.0
5	8.00	1790	1740	1790	1773.3	1750	1800	1800	1783.3
6	9.50	1690	1680	1680	1683.3	1640	1710	1710	1686.7
7	10.56	1570	1530	1560	1553.3	1520	1580	1560	1553.3
8	11.31	1440	1490	1430	1453.3	1430	1510	1440	1460.0
Averages ---------->		1644.4	1644.4	1638.9	1642.6	1636.7	1654.4	1668.9	1653.3

All	ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1648.0		Mean	1693.8	1702.9	1698.3
Min Point	1453.3	-11.8%	Std. Dev.	99.1	99.7	95.7
Max Point	1806.7	9.6%	COV as %	5.9	5.9	**5.6**

Flow w/o C-Pt 1258 scfm

Vel Avg w/o C-Pt 1629 fpm

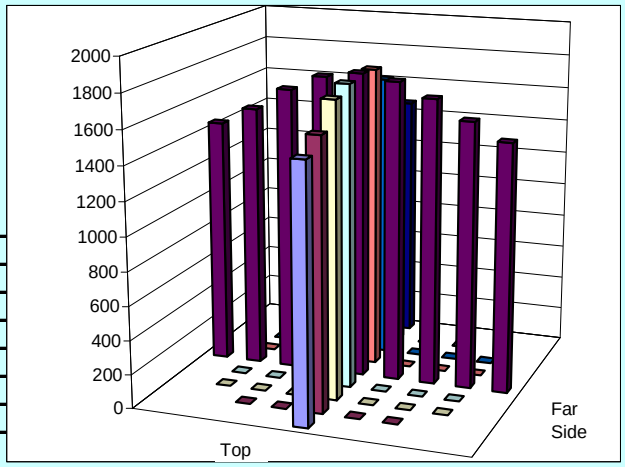
Instuments Used: Cal Due

TSI VelociCalc SN 209060 06/01/11

Fisher Scientific SN 61876141 05/17/11

BMS 7/21/10

	Start	Finish	
Stack temp	94.6	96.5	F
Equipment temp	N/A	N/A	F
Ambient temp	89.6	91.4	F
Stack static	0	0	mbars
Ambient pressure	1004	1004	mbars
Total Stack pressure	1004	1004	mbars
Ambient humidity	21%	22%	RH



Notes: Point 1 is near far stack wall; point 8 is near port opening. All data points are average of 5 TSI VelociCalc readings.

EA 7/21/10

Entries made by:	EA 7/21/10 YFSu 7/21/10	Technical Data Review performed by:	Carmen Arimescu
Signature/date	Signatures on original	Signature/date	Signatures on original 10/5/2010

TI-RPP-WTP_019

VELOCITY TRAVERSE DATA FORM

Site	**LB-S2 Model**	Run No.	**VT-6**
Date	**7/21/10**	Fan Configuration	**B only Damper A closed**
Testers	EA BMS	Fan Setting	**60** **Hz**
Stack Dia.	11.9 in.	Stack Temp	101.1 deg F
Stack X-Area	111.2 in.2	Start/End Time	14:30 15:14
Test Port	1	Center 2/3 from	1.09 to: 10.81
Distance to disturbance	360.19 inches	Points in Center 2/3	2 to: 7
Velocity units	ft/min	Data Files:	NA

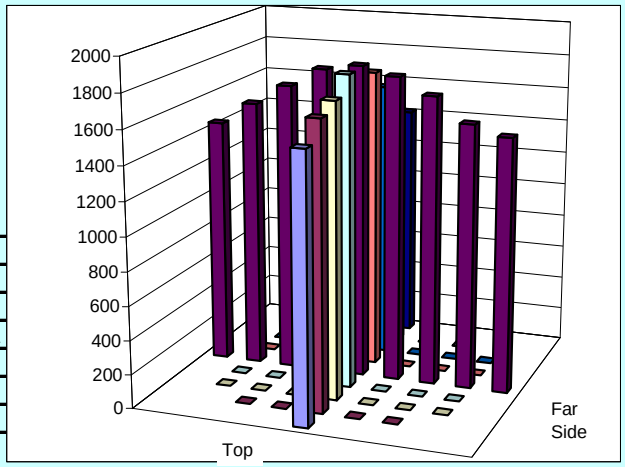
Order -->		2				1			EA 7/21/10	
Traverse-->		Side				Bottom				
Trial ---->		1	2	3	Mean	1	2	3	Mean	
Point	Depth, in.	Velocity				Velocity				
1	0.50	1430	1540	1390	1453.3	1560	1510	1620	1563.3	
2	1.25	1480	1570	1480	1510.0	1690	1600	1750	1680.0	
3	2.31	1650	1630	1670	1650.0	1680	1760	1760	1733.3	
4	3.81	1760	1730	1740	1743.3	1800	1860	1860	1840.0	
Center	5.95	1800	1770	1800	1790.0	1820	1870	1860	1850.0	
5	8.00	1790	1720	1760	1756.7	1760	1760	1800	1773.3	
6	9.50	1680	1620	1650	1650.0	1640	1630	1670	1646.7	
7	10.56	1550	1510	1540	1533.3	1510	1580	1510	1533.3	
8	11.31	1420	1410	1390	1406.7	1410	1400	1420	1410.0	
Averages ---------->		1617.8	1611.1	1602.2	1610.4	1652.2	1663.3	1694.4	1670.0	

All	ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1640.2		Mean	1661.9	1722.4	1692.1
Min Point	1406.7	-14.2%	Std. Dev.	109.5	112.6	111.2
Max Point	1850.0	12.8%	COV as %	6.6	6.5	**6.6**

Flow w/o C-Pt	1249	scfm	
Vel Avg w/o C-Pt	1618	fpm	

	Start	Finish	
Stack temp	100.5	101.7	F
Equipment temp	N/A		F
Ambient tem EA 7/21/10	96.8	100.4	F
Stack static	0	0	mbars
Ambient pressure	1004	989	mbars
Total Stack pressure	1004	989	mbars
Ambient humidity	20%	18%	RH

Instuments Used:	Cal Due
TSI VelociCalc SN 209060	06/01/11
Fisher Scientific SN 61876141	05/17/11
EA 7/21/10	



Notes: Pt. 1 closest to far wall, Pt 8 closest to port opening. Recorded data points are an avg of five TSI VelociCalc readings. Fisher Scientific barometer tipped over in breeze and batteries fell out, then replaced; time inaccurate until reset.

BMS 7/21/10

Entries made by:	EA 7/21/10 BMS 7/21/10	Technical Data Review performed by:	Carmen Arimescu
Signature/date	Signatures on original	Signature/date	Signatures on original 10/5/2010
			TI-RPP-WTP_019

VELOCITY TRAVERSE DATA FORM

Site	**LB-S2 Model**	Run No.	**VT-7**
Date	**7/21/10**	Fan Configuration	**B only, Damper A closed**
Testers	BMS EA	Fan Setting	**60 Hz**
Stack Dia.	11.8 in.	Stack Temp	101.4 deg F
Stack X-Area	109.4 in.2	Start/End Time	15:20 16:11
Test Port	3	Center 2/3 from	1.08 to: 10.72
Distance to disturbance	239.84 inches	Points in Center 2/3	2 to: 7
Velocity units	ft/min	Data Files:	NA

Order --> 1st 2nd BMS 7/21/10

		Side				Bottom			
Traverse-->									
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	1550	1430	1470	1483.3	1430	1520	1560	1503.3
2	1.25	1550	1620	1510	1560.0	1630	1660	1630	1640.0
3	2.31	1630	1710	1680	1673.3	1730	1660	1730	1706.7
4	3.81	1720	1760	1740	1740.0	1800	1790	1690	1760.0
Center	5.95	1780	1830	1760	1790.0	1800	1800	1740	1780.0
5	8.00	1750	1770	1790	1770.0	1720	1740	1730	1730.0
6	9.50	1700	1670	1700	1690.0	1690	1690	1680	1686.7
7	10.56	1630	1590	1590	1603.3	1600	1580	1530	1570.0
8	11.31	1550	1530	1490	1523.3	1480	1480	1460	1473.3
Averages ---------->		1651.1	1656.7	1636.7	1648.1	1653.3	1657.8	1638.9	1650.0

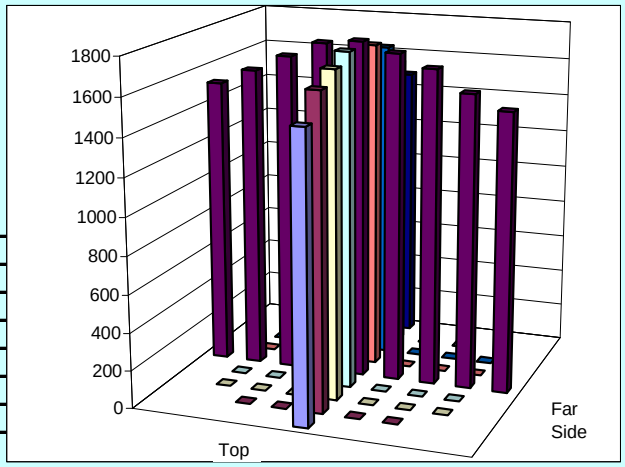
All	ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1649.1		Mean	1689.5	1696.2	1692.9
Min Point	1473.3	-10.7%	Std. Dev.	85.2	72.5	76.1
Max Point	1790.0	8.5%	COV as %	5.0	4.3	**4.5**

Flow w/o C-Pt 1239 scfm

Vel Avg w/o C-Pt 1632 fpm

	Start	Finish	
Stack temp	100.8	102	F
Equipment temp	N/A		F
Ambient temp	99.5	95.0	F
Stack static	0	0	mbars
Ambient pressure	989	988	mbars
Total Stack pressure	989	988	mbars
Ambient humidity	17%	18%	RH

Instuments Used:	Cal Due
TSI VelociCalc SN 209060	06/01/11
Fisher Scientific SN 61876141	05/17/11
BMS 7/21/10	



Notes: Pt. 1 closest to far wall, Pt. 8 closest to port opening. Recorded data points are an avg of five TSI VelociCalc readings.

BMS 7/21/10

Entries made by:	EA 7/21/10 BMS 7/21/10	Technical Data Review performed by:	Carmen Arimescu
Signature/date	Signatures on original	Signature/date	Signatures on original 10/5/2010

TI-RPP-WTP_019

VELOCITY TRAVERSE DATA FORM

Site	**LB-S2 Model**	Run No.	**VT-8**
Date	**7/22/2010**	Fan Configuration	**A Only, Dampers B closed**
Testers	YFSu, BMS, EA	Fan Setting	**60 Hz**
Stack Dia.	11.9 in.	Stack Temp	89.4 deg F
Stack X-Area	111.2 in.2	Start/End Time	9:24 10:25
Test Port	2	Center 2/3 from	1.09 to: 10.81
Distance to disturbance	300.06 inches	Points in Center 2/3	2 to: 7
Velocity units	ft/min	Data Files:	NA

Order --> EA 7/22/10

Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	1380	1410	1540	1443.3	1370	1450	1380	1400.0
2	1.25	1580	1530	1590	1566.7	1480	1510	1490	1493.3
3	2.31	1630	1580	1670	1626.7	1580	1590	1590	1586.7
4	3.81	1670	1650	1650	1656.7	1640	1630	1610	1626.7
Center	5.95	1710	1660	1660	1676.7	1670	1640	1660	1656.7
5	8.00	1650	1600	1580	1610.0	1630	1620	1620	1623.3
6	9.50	1560	1630	1580	1590.0	1550	1560	1550	1553.3
7	10.56	1550	1500	1540	1530.0	1410	1400	1480	1430.0
8	11.31	1440	1410	1420	1423.3	1330	1340	1320	1330.0
Averages ---------->		1574.4	1552.2	1581.1	1569.3	1517.8	1526.7	1522.2	1522.2

All	ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1545.7		Mean	1608.1	1567.1	1587.6
Min Point	1330.0	-14.0%	Std. Dev.	50.9	81.2	68.5
Max Point	1676.7	8.5%	COV as %	3.2	5.2	**4.3**

Flow w/o C-Pt 1182 scfm

Vel Avg w/o C-Pt 1531 fpm

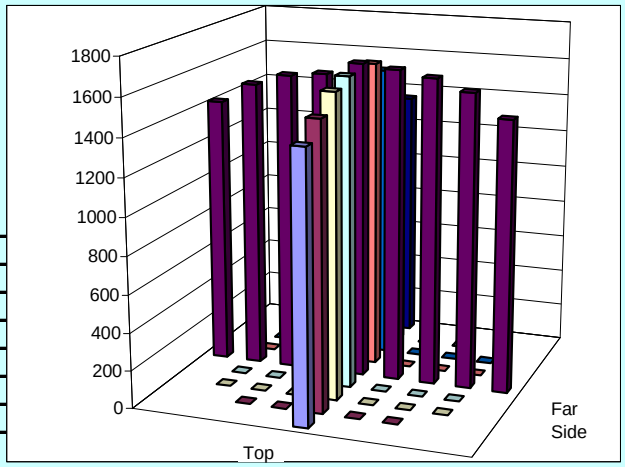
	Start	Finish	
Stack temp	87.5	91.3	F
Equipment temp	N/A		F
Ambient temp	83.3	85.1	F
Stack static	0	0	mbars
Ambient pressure	988	988	mbars
Total Stack pressure	988	988	mbars
Ambient humidity	30%	28%	RH

Instuments Used: Cal Due

TSI VelociCalc SN 209060 06/01/11

Fisher Scientific SN 61876141 05/17/11

EA 7/22/10



Notes: Re-do of VT-2 due to low reading along edges - see post-processed data averages. Point 1 is near far stack wall; Point 8 is near port opening. Data points are average of 5 TSI Velocicalc readings. EA 7/22/10

EA 7/22/10

Entries made by: EA 7/22/10

Signature/date Signatures on original

Technical Data Review performed by: Carmen Arimescu

Signature/date Signatures on original 10/5/2010

TI-RPP-WTP_019

VELOCITY TRAVERSE DATA FORM

Site	**LB-S2 Model**	Run No.	**VT-9**
Date	**7/22/10**	Fan Configuration	**B Only, Damper A closed**
Testers	YFSu, EA	Fan Setting	**40** **Hz**
Stack Dia.	11.9 in.	Stack Temp	91.6 deg F
Stack X-Area	111.2 in.2	Start/End Time	11:15 12:11
Test Port	1	Center 2/3 from	1.09 to: 10.81
Distance to disturbance	360.19 inches	Points in Center 2/3	2 to: 7
Velocity units	ft/min	Data Files:	NA

Order -->		1				2			XYY 8/16/10
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	Velocity				Velocity			
1	0.50	940	950	920	936.7	900	925	975	933.3
2	1.25	965	970	980	971.7	1010	990	995	998.3
3	2.31	1020	1070	1000	1030.0	1040	1060	1040	1046.7
4	3.81	1070	1090	1090	1083.3	1070	1070	1060	1066.7
Center	5.95	1080	1120	1090	1096.7	1080	1090	1110	1093.3
5	8.00	1030	1080	1060	1056.7	1060	1040	1060	1053.3
6	9.50	1030	1010	1020	1020.0	980	975	1010	988.3
7	10.56	955	980	965	966.7	910	915	880	901.7
8	11.31	925	945	900	923.3	810	790	820	806.7
Averages ---------->		1001.7	1023.9	1002.8	1009.4	984.4	983.9	994.4	987.6

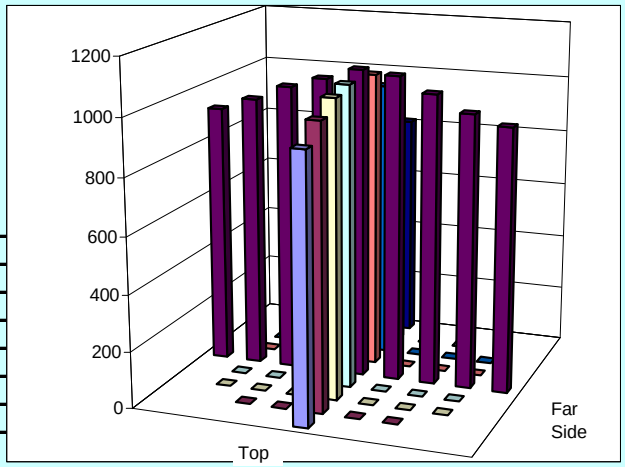
All	ft/min	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	998.5		Mean	1032.1	1021.2	1026.7
Min Point	806.7	-19.2%	Std. Dev.	50.8	64.3	56.0
Max Point	1096.7	9.8%	COV as %	4.9	6.3	**5.5**

Flow w/o C-Pt 762 scfm
Vel Avg w/o C-Pt 986 fpm

Instuments Used: Cal Due

TSI VelociCalc SN 209060	06/01/11
Fisher Scientific SN 61876141	05/17/11
EA 7/22/10	

	Start	Finish	
Stack temp	90.2	93	F
Equipment temp	N/A		F
Ambient temp	84.2	89.6	F
Stack static	0	0	mbars
Ambient pressure	987	988	mbars
Total Stack pressure	987	988	mbars
Ambient humidity	28%	21%	RH



Notes: Flow velocities were too low at 36.5 Hz (70%) Changed to 40 Hz per Xaio-Ying Yu. Each data point is an average of 5 TSI Velocicalc readings. Point 1 is near far stack wall; point 8 is near port opening. EA 7/22/2010

EA 7/22/2010

Entries made by:	EA 7/22/10	Technical Data Review performed by:	Carmen Arimescu
Signature/date	Signatures on original	Signature/date	Signatures on original 10/5/2010
			TI-RPP-WTP_019

Appendix C.3: LB-S2 Flow Angle Data Sheets

FLOW ANGLE DATA FORM

FlowAngleRev0.xls 4-Aug-06 Based on ---- CCP-WTPSP-178

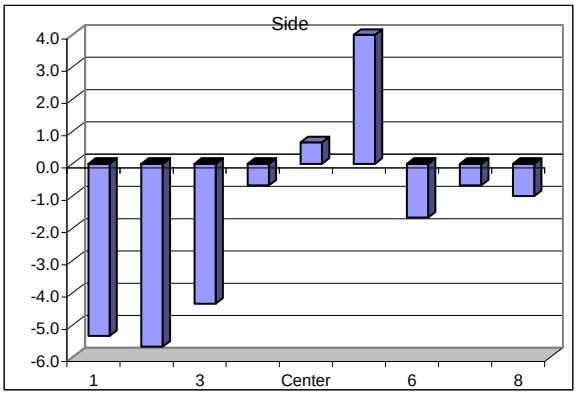
Site	**LBS2 scale model**	Run No.	**FA- 1**
Date	7/15/2010	Fan Setting	**60** Hz
Tester	YFSu, EA	Fan configuration	**A Only**
Stack Dia.	11.906 in	YFSu 7/15/1(Approx. air vel.	1580 fpm at point >> 1 side center
Stack X-Area	111.3 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	2
Distance to disturbance	300.06 in.	Stack Temp	107.4 F
Start/End Time	1500 / 1630h		

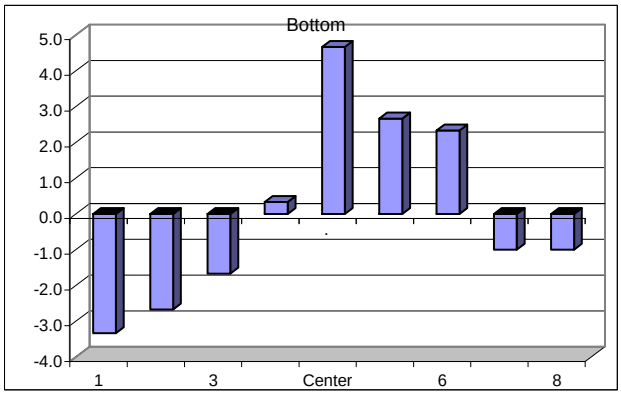
Order -->		1st				2nd			
Traverse-->		**Side**				**Bottom**			
Trial ---->		1	2	3		1	2	3	
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.
1	0.50	-3	-6	-7	-5.3	-4	-3	-3	-3.3
2	1.24	-6	-5	-6	-5.7	-3	-2	-3	-2.7
3	2.29	-4	-5	-4	-4.3	-1	-2	-2	-1.7
4	3.81	0	-2	0	-0.7	0	0	1	0.3
Center	5.89	1	0	1	0.7	5	5	4	4.7
5	7.98	5	0	7	4.0	0	1	7	2.7
6	9.50	-3	2	-4	-1.7	0	-3	10	2.3
7	10.54	-3	1	0	-0.7	-1	-1	-1	-1.0
8	11.28	-2	0	-1	-1.0	-2	-1	0	-1.0
Mean of absolute values:					2.7				2.2
" " w/o points by wall:					2.5				2.2
								Grand mean ABS	2.4
								" " w/o wall pts	2.4

Instuments Used:		**Cal. Due**
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI VelocCalc SN 209060	7/6/2011
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).

Notes: EA 7/15/2010





Entries made by:	YFSu, EA 7/15/2010	Technical Data Review performed by:	Carmen Arimescu
Signature/date	On file with original	Signature/date	Signature on File 9/28/2010
			TI-RPP-WTP_018

FLOW ANGLE DATA FORM

FlowAngleRev0.xls 4-Aug-06 Based on ---- CCP-WTPSP-178

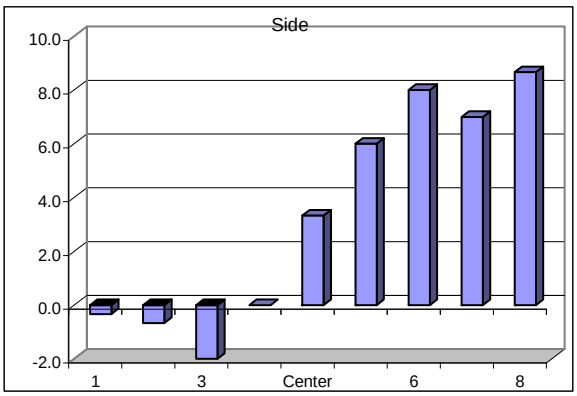
Site	LBS2 scale model	Run No.	FA-2
Date	7/16/2010	Fan Setting	60 Hz
Tester	EA, YFSu	Fan configuration	B Only, Damper A Closed
Stack Dia.	11.906 in	Approx. air vel.	1800 fpm at point >> 1 side center
Stack X-Area	111.3 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	2
Distance to disturbance	300.06 in.	Stack Temp	101.6 F
Start/End Time	1525 / 1609h		

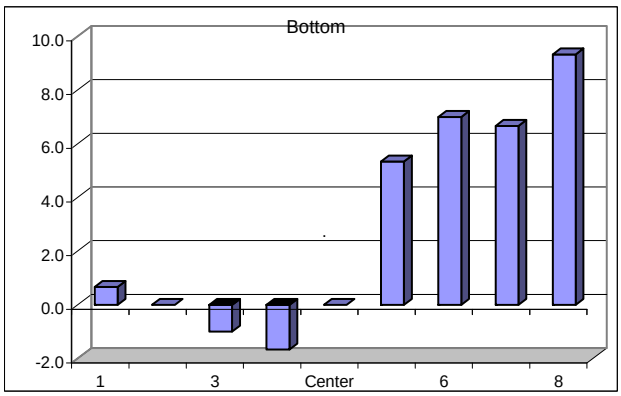
Order -->		2nd				1st			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3		1	2	3	
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.
1	0.50	0	-1	0	-0.3	0	1	1	0.7
2	1.24	0	-1	-1	-0.7	0	0	0	0.0
3	2.29	-2	-2	-2	-2.0	-1	-1	-1	-1.0
4	3.81	0	0	0	0.0	-3	-1	-1	-1.7
Center	5.89	3	3	4	3.3	0	0	0	0.0
5	7.98	6	6	6	6.0	4	6	6	5.3
6	9.50	8	8	8	8.0	7	7	7	7.0
7	10.54	7	7	7	7.0	6	7	7	6.7
8	11.28	9	8	9	8.7	9	9	10	9.3
Mean of absolute values:					4.0				3.5
" " w/o points by wall:					3.9				3.1
								Grand mean ABS	3.8
								" " w/o wall pts	3.5

Instuments Used:		Cal. Due
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI VelocCalc SN 209060	7/6/2011
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).

Notes: EA 7/16/2010





Entries made by:	EA, YFSu 7/16/2010	Technical Data Review performed by:	Carmen Arimescu
Signature/date	On file with original	Signature/date	Signature on File 9/28/2010
			TI-RPP-WTP_018

FLOW ANGLE DATA FORM

FlowAngleRev0.xls | 4-Aug-06 | Based on ---- | CCP-WTPSP-178

Site	**LBS2 scale model**	Run No.	**FA-3** **(Redo of FA-2)**
Date	7/19/2010	Fan Setting	**60** Hz
Tester	BMS, EA	Fan configuration	B Only, damper A closed
Stack Dia.	11.906 in	Approx. air vel.	1800 fpm at point >> 1 side center
Stack X-Area	111.3 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	2
Distance to disturbance	300.06 in.	Stack Temp	82 F
Start/End Time	940 / 1030		

Order -->	2nd					1st			
Traverse-->	**Side**					**Bottom**			
Trial ---->	1	2	3			1	2	3	
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.
1	0.50	0	0	0	0.0	-2	-1	0	-1.0
2	1.24	4	5	4	4.3	5	5	5	5.0
3	2.29	3	4	4	3.7	4	4	3	3.7
4	3.81	5	5	5	5.0	5	4	5	4.7
Center	5.89	1	1	0	0.7	2	2	3	2.3
5	7.98	0	0	0	0.0	-3	-4	0	-2.3
6	9.50	-2	-3	-2	-2.3	-2	-2	-3	-2.3
7	10.54	-1	-2	-1	-1.3	-2	-2	-2	-2.0
8	11.28	0	0	0	0.0	0	0	0	0.0
Mean of absolute values:					1.9				2.6
" " w/o points by wall:					2.5				3.2
								Grand mean ABS	2.3
								" " w/o wall pts	2.8

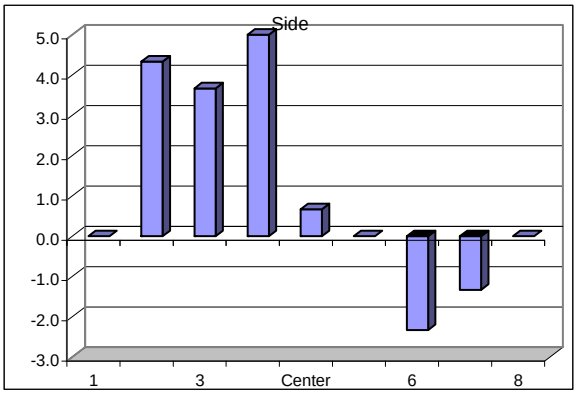
Instuments Used:		**Cal. Due**
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI VelocCalc SN 209060	7/6/2011
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

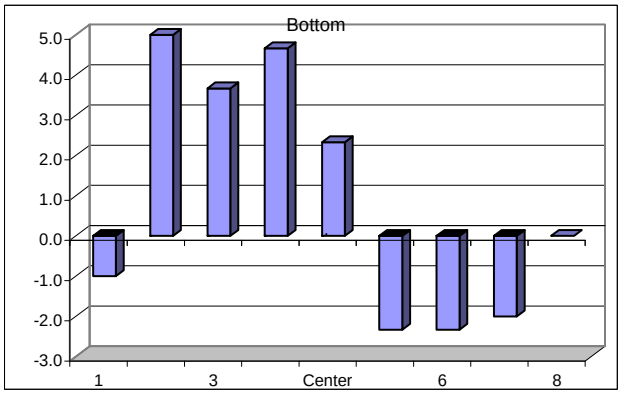
Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).

Notes: **Point 1 is nearest far wall of stack; Point 8 is nearest port opening.**

Data updated to reflect pt 1 as nearest to port and pt 8 nearest far wall EA 11/11/10

EA 7/19/10





Entries made by:	Ernest Antonio 7/19/10	Technical Data Review performed by:	Carmen Arimescu
Signature/date	On file with original	Signature/date	Signature on File 9/28/2010
			TI-RPP-WTP_018

FLOW ANGLE DATA FORM

FlowAngleRev0.xls | 4-Aug-06 | Based on ---- CCP-WTPSP-178

Site	**LBS2 scale model**	Run No.	**FA-4** **(Redo of FA-1)**
Date	7/19/2010	Fan Setting	**60** Hz
Tester	BMS, EA	Fan configuration	**A Only- Damper B closed**
Stack Dia.	11.906 in	Approx. air vel.	1730 fpm at point >> 1 side center
Stack X-Area	111.3 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	2
Distance to disturbance	300.06 in.	Stack Temp	89 F
Start/End Time	1035 / 1121		

Order -->	1st					2nd				
Traverse-->		**Side**				**Bottom**				
Trial ---->		1	2	3		1	2	3		
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.	
1	0.50	-14	-15	-15	-14.7	-5	-7	-8	-6.7	
2	1.24	-15	-16	-15	-15.3	-15	4	0	-3.7	
3	2.29	2	0	0	0.7	-1	0	0	-0.3	
4	3.81	0	0	5	1.7	1	0	0	0.3	
Center	5.89	-13	-2	-13	-9.3	0	0	0	0.0	
5	7.98	-10	-6	-6	-7.3	-4	-3	-4	-3.7	
6	9.50	-8	-7	-7	-7.3	-6	-6	-6	-6.0	
7	10.54	-8	-8	-7	-7.7	-6	-7	-6	-6.3	
8	11.28	-7	-8	-8	-7.7	-8	-7	-7	-7.3	
Mean of absolute values:					8.0				3.8	
" " w/o points by wall:					7.0				2.9	
								Grand mean ABS	5.9	
								" " w/o wall pts	5.0	

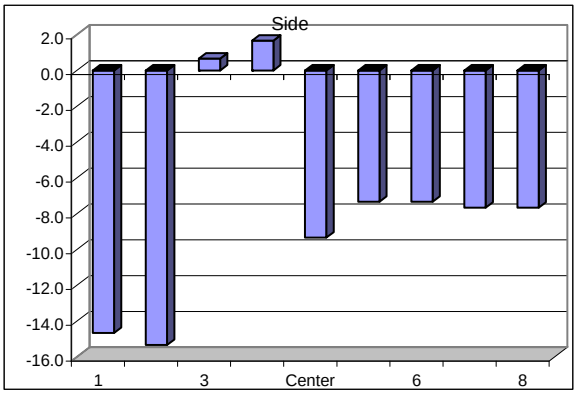
Instuments Used:		**Cal. Due**
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI VelocCalc SN 209060	7/6/2011
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

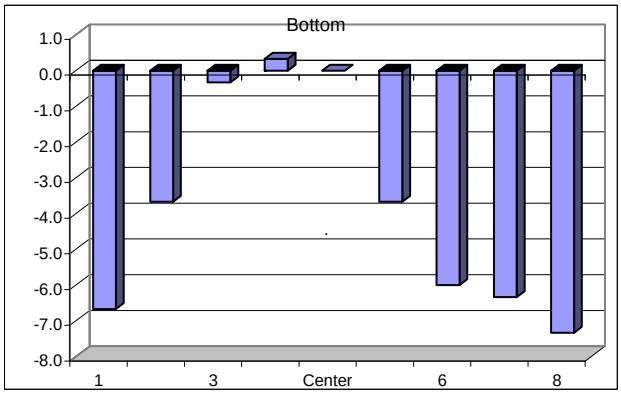
Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).

Notes: **Point 1 is nearest far wall of stack; Point 8 is nearest port opening.**

Data updated to reflect pt 1 as nearest to port and pt 8 nearest far wall EA 11/11/10

EA 7/19/10





Entries made by:	Ernest Antonio	7/19/2010	Technical Data Review performed by:	Carmen Arimescu
Signature/date	On file with original		Signature/date	Signature on File 9/28/2010
				TI-RPP-WTP_018

FLOW ANGLE DATA FORM

FlowAngleRev0.xls 4-Aug-06 Based on ---- CCP-WTPSP-178

Site	LBS2 scale model	Run No.	FA-5
Date	7/20/2010	Fan Setting	40 Hz
Tester	BMS, EA	Fan configuration	A Only- Damper B closed, 70%
Stack Dia.	11.906 in	Approx. air vel.	1010 fpm at point >>1 side center
Stack X-Area	111.3 in2	Units	degrees (clockwise > pos. nos.)
Elevation	N.A. ft	Port	2
Distance to disturbance	300.06 in.	Stack Temp	91.5 F
Start/End Time	1120/1210		

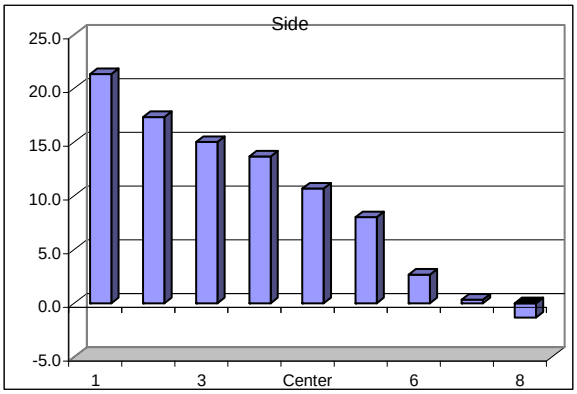
Order -->		1st				2nd				
Traverse-->		Side				Bottom				
Trial ---->		1	2	3		1	2	3		
Point	Depth, in.	deg. cw	deg. cw	deg. cw	Avg.	deg. cw	deg. cw	deg. cw	Avg.	
1	0.50	20	21	23	21.3	24	25	26	25.0	
2	1.24	15	18	19	17.3	22	21	23	22.0	
3	2.29	14	15	16	15.0	17	19	19	18.3	
4	3.81	12	14	15	13.7	17	16	18	17.0	
Center	5.89	9	10	13	10.7	14	16	15	15.0	
5	7.98	6	8	10	8.0	12	12	11	11.7	
6	9.50	1	2	5	2.7	7	6	6	6.3	
7	10.54	-1	0	2	0.3	2	3	3	2.7	
8	11.28	-4	-1	1	-1.3	1	0	2	1.0	
Mean of absolute values:					10.0				13.2	
" " w/o points by wall:					9.7				13.3	
								Grand mean ABS	11.6	
								" " w/o wall pts	11.5	

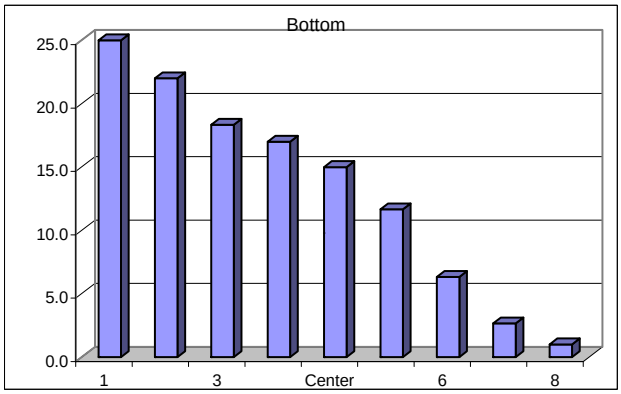
Instuments Used:

		Cal. Due
S-type pitot	Dwyer 24-inch S-type Pitot#10	Cert. of conformance
Velocity sensor	TSI VelociCalc SN 209060	6/1/2011
Angle indicator	Shop built	Cat. 3
Manometer	Dwyer 400-5, S36N	Cat. 3

Note:
To assure similar hose connections between the manometer and pitot tube, rotating the pitot tube assembly clockwise drives the meniscus to the right (to higher pos. numbers).

Notes: pt. 1 is nearest to far wall, pt. 8 is nearest to port.
Data updated to reflect pt 1 as nearest to port and pt 8 nearest far wall EA 11/11/10
BMS 7/20/10





Entries made by:	BMS 7/20/10	Technical Data Review performed by:	Carmen Arimescu
Signature/date	Signature on original	Signature/date	Signature on File 9/28/2010
			TI-RPP-WTP_018

Appendix C.4: LB-S2 Tracer Gas Uniformity Data Sheets

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LB-S2 Model**	Run No.	**GT-1**
Date	7/23/2010	Fan Configuration	**B Only; Damper A closed**
Testers	BMS, EA	Fan Setting	**60 Hz**
Stack Dia.	11.9 in.	Stack Temp	85.95 deg F
Stack X-Area	111.2 $in.^2$	Start/End Time	1100 / 1200
Test Port	2	Center 2/3 from	1.09 to: 10.81
Distance to disturbance	300.06 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**B Center**

Order -->		1				2			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	1.56	1.61	1.59	1.587	1.50	1.59	1.62	1.570
2	1.24	1.55	1.60	1.57	1.573	1.62	1.58	1.56	1.587
3	2.29	1.55	1.56	1.54	1.550	1.60	1.58	1.60	1.593
4	3.82	1.56	1.63	1.62	1.603	1.62	1.56	1.63	1.603
Center	5.91	1.54	1.56	1.60	1.567	1.58	1.62	1.62	1.607
5	8.00	1.61	1.60	1.62	1.610	1.58	1.60	1.59	1.590
6	9.52	1.62	1.59	1.64	1.617	1.65	1.62	1.62	1.630
7	10.57	1.65	1.69	1.62	1.653	1.64	1.59	1.59	1.607
8	11.31	1.55	1.60	1.58	1.577	1.61	1.56	1.64	1.603
Averages ---------->		1.577	1.604	1.598	1.593	1.600	1.589	1.608	1.599

All	ppm	Dev. from mean
Mean	1.60	
Min Point	1.55	-2.9%
Max Point	1.65	3.6%

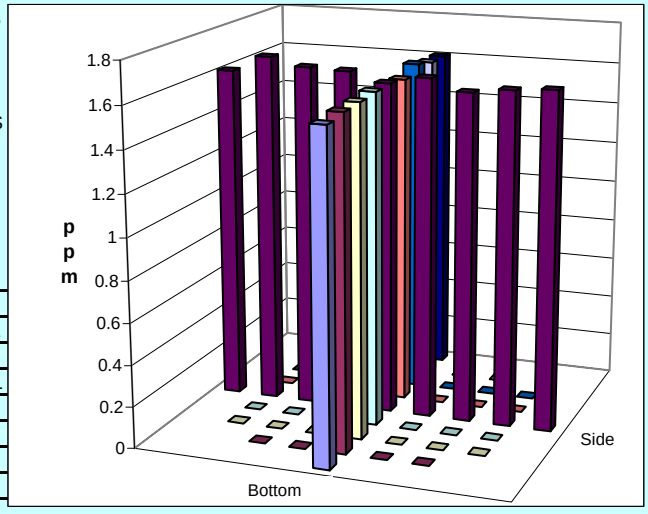
Center 2/3	Side	Bottom	All
Mean	1.60	1.60	1.60
Std. Dev.	0.04	0.01	0.03
COV as %	2.2	0.9	**1.6**

Avg. Conc. 1.597 ppm

Gas analyzer checked:
7/22/10 BMS SN 1788615

BMS 7/23/10

	Start	Finish	
Tracer tank pressure	300	300	psig
Stack Temp	84.3	87.6	Fº 7/27/10
Center Pt. air vel.	1850	1750.0	sfpm BMS
Injection flowmeter	59.0	59.0	sccm
Sampling flowmeter	10	9.5	lpm Sierra
Ambient pressure	999	999	mbar BMS
Ambient humidity	29%	25%	RH 7/27/10
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	47.1, 40.8, 49.4, 49.9	49.6, 48.0, 48.0, 46.8	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	80.6	84.2	



Instuments Used:

B&K 1302 Gas Analyzer SN 1788615	Cat2 MTE
TSI VelociCalc SN 209060	June 2011
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	5/17/2011

Notes: Sierra Instruments Vaccum SN 200

BMS 7/23/10

Entries made by:	BMS	Technical Data Review performed by:	Carmen Arimescu
Signature/date	signature on file 7/23/2010	Signature/date	Signature on File TI-RPP-WTP_020

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LB-S2 Model**	Run No.	**GT-2**
Date	7/23/2010	Fan Configuration	**B Only; Damper A closed**
Testers	BMS, EA	Fan Setting	**60 Hz**
Stack Dia.	11.9 in.	Stack Temp	89.55 deg F
Stack X-Area	111.2 in.^{2}	Start/End Time	1300 / 1350
Test Port	2	Center 2/3 from	1.09 to: 10.81
Distance to disturbance	300.06 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**B North**

Order -->		1st				2nd			
Traverse-->		Bottom BMS 7/23/10				Side BMS 7/23/10			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	1.62	1.60	1.73	1.650	1.60	1.64	1.62	1.620
2	1.24	1.64	1.61	1.69	1.647	1.78	1.71	1.65	1.713
3	2.29	1.63	1.62	1.67	1.640	1.64	1.63	1.64	1.637
4	3.82	1.67	1.65	1.71	1.677	1.67	1.62	1.63	1.640
Center	5.91	1.64	1.74	1.62	1.667	1.67	1.66	1.62	1.650
5	8.00	1.64	1.67	1.69	1.667	1.64	1.62	1.62	1.627
6	9.52	1.65	1.62	1.65	1.640	1.70	1.71	1.66	1.690
7	10.57	1.66	1.57	1.63	1.620	1.67	1.65	1.63	1.650
8	11.31	1.61	1.68	1.67	1.653	1.64	1.65	1.67	1.653
Averages ---------->		1.640	1.640	1.673	1.651	1.668	1.654	1.638	1.653

All	ppm	Dev. from mean
Mean	1.65	
Min Point	1.62	-2.0%
Max Point	1.71	3.7%

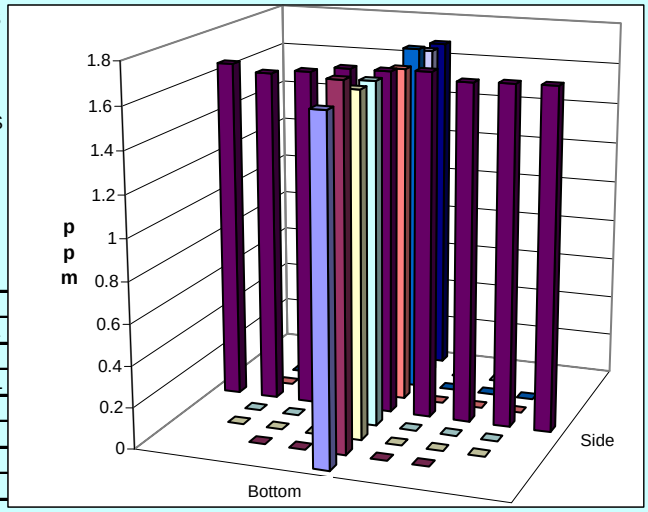
Center 2/3	Side	ide BMS 7/23/10	All
Mean	1.65	1.66	1.65
Std. Dev.	0.02	0.03	0.03
COV as %	1.2	1.9	**1.5**

Avg. Conc. 1.651 ppm

Gas analyzer checked:
7/22/10 BMS SN 1788615

	Start	Finish	
Tracer tank pressure	300	300	psig
Stack Temp	89.1	90	Fº 7/27/10
Center Pt. air vel.	1870	1810.0	sfpm BMS
Injection flowmeter	59.0	59.0	sccm
Sampling flowmeter	10.5	10.0	lpm Sierra
Ambient pressure	987	987	mbar BMS
Ambient humidity	24%	23%	RH 7/23/10
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	52.3, 51.0, 53.2, 50.0	59.1, 50.6, 52.4, 45.8	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	86.0	87.8	

BMS 7/23/10



Instuments Used:

B&K 1302 Gas Analyzer SN 1788615	Cat2 MTE
TSI VelociCalc SN 209060	June 2011
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	5/17/2011

Notes: Sierra Instruments Vaccum SN 200

Injection point is 1.5 inches away from duct wall on North Side.

Entries made by:	BMS	Technical Data Review performed by:	Carmen Arimescu
Signature/date	signature on file 7/23/2010	Signature/date	Signature on File 10/5/2010
			TI-RPP-WTP_020

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LB-S2 Model**	Run No.	**GT-3**
Date	7/23/2010	Fan Configuration	**B Only; Damper A closed**
Testers	BMS, EA	Fan Setting	**60 Hz**
Stack Dia.	11.9 in.	Stack Temp	91.1 deg F
Stack X-Area	111.2 in.^{2}	Start/End Time	1355 / 1437
Test Port	2	Center 2/3 from	1.09 to: 10.81
Distance to disturbance	300.06 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**B South**

		Side				Bottom			
Order -->		1st				2nd			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	1.67	1.70	1.75	1.707	1.70	1.70	1.75	1.717
2	1.24	1.72	1.73	1.72	1.723	1.77	1.68	1.74	1.730
3	2.29	1.68	1.75	1.74	1.723	1.70	1.75	1.73	1.727
4	3.82	1.75	1.72	1.75	1.740	1.78	1.73	1.73	1.747
Center	5.91	1.72	1.75	1.70	1.723	1.71	1.76	1.77	1.747
5	8.00	1.74	1.76	1.66	1.720	1.72	1.64	1.68	1.680
6	9.52	1.73	1.78	1.75	1.753	1.67	1.72	1.73	1.707
7	10.57	1.69	1.72	1.72	1.710	1.70	1.69	1.73	1.707
8	11.31	1.77	1.71	1.81	1.763	1.68	1.73	1.73	1.713
Averages ---------->		1.719	1.736	1.733	1.729	1.714	1.711	1.732	1.719

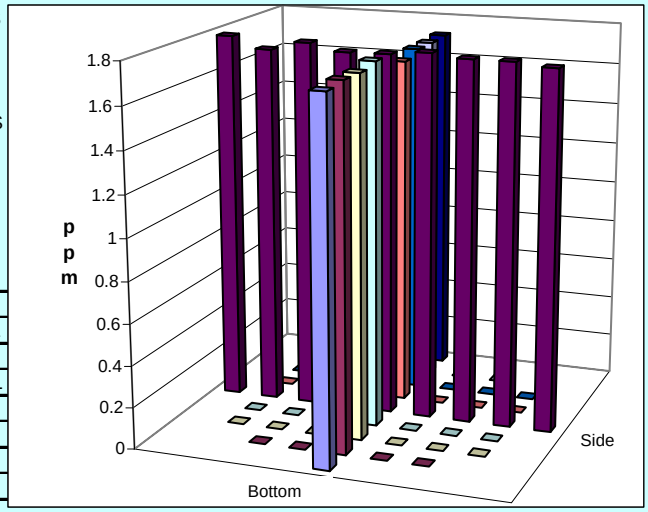
All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1.72		Mean	1.73	1.72	1.72
Min Point	1.68	-2.6%	Std. Dev.	0.01	0.02	0.02
Max Point	1.76	2.3%	COV as %	0.8	1.4	**1.1**

Avg. Conc. 1.723 ppm

Gas analyzer checked:
7/22/10 BMS SN 1788615

BMS 7/23/10

	Start	Finish	
Tracer tank pressure	300	300	psig
Stack Temp	90.2	92	Fº 7/27/10
Center Pt. air vel.	1840	1820.0	sfpm BMS
Injection flowmeter	59.0	59.0	sccm
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	987	987	mbar BMS
Ambient humidity	23%	21%	RH 7/23/10
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	43.7, 41.1, 41.6, 45.4	58.3, 48.9, 53.3, 42.3	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	88.7	89.6	



Instuments Used:

B&K 1302 Gas Analyzer SN 1788615	Cat2 MTE
TSI VelociCalc SN 209060	June 2011
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	5/17/2011

Notes: Sierra Instruments Vaccum SN 200

Injection point is 1.5 inches away from duct wall on South Side.

BMS 7/23/10

Entries made by:	BMS	Technical Data Review performed by:	Carmen Arimescu
Signature/date	signature on file 7/23/2010	Signature/date	Signature on File 10/5/2010
			TI-RPP-WTP_020

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06	Site	**LB-S2 Model**	Run No.	**GT-4**	
	Date	7/23/2010	Fan Configuration	**B Only; Damper A closed**	
	Testers	BMS, EA	Fan Setting	**60**	**Hz**
	Stack Dia.	11.9 in.	Stack Temp	93.3	deg F
	Stack X-Area	111.2 in.^{2}	Start/End Time	1445 / 1530	
	Test Port	2	Center 2/3 from	1.09 to:	10.81
	Distance to disturbance	300.06 inches	Points in Center 2/3	2 to:	7
	Measurement units	ppm SF6	Injection Point	**B West**	

Order -->		2nd				1st				
Traverse-->		Side				Bottom				
Trial ---->		1	2	3	Mean	1	2	3	Mean	
Point	Depth, in.	ppm				ppm				
1	0.50	1.63	1.68	1.67	1.660	1.67	1.68	1.69	1.680	
2	1.24	1.72	1.69	1.68	1.697	1.72	1.67	1.70	1.697	
3	2.29	1.72	1.73	1.68	1.710	1.74	1.60	1.70	1.680	
4	3.82	1.68	1.67	1.66	1.670	1.69	1.68	1.77	1.713	
Center	5.91	1.74	1.68	1.72	1.713	1.75	1.73	1.67	1.717	
5	8.00	1.68	1.66	1.67	1.670	1.74	1.70	1.61	1.683	
6	9.52	1.68	1.67	1.65	1.667	1.74	1.65	1.72	1.703	
7	10.57	1.69	1.68	1.69	1.687	1.68	1.65	1.68	1.670	
8	11.31	1.69	1.66	1.70	1.683	1.73	1.61	1.65	1.663	
Averages ---------->		1.692	1.680	1.680	1.684	1.718	1.663	1.688	1.690	

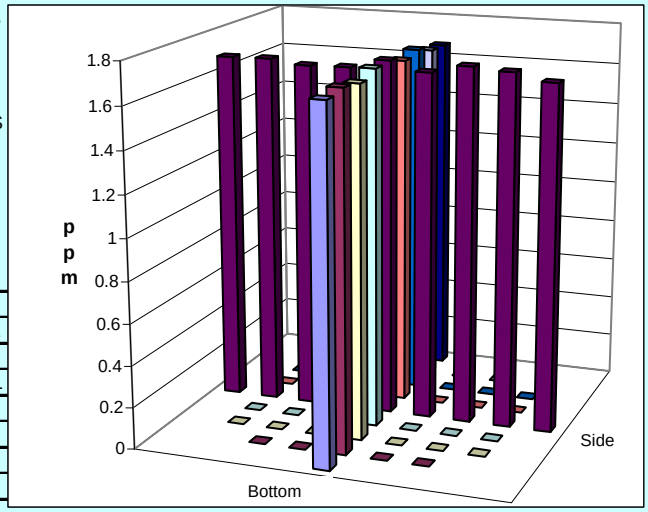
All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1.69		Mean	1.69	1.69	1.69
Min Point	1.66	-1.6%	Std. Dev.	0.02	0.02	0.02
Max Point	1.72	1.8%	COV as %	1.2	1.0	**1.1**

Avg. Conc. 1.683 ppm

Gas analyzer checked:
7/22/10 BMS SN 1788615

BMS 7/23/10

	Start	Finish	
Tracer tank pressure	300	300	psig
Stack Temp	93	93.6	Fº 7/27/10
Center Pt. air vel.	1070	1830.0	sfpm BMS
Injection flowmeter	59.0	59.0	sccm
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	987	987	mbar BMS
Ambient humidity	21%	21%	RH 7/23/10
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	61.3, 57.3, 54.9, 51.9	63.0, 62.1, 56.5, 59.9	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	84.2	89.6	



Instuments Used:

B&K 1302 Gas Analyzer SN 1788615	Cat2 MTE
TSI VelociCalc SN 209060	June 2011
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	5/17/2011

Notes: Sierra Instruments Vaccum SN 200

Injection point is 1.5 inches away from duct wall on West Side.

BMS 7/23/10

Entries made by:	BMS	Technical Data Review performed by:	Carmen Arimescu
Signature/date	signature on file 7/23/2010	Signature/date	Signature on File 10/5/2010
			TI-RPP-WTP_020

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LB-S2 Model**	Run No.	**GT-5**
Date	7/26/2010	Fan Configuration	**B Only; Damper A closed**
Testers	BMS, EA	Fan Setting	**60 Hz**
Stack Dia.	11.9 in.	Stack Temp	94.3 deg F
Stack X-Area	111.2 $in.^2$	Start/End Time	1040 / 1130
Test Port	2	Center 2/3 from	1.09 to: 10.81
Distance to disturbance	300.06 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**B East**

		Order -->	1st				2nd			
		Traverse-->	Side				Bottom			
		Trial ---->	1	2	3	Mean	1	2	3	Mean
Point	Depth, in.		ppm				ppm			
1	0.50		1.64	1.71	1.68	1.677	1.71	1.70	1.74	1.717
2	1.24		1.65	1.76	1.78	1.730	1.73	1.76	1.64	1.710
3	2.29		1.66	1.78	1.74	1.727	1.70	1.72	1.62	1.680
4	3.82		1.68	1.65	1.74	1.690	1.64	1.63	1.67	1.647
Center	5.91		1.65	1.62	1.71	1.660	1.78	1.65	1.74	1.723
5	8.00		1.72	1.80	1.73	1.750	1.81	1.78	1.70	1.763
6	9.52		1.73	1.73	1.71	1.723	1.71	1.75	1.74	1.733
7	10.57		1.72	1.78	1.69	1.730	1.68	1.77	1.76	1.737
8	11.31		1.68	1.68	1.70	1.687	1.65	1.64	1.72	1.670
Averages ---------->			1.681	1.723	1.720	1.708	1.712	1.711	1.703	1.709

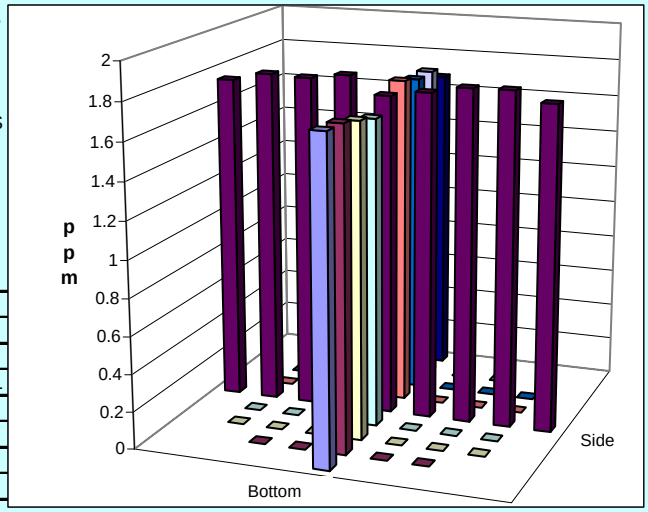
All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1.71		Mean	1.72	1.71	1.71
Min Point	1.65	-3.6%	Std. Dev.	0.03	0.04	0.03
Max Point	1.76	3.2%	COV as %	1.8	2.3	**2.0**

Avg. Conc. 1.711 ppm

Gas analyzer checked:
7/22/10 BMS SN 1788615

	Start	Finish	
Tracer tank pressure	300	300	psig
Stack Temp	93.3	95.3	Fº 7/27/10
Center Pt. air vel.	1070	1750.0	sfpm BMS
Injection flowmeter	59.0	59.0	sccm
Sampling flowmeter	10.5	10.0	lpm Sierra
Ambient pressure	989	988	mbar BMS
Ambient humidity	27%	23%	RH 7/26/10
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	44.6, 44.0, 44.0, 45.9	59.3, 56.5, 54.5, 55.7	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	84.2	92.3	

BMS 7/26/10



Instuments Used:

B&K 1302 Gas Analyzer SN 1788615	Cat2 MTE
TSI VelociCalc SN 209060	6/25/2011
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	5/17/2011

Notes: Sierra Instruments Vaccum SN 200

Injection point is 1.5 inches away from duct wall on East Side.

Entries made by:	BMS	Technical Data Review performed by:	Carmen Arimescu
Signature/date	signature on file 7/26/2010	Signature/date	Signature on File 10/5/2010
			TI-RPP-WTP_020

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LB-S2 Model**	Run No.	**GT-6**		
Date	7/26/2010	Fan Configuration	**A Only; Damper B closed**		
Testers	BMS, EA	Fan Setting	**60**	**Hz**	
Stack Dia.	11.9 in.	Stack Temp	100.85	deg F	
Stack X-Area	111.2 in.^{2}	Start/End Time	1140 / 1230		
Test Port	2	Center 2/3 from	1.09	to:	10.81
Distance to disturbance	300.06 inches	Points in Center 2/3	2	to:	7
Measurement units	ppm SF6	Injection Point	**A Center**		

Order -->		1st				2nd			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	1.81	1.79	1.86	1.820	1.82	1.80	1.86	1.827
2	1.24	1.84	1.82	1.80	1.820	1.82	1.83	1.84	1.830
3	2.29	1.81	1.86	1.77	1.813	1.80	1.80	1.84	1.813
4	3.82	1.85	1.84	1.84	1.843	1.84	1.81	1.87	1.840
Center	5.91	1.81	1.78	1.84	1.810	1.79	1.80	1.83	1.807
5	8.00	1.81	1.80	1.83	1.813	1.84	1.83	1.81	1.827
6	9.52	1.85	1.84	1.80	1.830	1.86	1.82	1.85	1.843
7	10.57	1.79	1.85	1.86	1.833	1.84	1.82	1.85	1.837
8	11.31	1.82	1.82	1.86	1.833	1.83	1.84	1.86	1.843
Averages ---------->		1.821	1.822	1.829	1.824	1.827	1.817	1.846	1.830

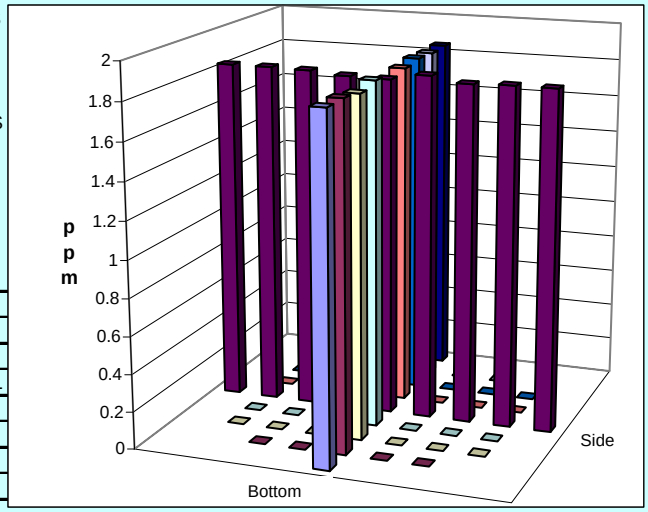
All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1.83		Mean	1.82	1.83	1.83
Min Point	1.81	-1.1%	Std. Dev.	0.01	0.01	0.01
Max Point	1.84	0.9%	COV as %	0.7	0.8	**0.7**

Avg. Conc. 1.829 ppm

Gas analyzer checked:
7/22/10 BMS SN 1788615

	Start	Finish	
Tracer tank pressure	300	300	psig
Stack Temp	100.8	100.9	Fº 7/27/10
Center Pt. air vel.	1070	1680	sfpm BMS
Injection flowmeter	59.0	59.0	sccm
Sampling flowmeter	10.0	10.0	lpm Sierra
Ambient pressure	988	988	mbar BMS
Ambient humidity	21%	20%	RH 7/26/10
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	55.3, 46.3, 44.8, 46.7	61.0, 66.6, 51.8, 42.8	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	84.2	95.9	

BMS 7/26/10



Instuments Used:

B&K 1302 Gas Analyzer SN 1788615	Cat2 MTE
TSI VelociCalc SN 209060	6/25/2011
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	5/17/2011

Notes: Sierra Instruments Vaccum SN 200

Entries made by:	BMS	Technical Data Review performed by:	Carmen Arimescu
Signature/date	signature on file 7/26/2010	Signature/date	Signature on File 10/5/2010
			TI-RPP-WTP_020

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06	Site	**LB-S2 Model**	Run No.	**GT-7**	
	Date	7/27/2010	Fan Configuration	**A Only; Damper B closed**	
	Testers	BMS, EA	Fan Setting	**60 Hz**	
	Stack Dia.	11.9 in.	Stack Temp	79.9 deg F	
	Stack X-Area	111.2 $in.^2$	Start/End Time	840 / 930	
	Test Port	2	Center 2/3 from	1.09 to: 10.81	
	Distance to disturbance	300.06 inches	Points in Center 2/3	2 to: 7	
	Measurement units	ppm SF6	Injection Point	**A South**	

		Side				Bottom			
Order -->		1st				2nd			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	1.71	1.76	1.83	1.767	1.80	1.79	1.76	1.783
2	1.24	1.72	1.76	1.81	1.763	1.72	1.80	1.74	1.753
3	2.29	1.78	1.77	1.74	1.763	1.89	1.79	1.82	1.833
4	3.82	1.78	1.74	1.83	1.783	1.84	1.92	1.88	1.880
Center	5.91	1.74	1.77	1.79	1.767	1.79	1.80	1.76	1.783
5	8.00	1.78	1.76	1.77	1.770	1.75	1.84	1.80	1.797
6	9.52	1.79	1.83	1.75	1.790	1.79	1.78	1.84	1.803
7	10.57	1.72	1.82	1.74	1.760	1.72	1.84	1.83	1.797
8	11.31	1.78	1.83	1.86	1.823	1.76	1.80	1.81	1.790
Averages ---------->		1.756	1.782	1.791	1.776	1.784	1.818	1.804	1.802

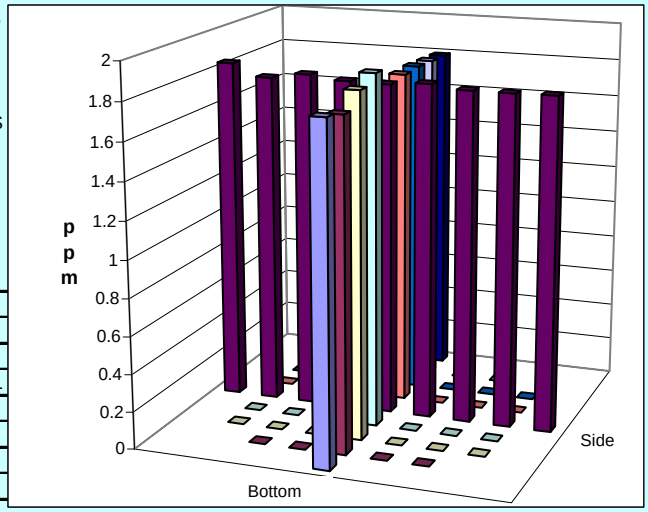
All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1.79		Mean	1.77	1.81	1.79
Min Point	1.75	-2.0%	Std. Dev.	0.01	0.04	0.03
Max Point	1.88	5.1%	COV as %	0.6	2.2	**1.9**

Avg. Conc. 1.791 ppm

Gas analyzer checked:
7/22/10 BMS SN 1788615

	Start	Finish	
Tracer tank pressure	300	300	psig
Stack Temp	79.3	80.5	Fº 7/27/10
Center Pt. air vel.	1070	1700	sfpm BMS
Injection flowmeter	59.0	59.0	sccm
Sampling flowmeter	10.0	10.0	lpm Sierra
Ambient pressure	987	987	mbar BMS
Ambient humidity	31%	32%	RH 7/27/10
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	61.3, 57.0, 55.2, 57.3	74.1, 60.5, 59.9, 58.1	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	84.2	78.8	

BMS 7/27/10



Instuments Used:

B&K 1302 Gas Analyzer SN 1788615	Cat2 MTE
TSI VelociCalc SN 209060	6/25/2011
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	5/17/2011

Notes: Sierra Instruments Vaccum SN 200

Injection point is approximately 1.5 inches away from duct wall on South side.

Entries made by:	BMS	Technical Data Review performed by:	Carmen Arimescu
Signature/date	signature on file 7/27/2010	Signature/date	Signature on File 10/5/2010
			TI-RPP-WTP_020

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LB-S2 Model**	Run No.	**GT-8**		
Date	7/27/2010	Fan Configuration	**A Only; Damper B closed**		
Testers	BMS, EA	Fan Setting	**60**	**Hz**	
Stack Dia.	11.9 in.	Stack Temp	83.15	deg F	
Stack X-Area	111.2 in.^{2}	Start/End Time	930 / 1020		
Test Port	2	Center 2/3 from	1.09	to:	10.81
Distance to disturbance	300.06 inches	Points in Center 2/3	2	to:	7
Measurement units	ppm SF6	Injection Point	**A North**		

		Side				Bottom			
Order -->		2nd				1st			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	1.78	1.83	1.80	1.803	1.76	1.76	1.79	1.770
2	1.24	1.82	1.75	1.80	1.790	1.77	1.72	1.81	1.767
3	2.29	1.79	1.78	1.75	1.773	1.86	1.78	1.74	1.793
4	3.82	1.79	1.76	1.75	1.767	1.79	1.77	1.80	1.787
Center	5.91	1.75	1.84	1.76	1.783	1.76	1.84	1.74	1.780
5	8.00	1.84	1.81	1.81	1.820	1.73	1.79	1.72	1.747
6	9.52	1.81	1.79	1.78	1.793	1.81	1.80	1.80	1.803
7	10.57	1.78	1.77	1.82	1.790	1.83	1.79	1.82	1.813
8	11.31	1.77	1.75	1.78	1.767	1.77	1.80	1.82	1.797
Averages ---------->		1.792	1.787	1.783	1.787	1.787	1.783	1.782	1.784

All	ppm	Dev. from mean
Mean	1.79	
Min Point	1.75	-2.2%
Max Point	1.82	1.9%

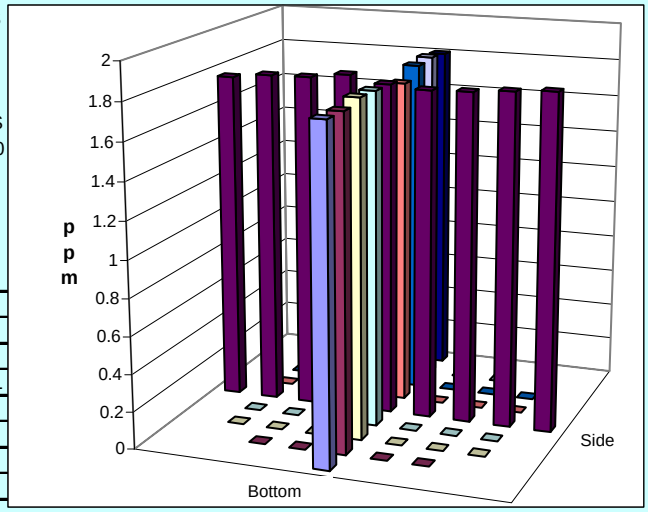
Center 2/3	Side	Bottom	All
Mean	1.79	1.78	1.79
Std. Dev.	0.02	0.02	0.02
COV as %	1.0	1.3	**1.1**

Avg. Conc. 1.786 ppm

Gas analyzer checked:
7/22/10 BMS SN 1788615

		Start	Finish	
Tracer tank pressure		300	300	psig
Stack Temp		80.9	85.4	F° 7/27/10
Center Pt. air vel.		1070	1640	sfpm BMS
Injection flowmeter		59.0	59.0	sccm
Sampling flowmeter		10.0	10.0	lpm Sierra
Ambient pres	BMS	987	987	mbar BMS
Ambient hum	7/27/2010	31%	28%	RH 7/27/10
B&K vapor correction		N	N	Y/N
Back-Gd gas ppb		48.0, 49.8, 112, 61.2	74.2, 70.6, 52.1, 54.6	
No. Bk-Gd samples		4	4	n
Ambient Temp, F		84.2	84.2	

BMS 7/27/10



Instuments Used:

B&K 1302 Gas Analyzer SN 1788615	Cat2 MTE
TSI VelociCalc SN 209060	6/25/2011
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	5/17/2011

Notes: Sierra Instruments Vaccum SN 200

Injection point is approximately 1.5 inches away from duct wall on North side.

Entries made by:	BMS	Technical Data Review performed by:	Carmen Arimescu
Signature/date	signature on file 7/27/2010	Signature/date	Signature on File 10/5/2010
			TI-RPP-WTP_020

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LB-S2 Model**	Run No.	**GT-9**
Date	7/27/2010	Fan Configuration	**A Only; Damper B closed**
Testers	BMS, EA	Fan Setting	**60 Hz**
Stack Dia.	11.9 in.	Stack Temp	88.65 deg F
Stack X-Area	111.2 in.^{2}	Start/End Time	1020 / 1110
Test Port	2	Center 2/3 from	1.09 to: 10.81
Distance to disturbance	300.06 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**A East**

Order -->		1st				2nd				
Traverse-->		Side				Bottom				
Trial ---->		1	2	3	Mean	1	2	3	Mean	
Point	Depth, in.	ppm				ppm				
1	0.50	1.87	1.82	1.81	1.833	1.82	1.82	1.76	1.800	
2	1.24	1.84	1.81	1.85	1.833	1.79	1.83	1.75	1.790	
3	2.29	1.80	1.85	1.82	1.823	1.82	1.74	1.84	1.800	
4	3.82	1.81	1.79	1.79	1.797	1.83	1.82	1.81	1.820	
Center	5.91	1.83	1.80	1.82	1.817	1.75	1.82	1.83	1.800	
5	8.00	1.83	1.79	1.82	1.813	1.77	1.86	1.82	1.817	
6	9.52	1.88	1.82	1.84	1.847	1.80	1.83	1.87	1.833	
7	10.57	1.92	1.82	1.78	1.840	1.79	1.79	1.89	1.823	
8	11.31	1.82	1.86	1.83	1.837	1.82	1.84	1.84	1.833	
Averages ---------->		1.844	1.818	1.818	1.827	1.799	1.817	1.823	1.813	

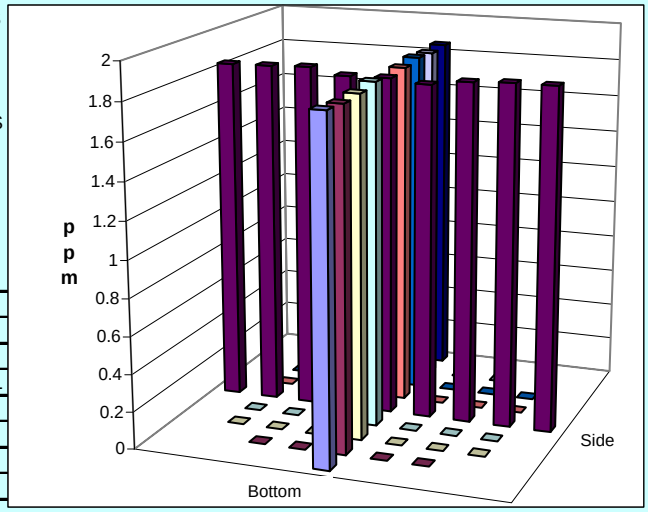
All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1.82		Mean	1.82	1.81	1.82
Min Point	1.79	-1.6%	Std. Dev.	0.02	0.02	0.02
Max Point	1.85	1.5%	COV as %	0.9	0.9	**0.9**

Avg. Conc. 1.821 ppm

Gas analyzer checked:
7/22/10 BMS SN 1788615

	Start	Finish	
Tracer tank pressure	300	300	psig
Stack Temp	85.6	91.7	Fº 7/27/10
Center Pt. air vel.	1070	1770	sfpm BMS
Injection flowmeter	59.0	59.0	sccm
Sampling flowmeter	10.0	10.0	lpm Sierra
Ambient pressure	987	986	mbar BMS
Ambient humidity	28%	25%	RH 7/27/10
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	55.0, 55.6, 70.5, 65.5	80.8, 67.9, 64.0, 64.2	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	84.2	92.3	

BMS 7/27/10



Instuments Used:

B&K 1302 Gas Analyzer SN 1788615	Cat2 MTE
TSI VelociCalc SN 209060	6/25/2011
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	5/17/2011

Notes: Sierra Instruments Vaccum SN 200

Injection point is approximately 1.5 inches away from duct wall on East side.

Entries made by:	BMS	Technical Data Review performed by:	Carmen Arimescu
Signature/date	signature on file 7/27/2010	Signature/date	Signature on File 10/5/2010
			TI-RPP-WTP_020

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06	Site	**LB-S2 Model**	Run No.	**GT-10**	
	Date	7/27/2010	Fan Configuration	**A Only; Damper B closed**	
	Testers	BMS, EA	Fan Setting	**60**	**Hz**
	Stack Dia.	11.9 in.	Stack Temp	98.1	deg F
	Stack X-Area	111.2 in.^{2}	Start/End Time	1320 / 1410	
	Test Port	2	Center 2/3 from	1.09 to:	10.81
	Distance to disturbance	300.06 inches	Points in Center 2/3	2 to:	7
	Measurement units	ppm SF6	Injection Point	**A West**	

Order -->		1st				2nd			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	1.57	1.86	1.82	1.750	1.76	1.81	1.80	1.790
2	1.24	1.78	1.79	1.79	1.787	1.77	1.77	1.82	1.787
3	2.29	1.77	1.76	1.89	1.807	1.81	1.79	1.73	1.777
4	3.82	1.78	1.79	1.70	1.757	1.82	1.74	1.84	1.800
Center	5.91	1.81	1.85	1.83	1.830	1.85	1.72	1.83	1.800
5	8.00	1.80	1.83	1.86	1.830	1.81	1.77	1.82	1.800
6	9.52	1.82	1.77	1.86	1.817	1.74	1.85	1.79	1.793
7	10.57	1.84	1.75	1.82	1.803	1.84	1.86	1.84	1.847
8	11.31	1.86	1.84	1.84	1.847	1.78	1.87	1.88	1.843
Averages ---------->		1.781	1.804	1.823	1.803	1.798	1.798	1.817	1.804

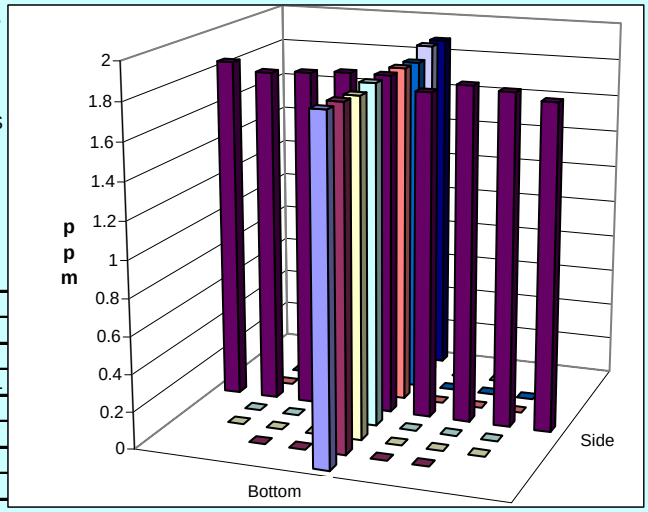
All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1.80		Mean	1.80	1.80	1.80
Min Point	1.75	-3.0%	Std. Dev.	0.03	0.02	0.02
Max Point	1.85	2.4%	COV as %	1.4	1.2	**1.3**

Avg. Conc. 1.802 ppm

Gas analyzer checked:
7/22/10 BMS SN 1788615

	Start	Finish	
Tracer tank pressure	300	300	psig
Stack Temp	97.5	98.7	Fº 7/27/10
Center Pt. air vel.	1070	1870	sfpm BMS
Injection flowmeter	59.0	59.0	sccm
Sampling flowmeter	10.0	10.0	lpm Sierra
Ambient pressure	984	983	mbar BMS
Ambient humidity	23%	21%	RH 7/27/10
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	64.2, 63.5, 59.8, 59.5	69.8, 64.9, 62.6, 62.6	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	84.2	95.9	

BMS 7/27/10



Instuments Used:

B&K 1302 Gas Analyzer SN 1788615	Cat2 MTE
TSI VelociCalc SN 209060	6/25/2011
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	5/17/2011

Notes: Sierra Instruments Vaccum SN 200

Injection point is approximately 1.5 inches away from duct wall on West side.

Entries made by:	BMS	Technical Data Review performed by:	Carmen Arimescu
Signature/date	signature on file 7/27/2010	Signature/date	Signature on File 10/5/2010
			TI-RPP-WTP_020

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06	Site	**LB-S2 Model**	Run No. **GT-11**
	Date	7/28/2010	Fan Configuration **B Only; Damper A closed**
	Testers	BMS, EA	Fan Setting **60 Hz**
	Stack Dia.	11.9 in.	Stack Temp 87.6 deg F
	Stack X-Area	111.2 $in.^2$	Start/End Time 1313 /1430
	Test Port	2	Center 2/3 from 1.09 to: 10.81
	Distance to disturbance	300.06 inches	Points in Center 2/3 2 to: 7
	Measurement units	ppm SF6	Injection Point **B East**

Order -->		1st				2nd				
Traverse-->		Side				Bottom				
Trial ---->		1	2	3	Mean	1	2	3	Mean	
Point	Depth, in.	ppm				ppm				
1	0.50	1.71	1.69	1.69	1.697	1.64	1.69	1.67	1.667	
2	1.24	1.68	1.65	1.74	1.690	1.67	1.80	1.71	1.727	
3	2.29	1.67	1.71	1.79	1.723	1.78	1.70	1.69	1.723	
4	3.82	1.71	1.74	1.71	1.720	1.79	1.70	1.67	1.720	
Center	5.91	1.72	1.64	1.66	1.673	1.76	1.66	1.80	1.740	
5	8.00	1.76	1.72	1.68	1.720	1.78	1.66	1.72	1.720	
6	9.52	1.73	1.72	1.65	1.700	1.79	1.81	1.72	1.773	
7	10.57	1.74	1.79	1.73	1.753	1.71	1.70	1.57	1.660	
8	11.31	1.72	1.70	1.73	1.717	1.72	1.67	1.76	1.717	
Averages ---------->		1.716	1.707	1.709	1.710	1.738	1.710	1.701	1.716	

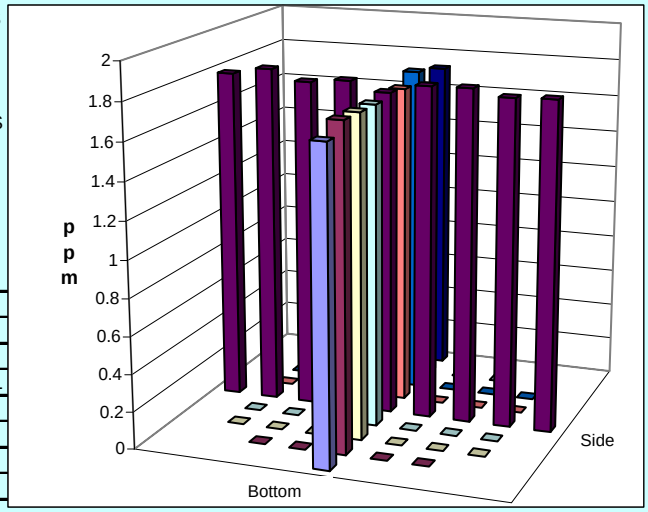
All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	1.71		Mean	1.71	1.72	1.72
Min Point	1.66	-3.1%	Std. Dev.	0.03	0.03	0.03
Max Point	1.77	3.5%	COV as %	1.5	2.0	**1.7**

Avg. Conc. 1.714 ppm

Gas analyzer checked:
7/22/10 BMS SN1788615

BMS 7/28/10

	Start	Finish	
Tracer tank pressure	300	300	psig
Stack Temp	89.1	86.1	Fº 7/28/10
Center Pt. air vel.	1070	1710.0	sfpm BMS
Injection flowmeter	59.0	59.0	sccm
Sampling flowmeter	10	10.0	lpm Sierra
Ambient pressure	990	989	mbar BMS
Ambient humidity	34%	33%	RH 7/28/10
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	77.1, 80.1, 75.8, 77.6	81.7, 78.9, 70.8, 73.0	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	84.2	86.0	



Instuments Used:

B&K 1302 Gas Analyzer SN 1788615	Cat2 MTE
TSI VelociCalc SN 209060	6/25/2011
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	5/17/2011

Notes: Sierra Instruments Vaccum SN 200

Repeat of GT-5.

Injection point is approximately 1.5 inches away from duct wall on East Side.

BMS 7/28/10

Entries made by:	BMS	Technical Data Review performed by:	Carmen Arimescu
Signature/date	signature on file 7/28/2010	Signature/date	Signature on File 10/5/2010
			TI-RPP-WTP_020

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LB-S2 Model**	Run No.	**GT-12**
Date	7/28/2010	Fan Configuration	**B Only; Damper A closed**
Testers	BMS, EA	Fan Setting	**60 Hz**
Stack Dia.	11.9 in.	Stack Temp	84.95 deg F
Stack X-Area	111.2 $in.^2$	Start/End Time	1435 /1515
Test Port	2	Center 2/3 from	1.09 to: 10.81
Distance to disturbance	300.06 inches	Points in Center 2/3	2 to: 7
Measurement units	ppm SF6	Injection Point	**B East**

Order -->		1st	BMS 7/28/10			2nd	7/28/2010			
Traverse-->		Bottom				Side				
Trial ---->		1	2	3	Mean	1	2	3	Mean	
Point	Depth, in.	ppm				ppm				
1	0.50	1.66	1.72	1.63	1.670	1.75	1.66	1.69	1.700	
2	1.24	1.69	1.71	1.76	1.720	1.75	1.75	1.75	1.750	
3	2.29	1.71	1.71	1.67	1.697	1.74	1.67	1.72	1.710	
4	3.82	1.66	1.73	1.69	1.693	1.68	1.71	1.71	1.700	
Center	5.91	1.76	1.76	1.66	1.727	1.66	1.67	1.70	1.677	
5	8.00	1.72	1.75	1.70	1.723	1.71	1.77	1.73	1.737	
6	9.52	1.70	1.75	1.77	1.740	1.75	1.74	1.69	1.727	
7	10.57	1.71	1.73	1.66	1.700	1.67	1.66	1.82	1.717	
8	11.31	1.69	1.78	1.75	1.740	1.73	1.79	1.72	1.747	
Averages ---------->		1.700	1.738	1.699	1.712	1.716	1.713	1.726	1.718	

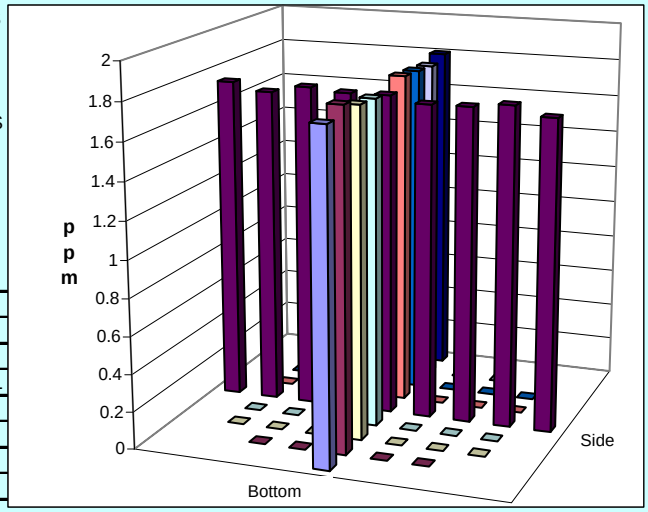
All	ppm	Dev. from mean	***Center 2/3***	Side	Side	All
Mean	1.72		Mean	1.71	1.72	1.72
Min Point	1.67	-2.6%	Std. Dev.	0.02	0.02	0.02
Max Point	1.75	2.0%	COV as %	1.0	1.4	**1.2**

Avg. Conc. 1.717 ppm

Gas analyzer checked:
7/22/10 BMS SN1788615

BMS 7/28/10

	Start	Finish	
Tracer tank pressure	300	300	psig
Stack Temp	86.1	83.8	Fº 7/28/10
Center Pt. air vel.	1070	1840	sfpm BMS
Injection flowmeter	59.0	59.0	sccm
Sampling flowmeter	10.0	10.0	lpm Sierra
Ambient pressure	989	988	mbar BMS
Ambient humidity	33%	34%	RH 7/28/10
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	61.2, 63.4, 66.5, 60.4	77.6, 73.0, 68.0, 76.6	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	84.2	83.3	



Instuments Used:

B&K 1302 Gas Analyzer SN 1788615	Cat2 MTE
TSI VelociCalc SN 209060	6/25/2011
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	5/17/2011

Notes: Sierra Instruments Vaccum SN 200

Repeat of GT-5.

Injection point is approximately 1.5 inches away from duct wall on East Side.

BMS 7/28/10

Entries made by:	BMS	Technical Data Review performed by:	Carmen Arimescu
Signature/date	signature on file 7/28/2010	Signature/date	Signature on File 10/5/2010
			TI-RPP-WTP_020

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06	Site	**LB-S2 Model**	Run No.	**GT-13**	
	Date	7/29/2010	Fan Configuration	**B Only; Damper A closed**	BMS 7/29/10
	Testers	BMS, EA	Fan Setting	**40 Hz**	
	Stack Dia.	11.9 in.	Stack Temp	82.5 deg F	
	Stack X-Area	111.2 $in.^2$	Start/End Time	840 / 1000	
	Test Port	2	Center 2/3 from	1.09 to:	10.81
	Distance to disturbance	300.06 inches	Points in Center 2/3	2 to:	7
	Measurement units	ppm SF6	Injection Point	**B Center**	

		Side				Bottom			
Order -->		1st				2nd			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	2.43	2.44	2.60	2.490	2.51	2.51	2.58	2.533
2	1.24	2.47	2.52	2.54	2.510	2.56	2.46	2.58	2.533
3	2.29	2.46	2.47	2.54	2.490	2.59	2.50	2.56	2.550
4	3.82	2.45	2.45	2.56	2.487	2.60	2.47	2.59	2.553
Center	5.91	2.47	2.47	2.48	2.473	2.49	2.56	2.57	2.540
5	8.00	2.50	2.50	2.52	2.507	2.59	2.57	2.54	2.567
6	9.52	2.45	2.44	2.51	2.467	2.61	2.51	2.44	2.520
7	10.57	2.44	2.44	2.50	2.460	2.55	2.43	2.58	2.520
8	11.31	2.44	2.44	2.48	2.453	2.55	2.56	2.48	2.530
Averages ---------->		2.457	2.463	2.526	2.482	2.561	2.508	2.547	2.539

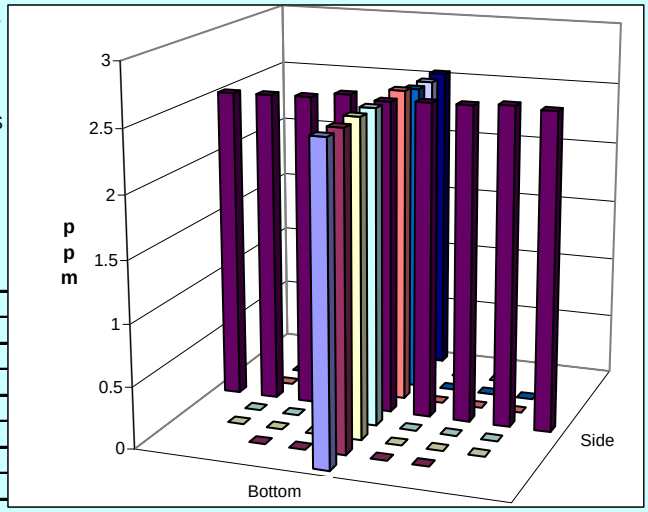
All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	2.51		Mean	2.48	2.54	2.51
Min Point	2.45	-2.3%	Std. Dev.	0.02	0.02	0.03
Max Point	2.57	2.3%	COV as %	0.8	0.7	**1.3**

Avg. Conc. 2.511 ppm

Gas analyzer checked:
7/22/10 BMS SN 1788615

	Start	Finish	
Tracer tank pressure	280	280	psig
Stack Temp	78.4	86.6	Fº 7/29/10
Center Pt. air vel.	1070	1060.0	sfpm BMS
Injection flowmeter	59.0	59.0	sccm
Sampling flowmeter	10	10	lpm Sierra
Ambient pressure	992	993	mbar BMS
Ambient humidity	55%	36%	RH 7/29/10
B&K vapor correction	Y	Y	Y/N
Back-Gd gas ppb	8.40, 5.29, 7.94, 8.53	22.6, 23.5, 24.4, 19.7	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	84.2	84.2	

BMS 7/29/10



Instuments Used:

B&K 1302 Gas Analyzer SN 1788615	Cat2 MTE
TSI VelociCalc SN 209060	6/25/11
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	5/17/11

Notes: Sierra Instruments Vaccum SN 200

Worst case Fan 70% flow.

Used water compensation because the gas analyzer gave a water vapor concentration > 14.5E+03.

BMS 7/29/10

Entries made by:	BMS	Technical Data Review performed by:	Carmen Arimescu
Signature/date	signature on file 7/29/2010	Signature/date	Signature on File 10/5/2010
			TI-RPP-WTP_020

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06	Site	**LB-S2 Model**	Run No.	**GT-14**	
	Date	7/29/2010	Fan Configuration	**B Only; Damper A closed**	BMS 7/29/10
	Testers	BMS, EA	Fan Setting	**40 Hz**	
	Stack Dia.	11.9 in.	Stack Temp	91.7 deg F	
	Stack X-Area	111.2 $in.^2$	Start/End Time	1000 / 1115	
	Test Port	2	Center 2/3 from	1.09 to: 10.81	
	Distance to disturbance	300.06 inches	Points in Center 2/3	2 to: 7	
	Measurement units	ppm SF6	Injection Point	**B North**	

Order -->		2nd				1st				
Traverse-->		Side				Bottom				
Trial ---->		1	2	3	Mean	1	2	3	Mean	
Point	Depth, in.	ppm				ppm				
1	0.50	2.65	2.70	2.64	2.663	2.61	2.59	2.57	2.590	
2	1.24	2.63	2.60	2.64	2.623	2.64	2.57	2.56	2.590	
3	2.29	2.66	2.65	2.61	2.640	2.55	2.63	2.64	2.607	
4	3.82	2.61	2.69	2.60	2.633	2.58	2.59	2.68	2.617	
Center	5.91	2.62	2.71	2.62	2.650	2.61	2.60	2.64	2.617	
5	8.00	2.60	2.68	2.60	2.627	2.67	2.59	2.65	2.637	
6	9.52	2.59	2.60	2.64	2.610	2.62	2.67	2.66	2.650	
7	10.57	2.68	2.64	2.67	2.663	2.62	2.67	2.54	2.610	
8	11.31	2.70	2.68	2.72	2.700	2.57	2.77	2.63	2.657	
Averages ---------->		2.638	2.661	2.638	2.646	2.608	2.631	2.619	2.619	

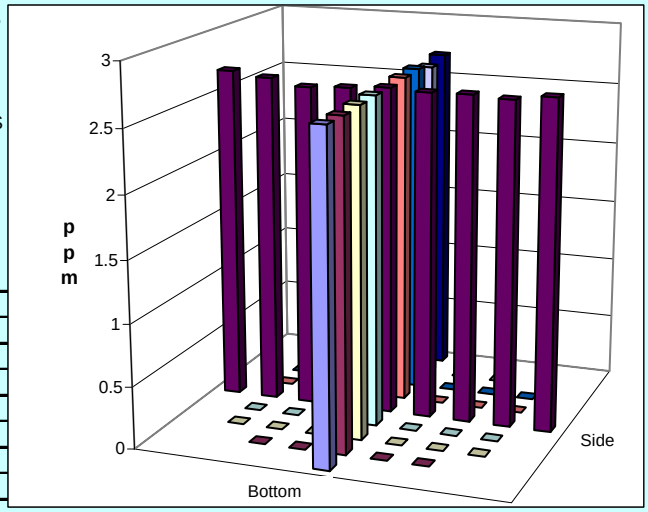
All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	2.63		Mean	2.64	2.62	2.63
Min Point	2.59	-1.6%	Std. Dev.	0.02	0.02	0.02
Max Point	2.70	2.6%	COV as %	0.7	0.8	**0.8**

Avg. Conc. 2.632 ppm

Gas analyzer checked:
7/22/10 BMS SN 1788615

	Start	Finish	
Tracer tank pressure	280	300	psig
Stack Temp	88.9	94.5	Fº 7/29/10
Center Pt. air vel.	1070	1070	sfpm BMS
Injection flowmeter	59.0	59.0	sccm
Sampling flowmeter	10.0	10.0	lpm Sierra
Ambient pressure	992	991	mbar BMS
Ambient humidity	37%	29%	RH 7/29/10
B&K vapor correction	Y	Y	Y/N
Back-Gd gas ppb	19.6, 13.0, 14.9, 13.3	34.1, 24.6, 22.2, 19.9	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	84.2	89.6	

BMS 7/29/10



Instuments Used:

B&K 1302 Gas Analyzer SN 1788615	Cat2 MTE
TSI VelociCalc SN 209060	6/25/11
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	5/17/11

Notes: Sierra Instruments Vaccum SN 200

Worst case Fan 70% flow. Injection point is approximately 1.5 inches from duct wall on north side. Used water compensation because the gas analyzer gave a water concentration > 14.5E+03. BMS 7/29/10

Entries made by:	BMS	Technical Data Review performed by:	Carmen Arimescu
Signature/date	signature on file 7/29/2010	Signature/date	Signature on File 10/5/2010
			TI-RPP-WTP_020

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06	Site	**LB-S2 Model**	Run No.	**GT-15**	
	Date	7/29/2010	Fan Configuration	**B Only; Damper A closed**	
	Testers	BMS, EA	Fan Setting	**40**	**Hz**
	Stack Dia.	11.9 in.	Stack Temp	94.35	deg F
	Stack X-Area	111.2 $in.^2$	Start/End Time	1120 / 1200	
	Test Port	2	Center 2/3 from	1.09 to:	10.81
	Distance to disturbance	300.06 inches	Points in Center 2/3	2 to:	7
	Measurement units	ppm SF6	Injection Point	**B South**	

		Side				Bottom			
Order -->		1st				2nd			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	2.85	2.73	2.81	2.797	2.84	2.86	2.82	2.840
2	1.24	2.79	2.79	2.81	2.797	2.79	2.84	2.87	2.833
3	2.29	2.82	2.79	2.81	2.807	2.81	2.85	2.84	2.833
4	3.82	2.79	2.83	2.82	2.813	2.81	2.87	2.85	2.843
Center	5.91	2.83	2.79	2.85	2.823	2.84	2.83	2.83	2.833
5	8.00	2.85	2.79	2.85	2.830	2.82	2.82	2.86	2.833
6	9.52	2.78	2.83	2.81	2.807	2.79	2.83	2.78	2.800
7	10.57	2.86	2.81	2.82	2.830	2.81	2.78	2.86	2.817
8	11.31	2.74	2.83	2.80	2.790	2.83	2.80	2.83	2.820
Averages ---------->		2.812	2.799	2.820	2.810	2.816	2.831	2.838	2.828

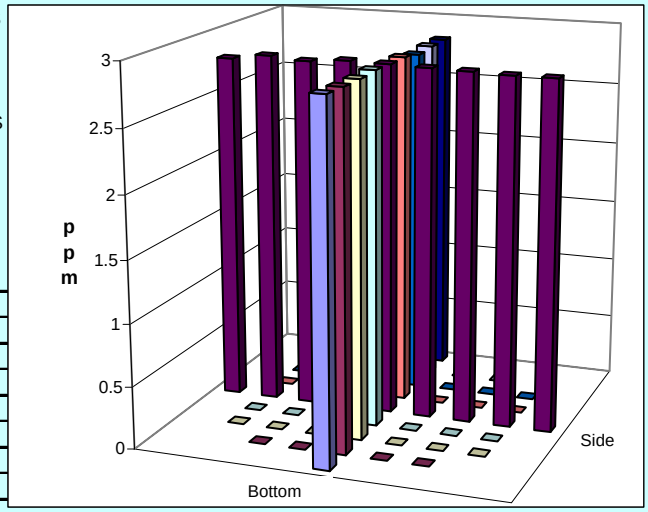
All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	2.82		Mean	2.82	2.83	2.82
Min Point	2.79	-1.0%	Std. Dev.	0.01	0.01	0.01
Max Point	2.84	0.9%	COV as %	0.5	0.5	**0.5**

Avg. Conc. 2.818 ppm

Gas analyzer checked:
7/22/10 BMS SN 1788615

BMS 7/29/10

	Start	Finish	
Tracer tank pressure	300	300	psig
Stack Temp	94.5	94.2	Fº 7/29/10
Center Pt. air vel.	1070	1100	sfpm BMS
Injection flowmeter	59.0	59.0	sccm
Sampling flowmeter	10.0	10.0	lpm Sierra
Ambient pressure	991	991	mbar BMS
Ambient humidity	28%	27%	RH 7/29/10
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	65.0, 60.9, 55.0, 57.4	76.7, 74.1, 67.3, 63.7	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	84.2	92.3	



Instuments Used:

B&K 1302 Gas Analyzer SN 1788615	Cat2 MTE
TSI VelociCalc SN 209060	6/25/11
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	5/17/11

Notes: Sierra Instruments Vaccum SN 200

Worst case Fan 70% flow. Injection point is approximately 1.5 inches from duct wall on south side.

BMS 7/29/10

Entries made by:	BMS	Technical Data Review performed by:	Carmen Arimescu
Signature/date	signature on file 7/29/2010	Signature/date	Signature on File 10/5/2010
			TI-RPP-WTP_020

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06

Site	**LB-S2 Model**	Run No.	**GT-16**		
Date	7/29/2010	Fan Configuration	**B Only; Damper A closed**		
Testers	BMS, EA	Fan Setting	**40**	**Hz**	
Stack Dia.	11.9 in.	Stack Temp	99.7	deg F	
Stack X-Area	111.2 $in.^2$	Start/End Time	1250 /1340		
Test Port	2	Center 2/3 from	1.09	to:	10.81
Distance to disturbance	300.06 inches	Points in Center 2/3	2	to:	7
Measurement units	ppm SF6	Injection Point	**B East**		

		Side				Bottom			
Order -->		2nd				1st			
Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	ppm				ppm			
1	0.50	2.76	2.66	2.68	2.700	2.66	2.87	2.80	2.777
2	1.24	2.89	2.80	2.85	2.847	2.62	2.71	2.86	2.730
3	2.29	2.79	2.61	2.72	2.707	2.77	2.76	2.63	2.720
4	3.82	2.90	2.80	2.60	2.767	2.90	2.94	2.81	2.883
Center	5.91	2.77	2.79	2.84	2.800	2.89	2.85	2.82	2.853
5	8.00	2.91	2.67	2.68	2.753	2.61	2.78	2.85	2.747
6	9.52	2.77	2.75	2.70	2.740	2.71	2.81	2.81	2.777
7	10.57	2.70	2.92	2.74	2.787	2.73	2.67	2.75	2.717
8	11.31	2.64	2.70	2.81	2.717	2.68	2.59	2.85	2.707
Averages ---------->		2.792	2.744	2.736	2.757	2.730	2.776	2.798	2.768

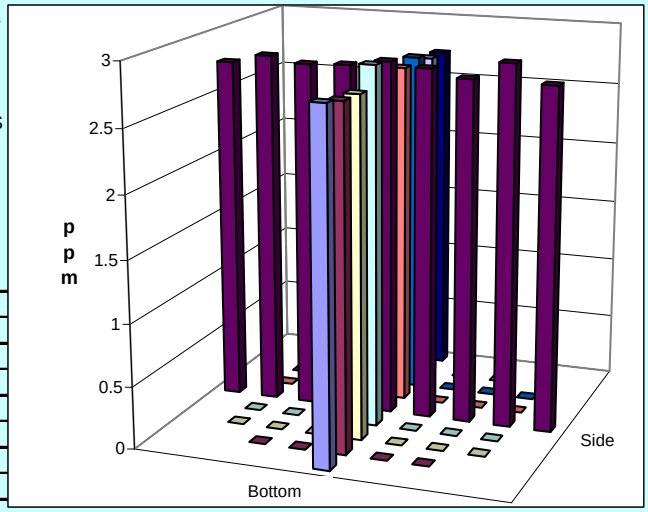
All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	2.76		Mean	2.77	2.78	2.77
Min Point	2.70	-2.3%	Std. Dev.	0.05	0.07	0.06
Max Point	2.88	4.4%	COV as %	1.6	2.4	**2.0**

Avg. Conc. 2.755 ppm

Gas analyzer checked:
7/22/10 BMS SN 1788615

BMS 7/29/10

	Start	Finish	
Tracer tank pressure	300	300	psig
Stack Temp	100.4	99.0	Fº 7/29/10
Center Pt. air vel.	1070	1070	sfpm BMS
Injection flowmeter	59.0	59.0	sccm
Sampling flowmeter	10.0	10.0	lpm Sierra
Ambient pressure	993	991	mbar BMS
Ambient humidity	23%	22%	RH 7/29/10
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	69.3, 66.5, 60.7, 64.5	83.1, 74.6, 72.0, 70.2	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	84.2	97.7	



Instuments Used:

B&K 1302 Gas Analyzer SN 1788615	Cat2 MTE
TSI VelociCalc SN 209060	6/25/11
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	5/17/11

Notes: Sierra Instruments Vaccum SN 200

Worst case Fan 70% flow. Injection point is approximately 1.5 inches from duct wall on east side.

BMS 7/29/10

Entries made by:	BMS	Technical Data Review performed by:	Carmen Arimescu
Signature/date	signature on file 7/29/2010	Signature/date	Signature on File 10/5/2010
			TI-RPP-WTP_020

Rev. 0

TRACER GAS TRAVERSE DATA FORM

31-Jul-06	Site	**LB-S2 Model**	Run No.	**GT-17**	
	Date	7/29/2010	Fan Configuration	**B Only; Damper A closed**	
	Testers	BMS, EA	Fan Setting	**40**	**Hz**
	Stack Dia.	11.9 in.	Stack Temp	100.7	deg F
	Stack X-Area	111.2 $in.^2$	Start/End Time	1350 / 1430	
	Test Port	2	Center 2/3 from	1.09	to: 10.81
	Distance to disturbance	300.06 inches	Points in Center 2/3	2	to: 7
	Measurement units	ppm SF6	Injection Point	**B West**	

		Order -->	1st				2nd			
		Traverse-->	Side				Bottom			
		Trial ---->	1	2	3	Mean	1	2	3	Mean
Point	Depth, in.		ppm				ppm			
1	0.50		2.69	2.69	2.92	2.767	2.68	2.76	2.80	2.747
2	1.24		2.81	2.78	2.88	2.823	2.84	2.64	2.71	2.730
3	2.29		2.66	2.69	2.91	2.753	2.73	2.67	2.67	2.690
4	3.82		2.61	2.70	2.69	2.667	2.70	2.74	2.78	2.740
Center	5.91		2.56	2.73	2.62	2.637	2.69	2.87	2.71	2.757
5	8.00		2.75	2.82	2.76	2.777	2.82	2.90	2.81	2.843
6	9.52		2.80	2.80	2.55	2.717	2.76	2.80	2.67	2.743
7	10.57		2.65	2.81	2.70	2.720	2.87	2.78	2.78	2.810
8	11.31		2.87	2.66	2.78	2.770	2.66	2.75	2.79	2.733
		Averages ---------->	2.711	2.742	2.757	2.737	2.750	2.768	2.747	2.755

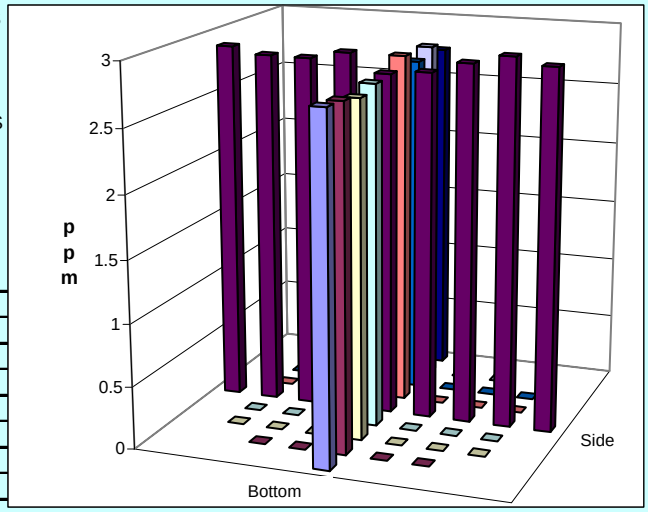
All	ppm	Dev. from mean	***Center 2/3***	Side	Bottom	All
Mean	2.75		Mean	2.73	2.76	2.74
Min Point	2.64	-4.0%	Std. Dev.	0.06	0.05	0.06
Max Point	2.84	3.6%	COV as %	2.3	1.9	**2.1**

Avg. Conc. 2.752 ppm

Gas analyzer checked:
7/22/10 BMS SN 1788615

BMS 7/29/10

	Start	Finish	
Tracer tank pressure	300	300	psig
Stack Temp	99.4	102.0	Fº 7/29/10
Center Pt. air vel.	1070	1050	sfpm BMS
Injection flowmeter	59.0	59.0	sccm
Sampling flowmeter	10.0	10.0	lpm Sierra
Ambient pressure	991	992	mbar BMS
Ambient humidity	24%	21%	RH 7/29/10
B&K vapor correction	N	N	Y/N
Back-Gd gas ppb	70.2, 70.5, 65.1, 63.2	84.6, 80.6, 74.8, 70.1	
No. Bk-Gd samples	4	4	n
Ambient Temp, F	84.2	97.7	



Instuments Used:

B&K 1302 Gas Analyzer SN 1788615	Cat2 MTE
TSI VelociCalc SN 209060	6/25/11
Omega FMA-2617A flowmeter SN30348	FIO
Fisher Scientific SN 61876141	5/17/11

Notes: Sierra Instruments Vaccum SN 200

Worst case Fan 70% flow. Injection point is approximately 1.5 inches from duct wall on west side.

BMS 7/29/10

Entries made by:	BMS	Technical Data Review performed by:	Carmen Arimescu
Signature/date	signature on file 7/29/2010	Signature/date	Signature on File 10/5/2010
			TI-RPP-WTP_020

SULFUR HEXAFLUORIDE GAS INSTRUMENT CALIBRATION

Site	Q Pad Trailer	Instrument	B&K Model 1302
Date	7/22/2010	Serial No.	1788615
Testers	BMS	Property No.	WD 54624

Setup:
- 7.5 ft B&K sample inlet tube length
- 987 mbar station pressure
- 69 deg F ambient temp — analyzer corrects to 20 deg C
- 55 percent RH

Pre-Test background, ppb

Not compensating for water vapor, monitoring task 2

56.6	58.1	55.5	63.4	63.0	BMS 7/22/10

Compensating for water vapor, monitoring task 1

8.38	10.3	11.9	10.6	12.3	

0.104 ppm
Cylinder SV17699
start P = 1100 psi
end P = 1000 psi

B&K Calibration readings: (ppm)

Compensating for water vapor

0.108
0.109
0.107
0.110
0.110

Not compensating for water vapor

0.109
0.105
0.109
0.109
0.106

0.108 = avg

5.00 ppm
Cylinder SV18280
start P = 1000 psi
end P = 900 psi

B&K Calibration readings: (ppm)

Compensating for water vapor

5.17
5.16
5.18
5.18
5.21

Not compensating for water vapor

5.22
5.09
5.15
5.14
5.15

5.17 = avg

Standards Used:	Expiration date:
Fisher Scientific SN 61876141	5/17/2011
0.104 ppm cylinder SV 17699	2/3/2011
5.00 ppm cylinder SV 18280	2/15/2012

Entries made by:	BMS		Technical Data Review performed by:	Carmen Arimescu
Signature/date	signature on file	7/22/2010	Signature/date	Signature on File 10/5/2010 TI-RPP-WTP_020

SULFUR HEXAFLUORIDE GAS INSTRUMENT CALIBRATION

Site	Q Pad Trailer	Instrument	B&K Model 1302
Date	7/29/2010	Serial No.	1788615
Testers	BMS, EA	Property No.	WD54624

Setup:	7.5	ft	B&K sample inlet tube length
7/29/10 BMS	992	mbar	station pressure
7/29/10 BMS	95.9	deg F	ambient temp analyzer corrects to 20 deg C
7/29/10 BMS	28	percent	RH

Pre-Test background, ppb

Not compensating for water vapor, monitoring task 2

42.0	42.4	47.3	40.8	43.1

Compensating for water vapor, monitoring task 1

2.00	0.660	2.51	3.00	3.49

	0.104	ppm	
Cylinder	SV17699		
start P =	1000	psi	
end P =	1000	psi	

	5.00	ppm	
Cylinder	SV18280		
start P =	900	psi	
end P =	800	psi	

B&K Calibration readings: (ppm)

Compensating for water vapor

0.109
0.114
0.110
0.112
0.110

Not compensating for water vapor

0.111
0.111
0.110
0.114
0.108

0.1109 = avg

B&K Calibration readings: (ppm)

Compensating for water vapor

5.32
5.33
5.34
5.35
5.37

Not compensating for water vapor

5.32
5.30
5.38
5.39
5.40

5.35 = avg

NOTE: Had to perform calibration outside because background concentration inside trailer was > 0.104 ppm. BMS 7/29/10

Standards Used:	Expiration date:
0.104 ppm SF6 cylinder SV17699	2/3/2011
5.00 ppm SF6 cylinder SV18280	2/15/2012
Fisher Scientific SN 61876141	5/17/2011

Entries made by:	BMS		Technical Data Review performed by:	Carmen Arimescu	
Signature/date	signature on file	7/29/2010	Signature/date	Signature on File	10/5/2010
				TI-RPP-WTP_020	

Appendix C.5: LB-S2 Tracer Particle Uniformity Data Sheets

Rev. 0
3 Aug. 2006

PARTICLE TRACER TRAVERSE DATA FORM

Site	**LB-S2 Model**	Run No.	**PT-1**
Date	8/3/2010	Fan configuration	**B Only, Damper A Closed**
Tester	BMS, YFS, EA	Fan Setting	**60 Hz**
Stack Dia.	11.9 in.	Stack Temp	96.45 deg F
Stack X-Area	111.2 in.2	Start/End Time	1322 / 1630
Test Port	2	Center 2/3 from	1.09 to: 10.81
Distance to disturbance	300.0625 inches	Points in Center 2/3	2 to: 7
Measurement units	particles/ft3	Injection Point	**B-Center**
Order ----->	2nd		1st

		Side				Bottom			
Traverse-->									
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	particles/ft3				particles/ft3			
1	0.50	567	549	532	549.3	566	388	381	445.0
2	1.24	606	618	618	614.0	520	340	327	395.7
3	2.29	696	639	682	672.3	527	410	349	428.7
4	3.82	739	732	679	716.7	577	446	371	464.7
Center	5.91	796	740	817	784.3	575	425	426	475.3
5	8.00	804	738	808	783.3	541	443	412	465.3
6	9.52	770	754	834	786.0	529	431	367	442.3
7	10.57	915	907	979	933.7	497	425	349	423.7
8	11.31	922	930	2252	1368.0	592	379	353	441.3
Averages ---------->		757.2	734.1	911.2	800.9	547.1	409.7	370.6	442.4

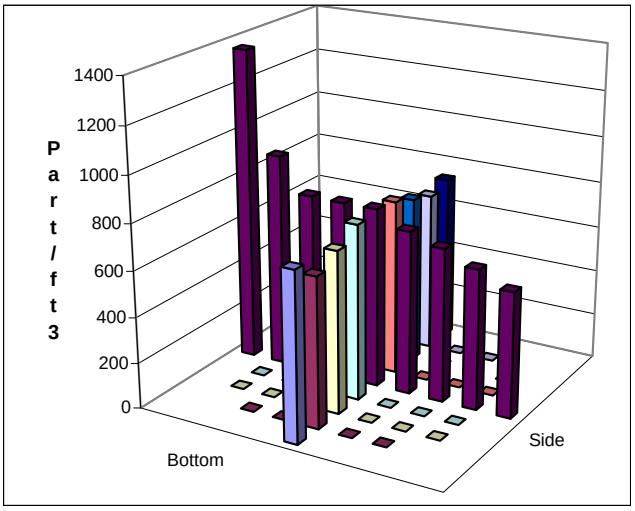
All	pt/ft3	Dev. from mean	***Center 2/3***	Side	Bottom	All	Normlzd
Mean	621.6		Mean	755.8	442.2	599.0	742.74
Min Point	395.7	-36.4%	Std. Dev.	102.2	28.4	177.9	77.58
Max Point	1368.0	120.1%	COV as %	13.5	6.4	**29.7**	**10.45**

Avg Conc 621 pt/ft3

	Start	Finish	
Generator Inlet Press	1	1	psig
Stack Temp	93.7	99.2	F
Centerline vel.	1790	1850	fpm
Ambient pressure	993	992	mbar
Ambient humidity	27%	21%	RH
Ambient temp	91	96.8	F
Back-Gd aerosol	14,11,8,14	8, 28, 6, 8	pt/ft3
No. Bk-Gd samples	4	4	
Compressor output	130	130	psig

Instuments Used:

		Cal. Due
TSI	SN209060	June-11
Met One A2408	96258675	6/15/2011
Fisher Scientific	61876141	5/17/2011



Notes: Because of difficulty in moving OPC, side measurements taken 3 at a time at a point. Other OPC used as reference SN 96258674

Oil Used: Edwards 19

Entries made by:	Ernest Antonio	Technical Data Review performed by:	Carmen Arimescu
Signature/date	*on file w/ original* 8/3/2010	Signature/date	Signature on File 10/15/2010
			TI-RPP-WTP_021

Rev. 0

3 Aug. 2006

PARTICLE TRACER TRAVERSE DATA FORM

Site	**LB-S2 Model**	Run No.	**PT-2**
Date	8/9/2010	Fan configuration	**B Only, Damper A Closed**
Tester	EA, QQ	Fan Setting	**60 Hz**
Stack Dia.	11.9 in.	Stack Temp	82 deg F
Stack X-Area	111.2 in.2	Start/End Time	1015 / 1155
Test Port	2	Center 2/3 from	1.09 to: 10.81
Distance to disturbance	300.0625 inches	Points in Center 2/3	2 to: 7
Measurement units	particles/ft3	Injection Point	**B-Center**
Order ----->	1st		2nd

		Side				Bottom			
Traverse-->									
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	particles/ft3				particles/ft3			
1	0.50	2483	2751	1978	2404.0	2844	2986	2702	2844.0
2	1.24	2782	2725	2838	2781.7	2729	3051	3509	3096.3
3	2.29	2632	2437	2751	2606.7	2918	3413	3726	3352.3
4	3.82	2938	2005	2836	2593.0	2893	3537	3943	3457.7
Center	5.91	2148	2582	2554	2428.0	3140	3641	3978	3586.3
5	8.00	1865	2654	2129	2216.0	3244	3719	3951	3638.0
6	9.52	1923	2757	2675	2451.7	3504	3520	3648	3557.3
7	10.57	1896	2387	2513	2265.3	3378	3275	3479	3377.3
8	11.31	2747	2262	2252	2420.3	3189	2952	3229	3123.3
Averages ---------->		2379.3	2506.7	2502.9	2463.0	3093.2	3343.8	3573.9	3337.0

All	pt/ft3	Dev. from mean
Mean	2900.0	
Min Point	2216.0	-23.6%
Max Point	3638.0	25.4%

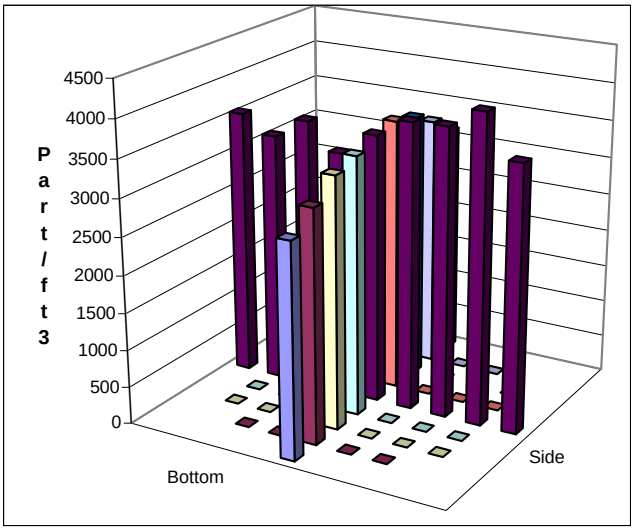
Center 2/3	Side	Bottom	All	Normlzd
Mean	2477.5	3437.9	2957.7	3548.66
Std. Dev.	199.6	184.6	531.5	262.78
COV as %	8.1	5.4	**18.0**	**7.40**

Avg Conc 2887 pt/ft3

Instuments Used:

		Cal. Due
TSI VelociCalc	SN209060	June-11
Met One A2408	96258674	7/13/2011
Fisher Scientific	61876141	5/17/2011

	Start	Finish	
Generator Inlet Press	2	2	psig
Stack Temp	78	86	F
Centerline vel.	1780	1880	fpm
Ambient pressure	990	989	mbar
Ambient humidity	33%	28%	RH
Ambient temp	76.1	84.2	F
Back-Gd aerosol	10, 11, 7, 4	19, 15, 9, 18	pt/ft3
No. Bk-Gd samples	4	4	
Compressor output	130	125	psig



Notes: Brass nozzle #3 was replaced with stainless Steel #2.

EA 8/9/2010

Oil Used: Edwards 19

Entries made by:	Ernest Antonio	Technical Data Review performed by:	Carmen Arimescu
Signature/date	*on file w/ original* 8/9/2010	Signature/date	Signature on File 10/15/2010
			TI-RPP-WTP_021

Rev. 0

3 Aug. 2006

PARTICLE TRACER TRAVERSE DATA FORM

Site	**LB-S2 Model**	Run No.	**PT-3**
Date	8/10/2010	Fan configuration	**Fan B Only**
Tester	YFSu EA	Fan Setting	**60 Hz**
Stack Dia.	11.9 in.	Stack Temp	79.85 deg F
Stack X-Area	111.2 in.2	Start/End Time	0920 / 1103
Test Port	2	Center 2/3 from	1.09 to: 10.81
Distance to disturbance	300.0625 inches	Points in Center 2/3	2 to: 7
Measurement units	particles/ft3	Injection Point	**B Center**
Order ----->	2		1

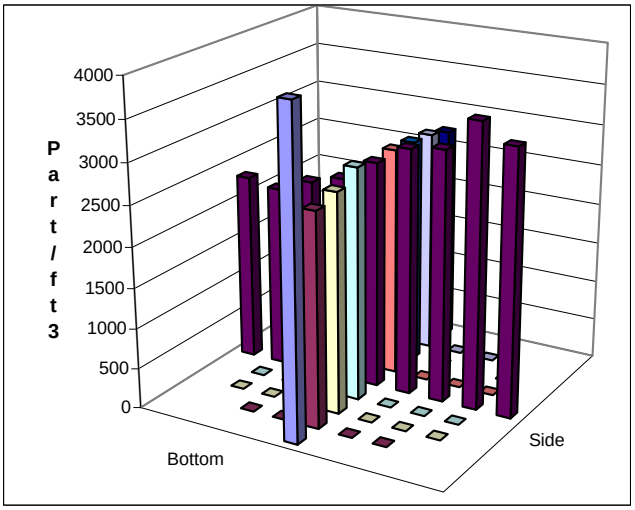
		Side				Bottom			
Traverse-->									
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	particles/ft3				particles/ft3			
1	0.50	2476	2700	3370	2848.7	3812	3911	4239	3987.3
2	1.24	2984	2852	3294	3043.3	2605	2544	2737	2628.7
3	2.29	2831	2848	2405	2694.7	2671	2550	2917	2712.7
4	3.82	2655	2630	2635	2640.0	2844	2799	2973	2872.0
Center	5.91	2307	2592	2401	2433.3	2737	2610	3048	2798.3
5	8.00	2114	2464	2025	2201.0	2696	2681	3112	2829.7
6	9.52	2080	2402	1823	2101.7	2713	2685	3016	2804.7
7	10.57	1890	2217	1761	1956.0	2666	2713	2962	2780.3
8	11.31	1941	1867	2252	2020.0	2560	2631	2903	2698.0
Averages ---------->		2364.2	2508.0	2440.7	2437.6	2811.6	2791.6	3100.8	2901.3

All	pt/ft3	Dev. from mean	***Center 2/3***	Side	Bottom	All	Normlzd
Mean	2669.5		Mean	2438.6	2775.2	2606.9	2789.77
Min Point	1956.0	-26.7%	Std. Dev.	381.8	80.8	317.5	303.69
Max Point	3987.3	49.4%	COV as %	15.7	2.9	**12.2**	**10.89**

Avg Conc 2676 pt/ft3

	Start	Finish	
Generator Inlet Press	2	2	psig
Stack Temp	77.4	82.3	F
Centerline vel.	1830	1810	fpm
Ambient pressure	991	991	mbar
Ambient humidity	41%	30%	RH
Ambient temp	72.5	77.9	F
Back-Gd aerosol	12, 4, 9, 7	3, 6, 8, 6	pt/ft3
No. Bk-Gd samples	4	4	
Compressor output	125	90	psig

Instuments Used:		Cal. Due
TSI	SN209060	6/1/2011
Met One A2408	96258674	7/13/2011
Fisher Scientific	61876141	5/17/2011



Notes: 1st side traverse appeared low compared to bottom traverses, so we re-did one traverse. Side measurement - slid platform rather than move the stand.

EA 8/10/10

Oil Used: Edwards 19

Entries made by:	Yin-Fong Su		Technical Data Review performed by: Carmen Arimescu
Signature/date	*on file w/ original*	8/10/2010	Signature/date Signature on File 10/15/2010
			TI-RPP-WTP_021

Rev. 0
3 Aug. 2006

PARTICLE TRACER TRAVERSE DATA FORM

Site	**LB-S2 Model**	Run No.	**PT-4**
Date	8/11/2010	Fan configuration	**A Only, Damper B closed**
Tester	BMS , EA	Fan Setting	**60** **Hz**
Stack Dia.	11.9 in.	Stack Temp	75.8 deg F
Stack X-Area	111.2 in.2	Start/End Time	0930 h / 1128 h
Test Port	2	Center 2/3 from	1.09 to: 10.81
Distance to disturbance	300.0625 inches	Points in Center 2/3	2 to: 7
Measurement units	particles/ft3	Injection Point	**A Center**
Order ----->	1st		2nd

		Side				Bottom			
Traverse-->									
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	particles/ft3				particles/ft3			
1	0.50	829	862	789	826.7	747	794	731	757.3
2	1.24	767	843	855	821.7	739	803	769	770.3
3	2.29	826	915	820	853.7	822	813	794	809.7
4	3.82	796	860	787	814.3	835	812	875	840.7
Center	5.91	701	733	685	706.3	935	751	868	851.3
5	8.00	729	687	702	706.0	873	834	794	833.7
6	9.52	700	640	673	671.0	876	811	830	839.0
7	10.57	693	645	665	667.7	841	776	754	790.3
8	11.31	679	593	588	620.0	773	708	739	740.0
Averages ---------->		746.7	753.1	729.3	743.0	826.8	789.1	794.9	803.6

All	pt/ft3	Dev. from mean
Mean	773.3	
Min Point	620.0	-19.8%
Max Point	853.7	10.4%

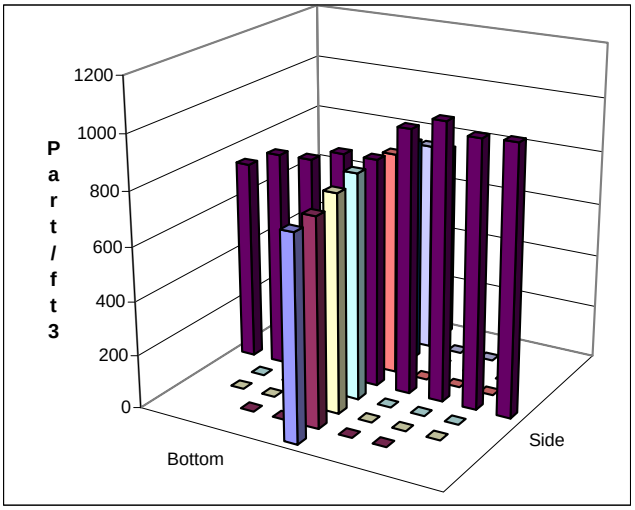
Center 2/3	Side	Bottom	All	Normlzd
Mean	748.7	819.3	784.0	860.82
Std. Dev.	78.4	30.0	67.8	79.96
COV as %	10.5	3.7	**8.6**	**9.29**

Avg Conc 773 pt/ft3

	Start	Finish	
Generator Inlet Press	1	1	psig
Stack Temp	75	76.6	F
Centerline vel.	1700	1590	fpm
Ambient pressure	992	992	mbar
Ambient humidity	40%	40%	RH
Ambient temp	74.2	75.2	F
Back-Gd aerosol	16, 8, 6, 9	6, 8, 8, 7	pt/ft3
No. Bk-Gd samples	4	4	
Compressor output	125	120	psig

Instuments Used:

		Cal. Due
TSI VelociCalc	SN209060	6/1/2011
Met One A2408	96258674	7/13/2011
Fisher Scientific	61876141	5/17/2011



Notes: Secondary particle counter ran out of paper near the end of the test. 74 had bad paper that is hard to read.
BMS 8/11/10

Oil Used: Edwards 19
BMS 8/11/10

Entries made by:	Brian M. Smith	
Signature/date	*on file w/ original*	8/11/2010

Technical Data Review performed by: Carmen Arimescu
Signature/date Signature on File 10/15/2010
TI-RPP-WTP_021

Rev. 0

3 Aug. 2006

PARTICLE TRACER TRAVERSE DATA FORM

Site	**LB-S2 Model**	Run No.	**PT-5**
Date	8/12/2010	Fan configuration	**B Only, Damper A closed**
Tester	EA, QQ, YFSu	Fan Setting	**60 Hz**
Stack Dia.	11.9 in.	Stack Temp	83.75 deg F
Stack X-Area	111.2 in.2	Start/End Time	0900 h / 1120h
Test Port	2	Center 2/3 from	1.09 to: 10.81
Distance to disturbance	300.0625 inches	Points in Center 2/3	2 to: 7
Measurement units	particles/ft3	Injection Point	B Center
Order ----->	2nd		1st

Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	particles/ft3				particles/ft3			
1	0.50	1040	993	1121	1051.3	2271	2242	2341	2284.7
2	1.24	960	961	908	943.0	2700	2445	2471	2538.7
3	2.29	828	875	900	867.7	2635	2589	2616	2613.3
4	3.82	802	840	868	836.7	2588	2605	2609	2600.7
Center	5.91	738	914	865	839.0	2650	2678	2645	2657.7
5	8.00	766	928	791	828.3	2686	2660	2776	2707.3
6	9.52	709	803	857	789.7	2705	2587	2580	2624.0
7	10.57	723	846	842	803.7	2525	2569	2475	2523.0
8	11.31	615	1070	866	850.3	2641	2523	2429	2531.0
Averages ---------->		797.9	914.4	890.9	867.7	2600.1	2544.2	2549.1	2564.5

All	pt/ft3	Dev. from mean
Mean	1716.1	
Min Point	789.7	-54.0%
Max Point	2707.3	57.8%

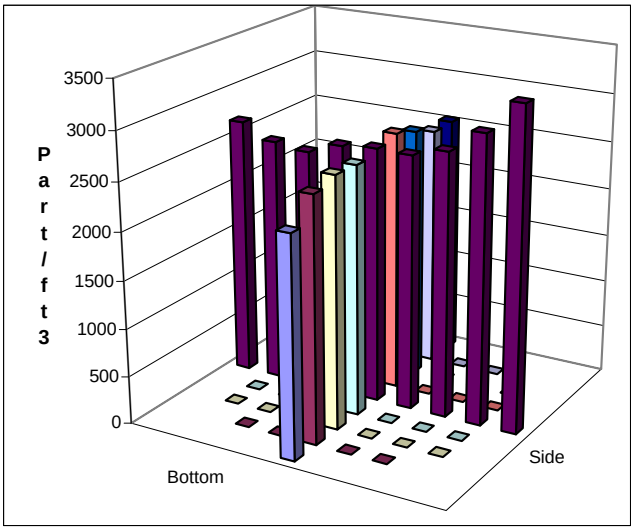
Center 2/3	Side	Bottom	All	Normlzd
Mean	844.0	2609.2	1726.6	2641.37
Std. Dev.	50.4	64.2	917.6	121.63
COV as %	6.0	2.5	**53.1**	**4.60**

Avg Conc 1712 pt/ft3

	Start	Finish	
Generator Inlet Press	1.5	1.5	psig
Stack Temp	80	87.5	F
Centerline vel.	1880	1870	fpm
Ambient pressure	992	992	mbar
Ambient humidity	44%	31%	RH
Ambient temp	75.2	83.3	F
Back-Gd aerosol	12, 15, 9, 22	13, 17, 29, 15	pt/ft3
No. Bk-Gd samples	4	4	
Compressor output	120	100	psig

Instuments Used:

		Cal. Due
TSI	SN209060	6/1/2011
Met One A2408	96258674	7/13/2011
Fisher Scientific	61876141	5/17/2011



Notes: PT-1 redo.

Oil Used: Edwards 19

Entries made by:	Ernest Antonio	
Signature/date	*on file w/ original*	8/12/2010

Technical Data Review performed by:	Carmen Arimescu	
Signature/date	Signature on File	10/15/2010
	TI-RPP-WTP_021	

Rev. 0

3 Aug. 2006

PARTICLE TRACER TRAVERSE DATA FORM

Site	**LB-S2 Model**	Run No.	**PT-6**
Date	8/13/2010	Fan configuration	**B Only, Damper A closed**
Tester	EA, BMS	Fan Setting	**37** **Hz**
Stack Dia.	11.9 in.	Stack Temp	84.75 deg F
Stack X-Area	111.2 in.2	Start/End Time	0920 h / 1130h
Test Port	2	Center 2/3 from	1.09 to: 10.81
Distance to disturbance	300.0625 inches	Points in Center 2/3	2 to: 7
Measurement units	particles/ft3	Injection Point	B center
Order ----->	1st		2nd

Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	particles/ft3				particles/ft3			
1	0.50	1226	1437	921	1194.7	1400	1551	1681	1544.0
2	1.24	1316	1504	1015	1278.3	1414	1547	1693	1551.3
3	2.29	1386	1383	1069	1279.3	1451	1702	1837	1663.3
4	3.82	1433	1274	906	1204.3	1564	1780	1814	1719.3
Center	5.91	1392	1203	877	1157.3	1597	1757	1886	1746.7
5	8.00	1080	1002	911	997.7	1495	1648	1872	1671.7
6	9.52	1238	1015	909	1054.0	1528	1678	1758	1654.7
7	10.57	1292	1004	816	1037.3	1476	1698	1750	1641.3
8	11.31	1061	905	799	921.7	1465	1581	1616	1554.0
Averages ---------->		1269.3	1191.9	913.7	1125.0	1487.8	1660.2	1767.4	1638.5

All	pt/ft3	Dev. from mean
Mean	1381.7	
Min Point	921.7	-33.3%
Max Point	1746.7	26.4%

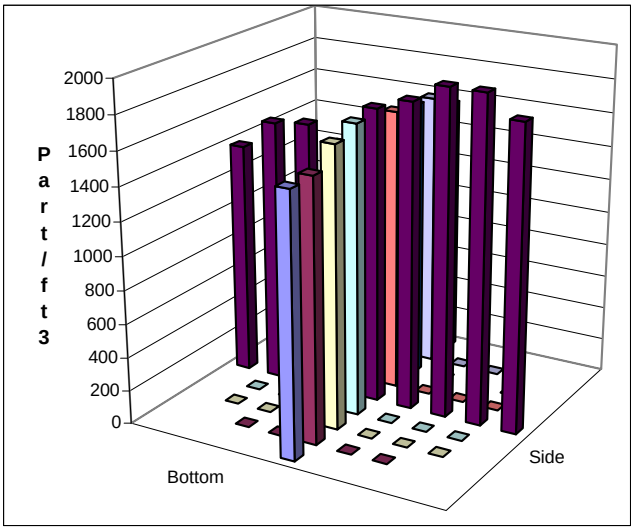
Center 2/3	Side	Bottom	All	Normlzd
Mean	1144.0	1664.0	1404.0	1695.33
Std. Dev.	116.2	62.2	284.3	130.56
COV as %	10.2	3.7	**20.2**	**7.70**

Avg Conc 1373 pt/ft3

	Start	Finish	
Generator Inlet Press	1	1	psig
Stack Temp	81	88.5	F
Centerline vel.	1010	1010	fpm
Ambient pressure	994	994	mbar
Ambient humidity	41%	29%	RH
Ambient temp	76.1	84.2	F
Back-Gd aerosol	12, 17, 16, 11	49, 36, 44, 47	pt/ft3
No. Bk-Gd samples	4	4	
Compressor output	125	90	psig

Instuments Used:

		Cal. Due
TSI Velocicalc	SN209060	6/1/2011
Met One A2408	96258674	7/13/2011
Fisher Scientific	61876141	5/17/2011



Notes:

BMS 8/13/10

Oil Used: Edwards 19

BMS 8/13/10

Entries made by:	Brian M. Smith	
Signature/date	*on file w/ original*	8/13/2010

Technical Data Review performed by:	Carmen Arimescu
Signature/date	Signature on File 10/15/2010
	TI-RPP-WTP_021

Rev. 0

3 Aug. 2006

PARTICLE TRACER TRAVERSE DATA FORM

Site	**LB-S2 Model**	Run No.	**PT-7**
Date	8/17/2010	Fan configuration	**B Only, Damper A closed**
Tester	BMS, JEF	Fan Setting	**60 Hz**
Stack Dia.	11.9 in.	Stack Temp	91.6 deg F
Stack X-Area	111.2 in.2	Start/End Time	0945 / 1215
Test Port	2	Center 2/3 from	1.09 to: 10.81
Distance to disturbance	300.0625 inches	Points in Center 2/3	2 to: 7
Measurement units	particles/ft3	Injection Point	B center
Order ----->	1st		2nd

Traverse-->		Side				Bottom			
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	particles/ft3				particles/ft3			
1	0.50	3565	3711	4233	3836.3	3652	3746	3466	3621.3
2	1.24	3491	4093	4462	4015.3	4118	4180	3787	4028.3
3	2.29	3506	4141	4568	4071.7	4549	4588	3957	4364.7
4	3.82	3568	4176	4679	4141.0	4701	4523	4157	4460.3
Center	5.91	3627	4315	4694	4212.0	4680	4782	4156	4539.3
5	8.00	3926	4296	4572	4264.7	4763	4618	4091	4490.7
6	9.52	3763	4179	4277	4073.0	4536	4433	3959	4309.3
7	10.57	3753	4164	4353	4090.0	4459	4322	3919	4233.3
8	11.31	3852	4166	4243	4087.0	4315	4291	3742	4116.0
Averages ---------->		3672.3	4137.9	4453.4	4087.9	4419.2	4387.0	3914.9	4240.4

All	pt/ft3	Dev. from mean
Mean	4164.1	
Min Point	3621.3	-13.0%
Max Point	4539.3	9.0%

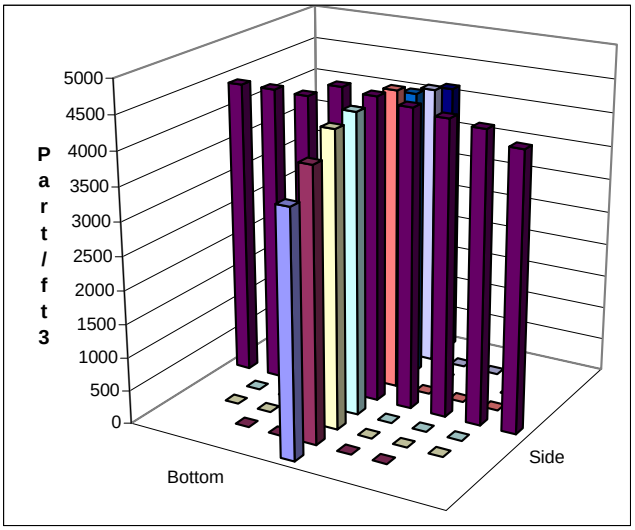
Center 2/3	Side	Bottom	All	Normlzd
Mean	4124.0	4346.6	4235.3	4395.51
Std. Dev.	87.7	176.4	176.8	145.12
COV as %	2.1	4.1	**4.2**	**3.30**

Avg Conc 4138 pt/ft3

	Start	Finish	
Generator Inlet Press	1.5	1.5	psig
Stack Temp	85.5	97.7	F
Centerline vel.	1750	1800	sfpm
Ambient pressure	989	988	mbar
Ambient humidity	29%	23%	RH
Ambient temp	84.2	94.1	F
Back-Gd aerosol	20, 15, 20, 14	24, 15, 29, 27	pt/ft3
No. Bk-Gd samples	4	4	
Compressor output	85	115	psig

Instuments Used:

		Cal. Due
TSI Velocicalc	SN 209060	6/1/2011
Met One A2408	96258674	7/13/2011
Fisher Scientific	61876141	5/17/2011



Notes: Used a probe with 2 bend for side measurements, and probe with 1 bend for bottom measurements.
Started measurements ~10:45.
Reference measurements at Port 4, Bottom.
Oil Used: Edwards 19
JEF 8/17/2010
Flow was ~1.04 cfm, which is as low as it could go.
JEF 8/17/2010

Entries made by:	Julia Flaherty		Technical Data Review performed by: Carmen Arimescu
Signature/date	*on file w/ original*	8/17/2010	Signature/date Signature on File 10/15/2010
			TI-RPP-WTP_021

Rev. 0

3 Aug. 2006

PARTICLE TRACER TRAVERSE DATA FORM

Site	**LB-S2 Model**	Run No.	**PT-8**
Date	8/19/2010	Fan configuration	**B Only, Damper A closed**
Tester	BMS, YFSu	Fan Setting	**60 Hz**
Stack Dia.	11.9 in.	Stack Temp	83.05 deg F
Stack X-Area	111.2 in.2	Start/End Time	0900 h / 1120h
Test Port	6" downstream of port2	Center 2/3 from	1.09 to: 10.81
Distance to disturbance	306 inches	Points in Center 2/3	2 to: 7
Measurement units	particles/ft3	Injection Point	center
Order ----->	2nd		1st

		Side				Bottom			
Traverse-->									
Trial ---->		1	2	3	Mean	1	2	3	Mean
Point	Depth, in.	particles/ft3				particles/ft3			
1	0.50	2120	1844	2062	2008.7	2053	2161	2101	2105.0
2	1.24	2014	1997	2175	2062.0	2133	2421	2310	2288.0
3	2.29	2223	2061	2306	2196.7	2349	2576	2539	2488.0
4	3.82	2233	2145	2493	2290.3	2538	2686	2554	2592.7
Center	5.91	2108	2100	2475	2227.7	2501	2771	2579	2617.0
5	8.00	2199	2118	2463	2260.0	2571	2785	2603	2653.0
6	9.52	1948	1970	2272	2063.3	2482	2617	2490	2529.7
7	10.57	1902	1956	2256	2038.0	2183	2555	2314	2350.7
8	11.31	1889	1901	2001	1930.3	2132	2309	2222	2221.0
Averages ---------->		2070.7	2010.2	2278.1	2119.7	2326.9	2542.3	2412.4	2427.2

All	pt/ft3	Dev. from mean
Mean	2273.4	
Min Point	1930.3	-15.1%
Max Point	2653.0	16.7%

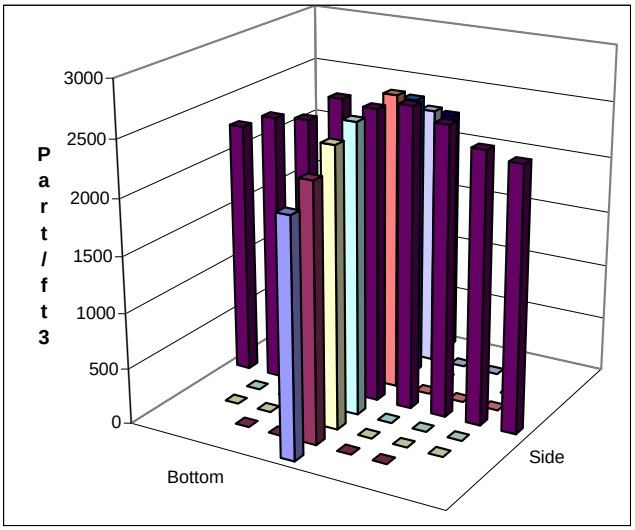
Center 2/3	Side	Bottom	All	Normlzd
Mean	2162.6	2502.7	2332.6	2521.62
Std. Dev.	105.4	137.8	212.2	127.39
COV as %	4.9	5.5	**9.1**	**5.05**

Avg Conc 2255 pt/ft3

	Start	Finish	
Generator Inlet Press	1.6	1.6	psig
Stack Temp	80	86.1	F
Centerline vel.	1870	1840	fpm
Ambient pressure	990	990	mbar
Ambient humidity	36%	29%	RH
Ambient temp	77	83.3	F
Back-Gd aerosol	22, 19, 29, 27	22, 14, 20, 22	pt/ft3
No. Bk-Gd samples	4	4	
Compressor output	125	95	psig

Instuments Used:

		Cal. Due
TSI	SN209060	6/1/2011
Met One A2408	96258674	7/13/2011
Fisher Scientific	61876141	5/17/2011



Notes: Removed downstream ducting in order to allow use of 1 bend probe and maintain orientation of OPC. Ambient wind speeds up to ~900 sfpm

Oil Used: Edwards 19 BMS 8/19/10

After test, took center point readings with tape: 2483, 2567, 2577

without tape: 2619, 2642, 2693

A piece of tape (~3/4" wide) with probe position marks was put horizontally across the duct during side traverse measurements.

Entries made by: Yin-Fong Su

Signature/date Yfsu 8/19/10

Technical Data Review performed by: Carmen Arimescu

Signature/date Signature on File 10/15/2010

TI-RPP-WTP_021

Appendix D

Tracer Particle Uniformity

Appendix D: Tracer Particle Uniformity

D.1 Special Study

A special test was performed where different optical particle counters (OPCs) were sampling from the duct at both the side and bottom ports of Test Port 2 of the LB-C2 scale model. The sampling probes for the side port differed from the one used on the bottom port because of the different orientations of the OPC's relative to the duct (see Figures 3.7 and 3.8). During each test, 27 consecutive readings were made from each OPC and an air velocity sensor. This was repeated four times and the position of each OPC was switched each time. The summary of results from this special test is shown in Table D.1. The air velocity through the scale model varied slightly and the %COV was only 0.7%. The variability in particle concentration was the same between the bottom and side test ports with a %COV of 6.1%. However, the concentration measured via the bottom port was about twice that measured through the side port.

Table D.1. Results of First Tracer Particle Special Test

	Trial 1	Trial 2	Trial 3	Trial 4	Average
Avg. velocity, fpm	2558.3	2555.4	2635.8	2619.8	2592
Velocity, %COV	0.6%	0.9%	0.7%	0.8%	0.7%
BOTTOM PORT					
Avg. concentration, pt/ft^3	2005.0	1611.4	1509.2	1475.4	1650
Concentration, %COV	5.2%	6.7%	5.5%	7.2%	6.1%
SIDE PORT					
Avg. concentration, pt/ft^3	635.3	770.5	762.2	1308.6	869
Concentration, %COV	4.6%	8.6%	4.7%	6.4%	6.1%

This special test was repeated with the results shown in Table D.2. The difference was that only 13 consecutive readings were taken before the OPC's were switched. This time, there was greater variability in the air velocity with a %COV of 2.3%. The ratio of particle concentration measured through the test ports was a little lower at 1.3:1. The %COV of particle concentration was a little lower and differed slightly between the ports.

Table D.2. Results of Second Particle Tracer Special Test

	Trial 1	Trial 2	Trial 3	Trial 4	Average
Avg. velocity fpm	2581.3	2520.1	2390.2	2486.2	2494
Velocity %COV	0.6%	2.6%	4.7%	1.3%	2.3%
BOTTOM PORT					
Avg. concentration, pt/ft^3	2315.9	1648.2	2274.7	1618.9	1964
Concentration, %COV	4.0%	4.1%	4.0%	5.9%	4.5%
SIDE PORT					
Avg. concentration, pt/ft^3	1070.9	1745.2	1610.4	1568.2	1499
Concentration, %COV	5.0%	9.5%	4.5%	9.9%	7.2%

The conclusion drawn from these special tests was that some type of normalization of the results is necessary to deal with the measurement bias often observed in between data taken via the top/bottom and side test ports.

D.2 Normalization Methods

Two different methods to normalize data were considered. The first normalization method has been used previously for the particle tracer tests. It is based on the approach used for the 3-D bar chart plots shown in most of the spreadsheets included in Appendices A to C of this report. The bar chart cannot show more than a single value for each measurement grid point. Each traverse direction has one point in common, the center point. If the data are not adjusted, then there are two average values for the center point. Hence, the 3-D bar chart is based on the adjusted values calculated as discussed in the following paragraph.

The data adjustment (referred to as the *normalization method*) is illustrated in Table D.3. The %COV is calculated only for the measurements in the center two-thirds of the duct area, which includes points2-7 and the center point. The table shows the data from Run PT-16 for the model LV-S1. The mean particle concentrations measured via the Side and Top test ports are shown in the second and third columns. For the purposes of plotting the data, the ratio of the larger center point value to the lesser center point value is calculated. Then all of the average concentration values for the traverse with the lesser center point value are adjusted upwards by that ratio. The adjusted data are shown in the fourth and fifth columns. Thus the adjusted center point values are now the same and the "shape" of the data is preserved. The normalized mean concentration, standard deviation, and %COV are calculated from the adjusted average values. Bias between the data of the two test ports is effectively removed.

A second normalization method considered was to calculate the %COV values separately for each of the six traverses of the duct. Then these six values were used to calculate a "pooled" estimate by calculating the root mean square (RMS) of the six values as shown in Equation (D.1).

$$\%\mathrm{COV}_{\mathrm{pooled}} = \left[\frac{(\%\mathrm{COV}_1)^2 + (\%\mathrm{COV}_2)^2 + \ldots + (\%\mathrm{COV}_6)^2}{6} \right]^{0.5} \qquad \text{(D.1)}$$

This pooled approach does not adjust the data for bias, but does assume the variability in each of the six measurement traverses are separate estimates of the same common variability. These separate estimates are then "pooled" (combined) using the RMS calculation shown in Equation (D.1). This method is illustrated in Table D.4 for Run PT-16 for the LV-S1 model. The table shows the data from each individual concentration measurement made during the six separate traverses of the sampling probe across the duct. The mean, standard deviation, and %COV are calculated for the points in the center two-thirds of the duct for each traverse (points 2 to 7). The "pooled" %COV is then calculated using Equation (D.1). Systematic bias between the two test ports is not a factor in this method for estimating the %COV.

Table D.3. Illustration of Particle Concentration Normalization to Calculate %COV

Measurement Points in Center 2/3 of Duct Area	Mean Particle Concentration per Measurement Point (particles/ft^3)			
			Normalized Means	
	Non-normalized Means		Adjustment Factor = 1	Adjustment Factor = 1.6636
	Side	Top	Side	Top
2	2261.3	1643.7	2261.3	2734.4
3	2361.7	1609.0	2361.7	2676.8
4	2432.7	1607.3	2432.7	2674.0
Center	**2552.0**	**1534.0**	**2552.0**	**2552.0**
5	2502.7	1365.3	2502.7	2271.4
6	2519.7	1329.0	2519.7	2211.0
7	2432.3	1285.0	2432.3	2137.8
	Ratio of Center Points = 2552/1534 = 1.6636			
Mean Concentration	1959.7		2451.4	
Standard Deviation	510.9		184.3	
%COV	**26.1 %**		**7.52 %**	

Table D.4. Illustration of Calculating a Pooled %COV

Traverse →	Side Port			Top Port		
	1	2	3	1	2	3
Point	Measured Concentration, particles/ft^3					
2	2238	2268	2278	1661	1641	1629
3	2319	2361	2405	1697	1543	1587
4	2514	2412	2372	1620	1661	1541
Center	**2618**	**2486**	**2552**	**1617**	**1540**	**1445**
5	2530	2450	2528	1411	1399	1286
6	2524	2546	2489	1400	1280	1307
7	2390	2458	2449	1328	1318	1209
Center 2/3 Mean	2448	2426	2439	1533	1483	1429
Center 2/3Std Dev	135	90	96	149	152	164
Center 2/3%COV	5.5%	3.7%	3.9%	9.7%	10.3%	11.5%
Pooled %COV	**8.1%**					

In summary, the "pooled" %COV method assumes that the %COV's from the six traverses are estimates of the same common variability[(a)] and combines them into a single estimate. The normalization method adjusts the results from the OPC location (side or top) with the smaller particle concentrations using the ratio of larger to smaller concentrations at the traverse center point. Thus, the normalization method basically assumes that the smaller concentrations at one measurement location underestimate the actual concentrations, and adjusts them higher to be consistent with the results from the other measurement location. In choosing between the two methods for calculating "adjusted" %COV values, a

(a) A method is available to test this assumption based on the Hartley F-max test, but that was not implemented here.

reasonable question is whether the difference in particle concentrations between the two measurement locations (top and side) is real or an artifact of the specific sampling probe and its orientation. The above "special tests" provide some insight for addressing this question. Using either of the two %COV-adjustment methods outlined here would be applicable when there is a concentration bias between the side and top test ports that are not mirrored by the reference OPC results. However, when the reference particle counter shows that the concentration changed significantly during the measurement traverses, the resulting data are suspect, and the run should be repeated.

Table D.5 lists the results for all of the LV-S1 particle uniformity tests where the %COV values are calculated by the three methods (non-normalized, normalized, and pooled). The pooled results are higher than the normalized values in all cases but one, although both sets of results meet the qualification criterion. However, there are instances where the non-normalized results fail to meet the criterion. Because the particle uniformity data were examined for indications that the aerosol output during each traverse direction was internally constant, it was decided to continue to continue using the normalization method to adjust the concentration values to eliminate the effects of variation between the traverse directions. Particle uniformity results in the body of the report show the %COV with and without normalization.

Table D.5. Particle Tracer Uniformity Results for the LV-S1 Scale Model with RMS Pooled %COV

Fans Flow Condition	Injection Port	Test Port	Run Nos.	Non-normalized %COV	Normalized %COV	RMS Pooled %COV
Fan B 115% flow	B	1	PT-1	8.6	7.48	12.3
	B	2	PT-2	31.2	2.14	6.0
			PT-3	12.9	2.55	3.7
			PT-4	38.4	4.51	6.6
			PT-10	21.1	8.82	10.7
			PT-11	4.2	3.91	4.8
	B	3	PT-5	6.1	2.67	3.5
Fan A 115% flow	A	1	PT-13	22.4	3.46	4.6
			PT-14	12.8	5.37	6.2
			PT-15	20.0	6.51	7.5
	A	2	PT-17	8.1	6.05	7.6
			PT-18	6.5	5.5	6.1
	A	3	PT-16	26.1	7.52	8.1
Fan B 70% flow	B	1	PT-12	28.6	2.96	4.7
	B	2	PT-9	24.5	3.25	4.6
	B	3	PT-6	26.1	4.03	4.8
			PT-7	6.1	5.23	6.7
			PT-8	21.6	6.79	6.5
			PT-19	17.1	3.29	4.8
			PT-20	20.3	1.99	2.7

Appendix E

Document List

Appendix E: Document List

Project Plan	PP-WTPSP-016	Air Sampling Probe Location Tests for Waste Treatment Plant LB-C2, LV-S1 and LB-S2 (Group 5-6) Air Exhaust Systems
Test Plan	TP-RPP-WTP-594 Rev 0.	Scale Model Testing the Waste Treatment Plant LB-C2, LB-S2, and LV-S1 (Test Group 5-6) Stack Air Sampling Positions
Test Instructions	TI-RPP-WTP-674	Measure Test Ports of LB-C2Scale Model Stack
	TI-RPP-WTP-675	Calibration of Ventilation Flow Controller for LB-C2 Scale Model Stack
	TI-RPP-WTP-676	Determine Air Velocity Uniformity of LB-C2 Scale Model Stack
	TI-RPP-WTP-677	Determine Flow Angle in LB-C2 Scale Model Stack
	TI-RPP-WTP-678	Tests of Gas Tracer Mixing in LB-C2 Scale Model Stack
	TI-RPP-WTP-679	Tests of Particle Tracer Mixing in LB-C2 Scale Model Stack
	TI-RPP-WTP-687	Calibration of Ventilation Flow Controller for LV-S1 (C3) Scale Model Stack
	TI-RPP-WTP-688	Determination of Air Velocity Uniformity of LV-S1 (C3) Scale Model Stack
	TI-RPP-WTP-689	Determine Flow Angle in LV-S1 (C3) Scale Model Stack
	TI-RPP-WTP-690	Tests of Gas Tracer Mixing in LV-S1 Scale Model Stack
	TI-RPP-WTP-691	Tests of Particle Tracer Mixing in LV-S1 Scale Model Stack
	TI-WTPSP-017	Measurements of LB-S2 Scale Model
	TI-WTPSP-018	Determine Flow Angle in LB-S2 Scale Model Stack
	TI-WTPSP-019	Velocity Uniformity Measurements of LB-S2 Scale Model
	TI-WTPSP-020	Gas Tracer Mixing Measurements of LB-S2 Scale Model
	TI-WTPSP-021	Tests of Particle Tracer Mixing in LB-S2 Scale Model
	TI-WTPSP-022	Calibration of Ventilation Controller for LB-S2 Scale Model Stack
Calculation Packages	CCP-WTPSP-507	Scale Model Exhauster Dimensions LAB-C2
	CCP-WTPSP-1062	LB-C2 Scale Model Particle Tracer Uniformity Calculations
	CCP-WTPSP-1063	Determine Uniformity of a Tracer Gas at a Sampler Probe
	CCP-WTPSP-1187	LB-C2 Flow Angle Calculations
	CCP-WTPSP-1188	LB_C2 Flow Control Calibration Calculations
	CCP-WTPSP-1189	LB_C2 Velocity Uniformity Calculations
	CCP-WTPSP-509	Scale Model Exhauster Dimensions LAB-C5
	CCP-WTPSP-1190	Determine Uniformity of a Tracer Gas at a Sampler Probe.
	CCP-WTPSP-1191	LB-S2 Scale Model Particle Tracer Uniformity Calculations
	CCP-WTPSP-1192	LB_S2 Velocity Uniformity Calculations

CCP-WTPSP-1193	Calibration of Ventilation Flow Controller for LB-S2 Scale Model Stack
CCP-WTPSP-1194	Determine Flow Angle in LB-S2 Scale Model Stack
CCP-WTPSP-510	Scale Model Exhauster Dimensions LAW-C3
CCP-WTPSP-1182	Determine Flow Angle in LV-S1 (C3) Scale Model Stack
CCP-WTPSP-1183	Calibration of Ventilation Flow Controller for LV-S1 (C3) Scale Model Stack
CCP-WTPSP-1184	Determine Air Velocity Uniformity of LV-S1 (C3) Scale Model Stack.
CCP-WTPSP-1185	Gas Tracer Mixing in LV-S1 Scale Model Stack
CCP-WTPSP-1186	LV-S1 Scale Model Particle Tracer Uniformity Calculations

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